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## GRADUATE CATALOGUE

Students at the University of Vermont are responsible for knowing and complying with all requirements for their respective degrees as stated in the catalogue.

The University of Vermont reserves the right to make changes in the course offerings, mode of delivery, degree requirements, charges, regulations, and procedures contained herein as educational, financial, and health, safety, and welfare considerations require, or as necessary to be compliant with governmental, accreditation, or public health directives.

Mode and method of instruction for any given course, including, but not limited to, in-person vs. remote instruction (synchronous or asynchronous), use of mixed formats, and alternative scheduling, is at the discretion of the University.

The following programs are currently inactive and thus do not have a listing in the catalogue: Certificate of Graduate Study in Ecological Design, the Master of Arts in French, the Master of Arts in German, the Master of Science in Engineering Management, the Master of Science in Athletic Training, the Master of Science in Plant Biology, and the Post-Professional Occupational Therapy Doctorate. The Master of Science in Teaching in Biology and the Master of Science in Teaching in Mathematics are not currently accepting applications. The Master of Science in Nursing - Clinical Nurse Leader (CNL) and the Direct Entry- Clinical Nurse Leader (DCNL) programs are not currently accepting applications. The Medical Laboratory Science AMP is not currently accepting applications.

## COURSES

The University reserves the right to change course offerings at any time.

A student who lacks the stated prerequisites for a course may be permitted to enroll by the Instructor. Such students must inform the Instructor that they lack the prerequisites, and the Instructor will make appropriate efforts to ascertain that they are properly qualified. Students enrolled who do not meet the prerequisites of a course may be disenrolled from that course. The Instructor will notify the Office of the Registrar of this action.

## ABOUT UVM GRADUATE COURSES

### Course Levels

Graduate courses are offered at the following levels:

- 5000-Level courses are entry-level graduate courses that may have graduate, but not undergraduate prerequisites; 5000-level courses cannot be required for an undergraduate curriculum but may be used as an option for completing requirements.
- 6000-Level courses are master's level courses and may have graduate prerequisites and/or program restrictions including Instructor permission.

- 7000-Level courses are doctoral level courses and may have graduate prerequisites and/or program restrictions including Instructor permission.
- 9000-Level courses are used for graduate administrative courses.

### Enrollment Restrictions

Provided students meet the course prerequisites/restrictions, enrollment restrictions by graduate course-level follow:

- Undergraduate, Professional and Continuing Education, and graduate students may enroll in 5000-level courses without approval unless the course prerequisite states 'Graduate student,' limiting enrollment to Graduate students only.
- Graduate students may enroll in 6000-level courses; undergraduate and Professional and Continuing Education (PACE) students may enroll in 6000-level courses with Instructor permission (non-Graduate student enrollment should be no more than 25% of the total course enrollment).
- Doctoral students may enroll in 7000-level courses; Master's and PACE students who hold a baccalaureate degree may enroll in 7000-level courses with Instructor permission; with the exception of specifically approved programs, undergraduate students may not enroll in 7000-level courses.
- With prior approval of their program and the Graduate College, Master's students may enroll in 3 credits of 3000-level or 4000-level course work and Doctoral students may enroll in 6 credits of 3000-level or 4000-level coursework that will apply towards their graduate credit requirements.
- Courses numbered below 5000 are not eligible for inclusion in a Certificate of Graduate Study or a microCertificate of Graduate Study.

### Other Course Information

Information about UVM undergraduate courses can be found here.

## SPECIAL TOPICS COURSE POLICY - INFORMATION FOR FACULTY MEMBERS

A course offered under the Special Topics course rubric (i.e., X990) may be presented up to three times within a ten-year period before it must be submitted for review as a permanent course offering listed under a unique course number in the Catalogue.

## COURSE LIST

### AGRICULTURE, LANDSCAPE & ENVIRONMENT (ALE)

#### Courses

#### **ALE 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ALE 5991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.



**ALE 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ALE 5994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**ALE 5995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ALE 6010. Professional Skills Colloquium. 1 Credit.**

Presentation and peer review of oral and written communication. Professional development skills including technical writing, literature review, mentorship, scientific integrity, grant proposals, and job market.

**ALE 6110. Introduction to Agroecology. 3 Credits.**

In-depth overview of research and applications in the field of agroecology, with a focus on providing the student with conceptual and analytical content.

**ALE 6120. Ecological Foundations of Agro. 3 Credits.**

Examines the ecological foundations of agroecology, largely from a biophysical perspective. Over the course of three sequential modules, students will explore the fundamental principles of ecology and their application to agricultural systems and landscapes. Prerequisite: ALE 6110 or Instructor permission.

**ALE 6130. PAR & Transdiscipl Agroecology. 3 Credits.**

Introduces students to Participatory Action Research (PAR) in the context of agroecology, and examines how the integration of PAR and transdisciplinary approaches can serve to deepen our collective understanding of complex problems/issues. Prerequisite: ALE 6110.

**ALE 6140. Agroecol, Food Sov. & Soc Mov.. 3 Credits.**

Investigates social, political, and economic elements of the global food system from multiple perspectives, considering the ability to scale-up agroecology, and the potential intersection between agroecology, food sovereignty and government policies.

**ALE 6150. Agroecology Grad Capstone. 3 Credits.**

The capstone designed for the application of newly developed knowledge and skills in a culminating experience/project that addresses an agroecological topic relevant to the individual student. Prerequisites: ALE 6110, ALE 6120, ALE 6130, ALE 6140.

**ALE 6391. Master's Thesis Research. 1-18 Credits.**

Research for Master's Thesis.

**ALE 6940. Seminar Series. 1 Credit.**

Presentations of personal research by faculty, Graduate students, and outside guest speakers. Attendance and oral presentations are required of Graduate students in Plant & Soil Science. Repeatable two times for Master's students and four times for Doctoral students.

**ALE 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ALE 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**ALE 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ALE 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**ALE 6995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ALE 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for Doctoral Dissertation.

**ALE 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ALE 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**ALE 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ALE 7994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**ALE 7995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## ANATOMY (ANAT)

### Courses

**ANAT 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ANAT 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ANAT 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

## ANATOMY & NEUROBIOLOGY (ANNB)

### Courses

#### **ANNB 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ANNB 6000. Human Gross Anatomy. 6 Credits.**

Lectures and detailed regional cadaver dissections emphasize functional anatomy of major systems (e.g. musculoskeletal, cardiovascular, nervous). Physical Therapy student or Instructor permission.

#### **ANNB 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

#### **ANNB 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ANNB 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **ANNB 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **ANNB 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **ANNB 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ANNB 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **ANNB 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **ANNB 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## ANESTHESIOLOGY (ANES)

### Courses

#### **ANES 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ANES 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ANES 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

## ANIMAL BIOSCIENCES (ABIO)

### Courses

#### **ABIO 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ABIO 6010. ABIO Graduate Journal Club. 1 Credit.**

Critical review of current scientific literature in terms of scientific method and merit.

#### **ABIO 6020. ABIO Graduate Seminar. 1 Credit.**

Topics of current faculty and Graduate student interest presented in a seminar-discussion format.

#### **ABIO 6030. Research Proposal Writing. 2 Credits.**

Discussion and practice of the grant/proposal writing process by developing and writing a research proposal in response to a specific request for proposals. Students practice grant writing and review, share their work, and review the work of others. Recommended enrollment prior to/during the semester of student's first committee meeting.

#### **ABIO 6090. One Health: Zoonoses. 3 Credits.**

Zoonoses and vector-borne disease account for the majority of emerging and re-emerging diseases. Covers the drivers that influence infection in animals and humans, tools used for disease monitoring and prevention, and policies and programs aimed at prevention. Cross-listed with: PH 6220.

#### **ABIO 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's thesis.

#### **ABIO 6920. Independent Literature Rsch. 1-6 Credits.**

Reading and literature research culminating in a paper on a topic of current interest in Animal Biosciences.

#### **ABIO 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ABIO 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **ABIO 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **ABIO 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

#### **ABIO 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



**ABIO 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**ABIO 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ABIO 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**ABIO 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ABIO 7994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**ABIO 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ANIMAL SCIENCES (ASCI)****ATHLETIC TRAINING (AT)**

Athletic Training courses are currently inactive.

**BIOCHEMISTRY (BIOC)****Courses****BIOC 6001. General Biochemistry I. 3 Credits.**

Survey for science majors. Chemistry, structure, metabolism, and function of proteins, carbohydrates, lipids; enzymes, bioenergetics and respiratory processes. Prerequisite: CHEM 2585 or Instructor permission.

**BIOC 6002. General Biochemistry II. 3 Credits.**

Survey for science majors. Amino acids, nucleic acids, protein synthesis, cellular and physiological control mechanisms. Prerequisite: BIOC 6001 or Instructor permission.

**BIOC 6051. Proteins I: Structure&Function. 3 Credits.**

Special Topics: Introduction to concepts in protein structure and chemistry as well as exploration of ideas in a hands on" fashion using computational resources. Prerequisite: BIOC 6001 or Department permission.

**BIOC 6072. Cancer Biology. 3 Credits.**

Overview of cancer biology for health science students. Foundation for cancer research. Lecture format; interdisciplinary viewpoint; outside lectures. Prerequisite: BIOC 6001 or Department permission.

**BIOC 6391. Master's Thesis Research. 1-12 Credits.**

Research for the Master's Thesis.

**BIOC 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BIOC 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BIOC 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOC 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOC 7001. Critical Reading and Analysis. 2 Credits.**

Acquire a working knowledge of some highly impactful studies conducted in the field of biochemistry. By carefully reading and reviewing a series of classic and contemporary scientific papers, gain a greater appreciation for some of the conceptual and technical innovations in experimentation that provided answers to vexing problems or created entirely new fields of inquiry. Prerequisite: BIOC 6001.

**BIOC 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**BIOC 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BIOC 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BIOC 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOENGINEERING (BIOE)****Courses****BIOE 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**BIOE 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BIOE 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BIOE 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOE 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOLOGY (BIOL)****Courses****BIOL 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BIOL 6000. Scientific Survival Skills. 2 Credits.**

Seminar topics include mentor-mentee relationships, finding funding, grant writing, preparing posters and seminars, communicating how to be a successful teacher, Curriculum Vitae preparation, job finding and interviewing. Prerequisite: Life Sciences Graduate student.

**BIOL 6005. Graduate Seminar. 1 Credit.**

Weekly departmental seminar attended by all faculty and graduate students. Graduate students practice giving scientific talks, presenting annual research-in-progress updates and receiving feedback from their peers and faculty. Prerequisite: Life sciences Graduate student.

**BIOL 6010. Biology Seminar. 1 Credit.**

Expert speakers are invited from within and outside UVM to present their research in the diverse fields of biology including cell, molecular and developmental biology, ecology, evolution, behavior and neuroscience. Prerequisite: Life sciences Graduate student.

**BIOL 6015. Proposal Writing. 2 Credits.**

Assignments help students understand the scientific method and develop strategies for writing well. By the end of the semester, students will have a complete/near complete proposal for their graduate research project. Typically, this course is taken in the second year prior to the candidacy exam. Prerequisite: Life sciences Graduate student.

**BIOL 6020. Foundations in Eco & Evo. 1 Credit.**

Seminar focused on reading and discussing foundational papers in ecology and evolution. Specific topics will vary by instructor. Prerequisite: Life Sciences Graduate student.

**BIOL 6025. Foundations in Cell & Dev. 1 Credit.**

Seminar focused on reading and discussing foundational papers in cell and developmental biology. Specific topics will vary by instructor. Prerequisite: Life sciences Graduate student.

**BIOL 6100. Computational Biology. 4 Credits.**

Basic programming methods in R, including functions, data types, graphics, file input and output; computational tools for reproducible research, including regular expressions, markdown, git, github, and shell commands; and advanced topics, including batch processing, structured programming, functional programming, and randomization tests. Prerequisite: Graduate student.

**BIOL 6200. Ecological Genomics. 4 Credits.**

An exploration of the merger of ecology and genomics to address the genetic basis of adaptive variation in natural populations. Emphasis on integrating quantitative approaches and hands-on analysis of large genomic and ecological data sets. Pre/co-requisites: BCOR 2300, BCOR 2100, or STAT 1410; basic knowledge of statistics, probability, genetics, and evolution required; familiarity with programming in R or bash is recommended. Cross-listed with: PBIO 6800.

**BIOL 6210. Foundations Quant Reasoning. 3 Credits.**

Provides the knowledge and competencies needed to tackle complex problems in data analysis using first principles of evolutionary theory. As part of this process, students will work to develop a comprehensive analysis toolbox to conduct highly reproducible quantitative research in high-performance computation (HPC) environment. These topics will be pivotal to ensure success in the student's graduate careers in data-intensive fields. Prerequisite: Graduate student.

**BIOL 6215. BiLDS Seminar. 1 Credit.**

Professional development via discussion panels and other activities. Prerequisite: Life sciences Graduate student.

**BIOL 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**BIOL 6990. Special Topics. 1-18 Credits.**

Readings with conferences, small seminar groups, or laboratories intended to contribute to the programs of Graduate students in Biology or related disciplines for which formal courses are not available. Prerequisite: An undergraduate major in life science.

**BIOL 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BIOL 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOL 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**BIOL 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOL 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**BIOL 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BIOL 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**BIOMEDICAL ENGINEERING (BME)****Courses****BME 5150. Nanobiomaterials. 3 Credits.**

Covers the classes of nanomaterials used biomedically, the biological response, and material testing. Content includes applications of nanomaterials in drug delivery, nano-topography of surfaces, sensors, and imaging as well as the topic of nanotoxicity.

**BME 5330. Advanced Biomedical Systems. 3 Credits.**

Uses the study of lung mechanics as a vehicle for teaching a range of mathematical modeling and data analysis methods central to the study of physiological systems. Students will gain a detailed understanding of how the lung works as a mechanical system and various diseases that affect mechanical function. At the same time, they will learn about applications of a range of mathematical and signal processing techniques. Prerequisite: Graduate standing or Instructor permission.

**BME 5440. Biothermodynamics. 3 Credits.**

Inter-disciplinary; guides the student through the thermodynamics of living organisms, comprised of the study of energy transformation in the life sciences. Designed for students from the STEM disciplines. Covers Gibbs free energy, statistical thermodynamics, binding equilibria, and reaction kinetics. Prerequisites: Successful completion of Materials and Mechanics Lab such as ME 2111, Thermo-Fluid Labs such as ME 2321, or Biomedical design such as BME 3600 is assumed; Graduate student or Instructor permission. Cross-listed with: ME 5440.

**BME 5800. Clinical Devices & Instruments. 3 Credits.**

Focuses on the development, design and adaptation of biomedical devices and instruments in exciting active areas of biomedical device development and applications at UVM and the UVM Medical Center (UVMCC). Includes lectures on commercialization and manufacturing. Team-taught by faculty in the Larner College of Medicine and the UVMCC. Prerequisites: Biomedical Engineering Graduate student or Instructor permission; Content knowledge in ANPS 1190, ANPS 1200, BME 2000, and BME 2050 is assumed.

**BME 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BME 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**BME 6710. Brain-Computer Interfaces. 3 Credits.**

Includes writing Python software to analyze data from the human brain and decode it to develop brain-computer interfaces (BCIs) that can predict a person's response/intent from brain activity alone. Includes work with real examples of neural data, particularly non-invasive electroencephalography (EEG) recordings. Discusses the design and ethics of real-world BCIs. Prerequisites: At least 2 semesters of coding, at least 1 of these semesters in Python or Matlab.

**BME 6930. Graduate Seminar. 1 Credit.**

Presentation and discussion of advanced problems, research, and current topics in Electrical Engineering by faculty, Graduate students, and outside guest speakers.

**BME 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BME 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BME 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BME 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**BME 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BME 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BME 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOMEDICAL & HEALTH SCIENCES (BHSC)****Courses****BHSC 5440. Gr Immunology Lab. 1 Credit.**

Provides laboratory experiences in immunology and serology. Designed to reinforce and expand the practical understanding of immunology by providing students with laboratory experiences dealing with cellular and humoral immunity, B cells and T cells, autoimmunity, and other disorders typically diagnosed in the clinical immunology laboratory. Pre/Co-requisites: BHSC 3420 or MMG 3230; or Medical Laboratory Science Graduate student.



**BHSC 5810. Gr Applied Molecular Bio. 3 Credits.**

Explores the fundamental principles underlying molecular biological applications used in basic biomedical research and in clinical diagnostics at the graduate level. Covers the structure and function as well as the extraction of key biomolecules, including nucleic acids and proteins. Prerequisite: Medical Laboratory Science Graduate student.

**BHSC 5820. Gr Applied Molec Bio Lab. 1 Credit.**

The practical concepts of molecular applications will be experienced in the laboratory. Introduces basic methods used in DNA technology including plasmid isolation, polymerase chain reaction, restriction enzyme use, and related assays. Students will gain experience in various molecular biology techniques that are commonly used to monitor and diagnose human health and disease. Prerequisite: Medical Laboratory Science Graduate student. Co-requisite: BHSC 5810.

**BHSC 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BHSC 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BHSC 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BHSC 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BHSC 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BHSC 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**BHSC 6995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOSTATISTICS (BIOS)****Courses****BIOS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BIOS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**BIOS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BIOS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BIOS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BIOS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**BUSINESS ADMINISTRATION (BUS)****Courses****BUS 5615. Advanced Accounting. 3 Credits.**

Focuses on accounting for business combinations and developing consolidated financial statements. Includes accounting for foreign currency transactions, and foreign subsidiaries. Prerequisite: BUS 3611.

**BUS 5620. Adv Topics in Management Acctg. 3 Credits.**

Emphasizes use of internal and external information in management decision making; includes cost of inventory, business activities, strategic use of information, long-range planning. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: Master of Accountancy student.

**BUS 5630. Auditing. 3 Credits.**

Examination of auditing theory and practice. Topics include standards, ethics and legal responsibilities of the profession, audit planning, internal control, audit evidence, and auditor communications. Prerequisites: BUS 3611, BUS 3660; Business Administration major, Master of Accountancy student, Business Administration minor, or Accounting minor; minimum Senior standing.

**BUS 5635. Fraud Examination. 3 Credits.**

Covers all of the major methods employees use to commit occupational fraud. Students will learn how and why occupational fraud is committed, how fraudulent conduct can be deterred, and how allegations of fraud should be investigated. Prerequisite: BUS 3611.

**BUS 5641. Corporation Taxation. 3 Credits.**

A survey of the tax consequences for C corporations and their shareholders of womb-to-tomb transactions, which might include formations, acquisitions, divisions, consolidations, and international operations as well as the reporting of book/tax differences. Prerequisites: BUS 3610; Business Administration major, Master of Accountancy student, Business Administration minor, or Accounting minor; minimum Senior standing.

**BUS 5643. Taxation of Social Enterprises. 3 Credits.**

Explores the balance that organizations try to achieve between the for-profit (business) and nonprofit (charitable) separation of the tax world. Prerequisite: Graduate student or Instructor permission.

**BUS 5650. Governmental Accounting. 3 Credits.**

Provides a study of the theory and practical application of accounting principles and auditing standards to governmental entities.

Prerequisite: Graduate student or Instructor permission.

**BUS 5660. Gr Accounting Information Syst. 3 Credits.**

Examination of how accounting information is collected, stored and made available to decision makers with an emphasis on internal control implementation. Prerequisite: Master of Accountancy student.

**BUS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**BUS 6420. Int Sustain New Business Model. 3 Credits.**

Entrepreneurial activities have a significant impact on individual lives and careers as they enable the growth and sustainability of organizations. This course focuses on developing an environmentally and socially responsible business model to assess the viability of an innovative idea.

**BUS 6450. Sustainable Family Enter I. 3 Credits.**

Long-lived family firms that sustain over generations of leaders, economic and industry life cycles, embrace transgenerational entrepreneurship and innovation as part of their culture. This course focuses on the unique dynamics and dilemmas of these family businesses.

**BUS 6451. Sustainable Family Enter II. 3 Credits.**

Goes beyond the documented best practices of family enterprises embedding sustainable development goals into their core operations to innovative next practices being tried while still continuing to generate positive economic returns to sustain their enterprise.

Case examples, experiential exercises, virtual learning, lectures, and discussions are used to bring concepts to life. Prerequisite: BUS 6450.

**BUS 6550. Sustainable Marketing. 3 Credits.**

Accelerated course on sustainable marketing principles and theory which focuses on how enterprises respond to the twin global challenges of global poverty and environmental sustainability.

**BUS 6601. Professional Communications. 3 Credits.**

Addresses different components of professional communications key to accounting career success. Clear business writing, strong interpersonal skills, effective presentations and group meeting communications are emphasized and illustrated through a variety of assignments. Prerequisite: Master of Accountancy student or Instructor permission.

**BUS 6602. CPA Law. 3 Credits.**

Provides Masters of Accountancy students with exposure to the major areas of U.S. law emphasized on the uniform CPA exam. Master of Business Administration students will also benefit from the course. Prerequisite: Master of Accountancy student.

**BUS 6612. Adv Topics in Corp Acct.&Rept. 3 Credits.**

Advanced topics in corporate accounting and reporting; focuses on accounting for business combinations and developing consolidated financial statements. Includes accounting for foreign currency transactions, foreign subsidiaries, segment, interim, and SEC reporting. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Master of Accountancy student.

**BUS 6641. Tax & Entrepreneurial Ventures. 3 Credits.**

Explores tax and other aspects of using partnerships, S corporations, and limited liability companies for large and small business ventures. Considers formation, funding, and exit strategies for startups; structuring options for private equity, venture capital, and other investors; and pass-through treatments for these very common and increasingly popular business entities.

**BUS 6670. Accounting & Reporting for ESG. 3 Credits.**

Combines an introduction to financial and managerial accounting and reporting with the most recent standards used by entities worldwide to report on their environmental, social and governance (ESG) activities.

**BUS 6690. Accounting Rsch, Reg & Ethics. 3 Credits.**

Students will research current financial reporting issues and regulatory requirements. Cases will emphasize the ethical responsibilities of professional accountants. Prerequisite: Master of Accountancy student.

**BUS 6700. Green Oper. and Supply Chains. 3 Credits.**

Study of the foundational concepts in supply chain and operations management in sustainable enterprises. Design, planning, and control are examined, with emphasis on managerial analysis and decision making that will help the enterprise succeed responsibly and sustainably.

**BUS 6990. Special Topics. 1-18 Credits.**

Topics and material that may develop later into a regular course offering; in addition, it may include topics and material offered only once. Prerequisite: Business Administration Graduate student.

**BUS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**BUS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CELL BIOLOGY (CLBI)****Courses****CLBI 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CLBI 6010. Cell Biology. 3 Credits.**

Advanced survey of cell organelles, their composition, origin, and the relationship between their structure and function. Emphasis on recent literature and current controversies. Prerequisites: CHEM 258S; Biology Graduate student; or Instructor permission.

**CLBI 6020. Science Communication. 3 Credits.**

Develop effective oral and written communication skills for a range of audiences from academia to industry, organizations, news, policymakers, and the general public.



**CLBI 6080. Seminar. 1 Credit.**

One hour.

**CLBI 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**CLBI 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CLBI 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CLBI 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CLBI 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CLBI 7010. Critical Reading & Analysis. 2 Credits.**

Runs concurrently with CLBI 6010 and utilizes primary literature and an active, discussion-based approach to provide intensive study in the logic, critical thinking, and experimental design & interpretation. Co-requisite: CLBI 6010.

**CLBI 7020. Biomedical Data Analysis. 2 Credits.**

Introduction to qualitative, quantitative and statistical analysis for cell, molecular, and biomedical sciences. The practical philosophy underlying data presentation and interpretation will be emphasized via problem solving in and outside of class time.

**CLBI 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**CLBI 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CLBI 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CLBI 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CHEMISTRY (CHEM)****Courses****CHEM 5300. Topics in Analytical Chemistry. 1-3 Credits.**

Selected topics of current interest in analytical chemistry. New techniques and methodologies, especially in chemical instrumentation. See Schedule of Courses for specific titles. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: Graduate student.

**CHEM 5320. Gr Instrumental Analysis. 3 Credits.**

Systematic survey of modern methods of chemical analysis. Fundamental principles and applications of spectroscopy, electrochemistry, and separation techniques. Prerequisite: Graduate student.

**CHEM 5400. Gr Advanced Inorganic Chem. 3 Credits.**

Molecular symmetry and group theory with an emphasis on applications (vibrational and electronic spectra, bonding and reactivity); introduction to transition metal processes; bioinorganic chemistry. Prerequisite: Graduate student.

**CHEM 5580. Gr Advanced Organic Chem 1. 3 Credits.**

Stereochemistry, conformational analysis, stereoelectronic effects, transition state theory, molecular orbital theory, and reactivity criteria are discussed in regards to reaction mechanisms and functional group manipulations. Prerequisite: Graduate student.

**CHEM 5600. Gr Advanced Physical Chemistry. 3 Credits.**

Advanced exploration of quantum chemistry, thermodynamics, and kinetics, with a significant level of mathematical rigor. Prerequisites: MATH 2248 or equivalent; Graduate student.

**CHEM 5990. Special Topics. 1-18 Credits.**

Selected topics of current interest that do not fall into one of the traditional areas of Chemistry.

**CHEM 6010. Intro to Graduate Research. 1 Credit.**

Introduction to graduate research in Chemistry. Overview of faculty research areas and department/university research resources. Prerequisite: Chemistry Graduate student.

**CHEM 6015. Chemical Investigations. 1 Credit.**

Current problems and literature. Prerequisite: Chemistry Graduate student.

**CHEM 6020. Grad Seminar. 1 Credit.**

Current problems and literature. Prerequisite: Chemistry Graduate student.

**CHEM 6050. Topics in Current Chemistry. 0 or 1 Credits.**

Survey of current topics in the Chemistry literature. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Chemistry Graduate student.

**CHEM 6300. Topics in Analytical Chemistry. 3 Credits.**

Selected topics of current interest in analytical chemistry. New techniques and methodologies, especially in chemical instrumentation. See Schedule of Courses for specific titles. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**CHEM 6391. Master's Lab Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**CHEM 6392. Master's Lit Project Research. 1-12 Credits.**

Reading and literature research culminating in the preparation of a comprehensive and critical review of a topic of current interest in Chemistry.

**CHEM 6395. Advancement to Candidacy Exam. 2 Credits.**

Students demonstrate the comprehensive, fundamental knowledge, in the context of their research, needed to pursue a Ph.D. degree. Preparation of a dossier consisting of an extensive introduction to the dissertation, a detailed record of research progress, and future directions. Culminates in the Advancement to Candidacy Examination, which includes a presentation and a comprehensive oral examination. Prerequisite: CHEM 6015.

**CHEM 6400. Topics in Inorganic Chemistry. 1-3 Credits.**

Areas of current interest involving inorganic systems, particularly catalysis, solid state chemistry, and bioinorganic chemistry. See Schedule of Courses for specific titles. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: CHEM 3400.

**CHEM 6410. Organometallic Chemistry. 3 Credits.**

Synthesis, structure, bonding, properties, reactions, and applications of organometallic systems; mechanisms of organometallic reactions including oxidative addition and insertion reactions with applications in catalysis. Prerequisite: Chemistry Graduate student.

**CHEM 6460. Physical Inorganic Chemistry. 3 Credits.**

Determination of molecular and electronic structure of inorganic complexes using spectroscopic techniques. Introduction to magnetism. Interpretation of spectroscopic data within the frameworks of group theory and electronic structure calculations. Prerequisite: Chemistry Graduate student.

**CHEM 6500. Topics in Organic Chemistry. 1-3 Credits.**

Advanced level discussion of specific topics in organic chemistry of current interest such as photochemistry, carbenes, bioorganic chemistry, magnetic resonance, etc. See Schedule of Courses for specific titles. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Chemistry Graduate student.

**CHEM 6580. Advanced Organic Chemistry 2. 3 Credits.**

Modern synthetic organic methods and approaches to multi-step synthesis are discussed. Selected total syntheses are reviewed to highlight important concepts including diastereoselective and enantioselective processes. Prerequisite: Chemistry Graduate student.

**CHEM 6600. Topics in Physical Chemistry. 1-3 Credits.**

Selected topics of current interest in physical chemistry. See Schedule of Courses for specific titles. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisites: CHEM 3600.

**CHEM 6610. Solid State Chemistry. 3 Credits.**

Explores the rich field of solid-state chemistry. Solid-state materials represent some of the most promising advanced materials in development, with applications ranging from pharmaceuticals to flexible electronics. Introduces the chemical physics surrounding solids. Topics include (but are not limited to) crystals and their properties, nanomaterials, semiconductors, and characterization methods. Prerequisite: Chemistry Graduate student.

**CHEM 6620. Computational Chemistry. 3 Credits.**

Explores the techniques and applications of computational chemistry to model organic, inorganic, and biological molecules. Introduces basic level of classical and quantum modeling, cheminformatics and big chemical data, as well as computer-aided design of new materials and medicines. Prerequisite: Chemistry Graduate student.

**CHEM 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CHEM 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CHEM 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CHEM 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**CHEM 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CHEM 7010. Research Problem Conception. 1 Credit.**

Identification of a current research problem to be addressed by original, independent research. Prerequisite: Chemistry Graduate student.

**CHEM 7015. Research Problem Solution. 1 Credit.**

Solution to a current research problem to be addressed by original, independent research. Prerequisite: CHEM 7010.

**CHEM 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**CHEM 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

## CIVIL AND ENVIRONMENTAL ENGINEERING (CEE)

### Courses

#### **CEE 5440. Transport Plan Demand Modeling. 3 Credits.**

Study of transportation planning theory and policy; methods used to collect and evaluate household travel behavior; design of household travel surveys; methods used to forecast household travel demand, destination choice; travel mode choice, and transportation network flows; mathematical methods common to travel modeling. Applications to both transportation planning practice and research.

#### **CEE 5450. Spatial Analy Sustainbl Transp. 3 Credits.**

Students will learn to use spatial analysis methods to support sustainable transportation and land use planning. Topics include spatial data types, mapping and data visualization, spatial operations and analysis, and network analysis. In-class examples and exercises will include applications related to transportation, land use, sustainability, planning, and equity. Prerequisite: Graduate student or Instructor permission.

#### **CEE 5550. Phys/Chem Proc Water/Wstwater. 0 or 3 Credits.**

Theory of physical/chemical processes for treating waters and wastewaters; reactor dynamics, mass transfer, adsorption, ion exchange, precipitation; project-based. Prerequisite: Graduate student or Instructor permission; content knowledge of water and wastewater engineering (such as CEE 3510 or CEE 3515) assumed.

#### **CEE 5560. Biol Proc Water/Wastewater Tr. 0 or 3 Credits.**

Theory and application of biological processes for treating industrial and domestic wastewaters and contaminated ground water; microbiological considerations; aerobic and anaerobic processes; reactor design, in-situ bioremediation; bench-scale and pilot-scale experimentation. Prerequisite: Graduate student or Instructor permission; content knowledge of water and wastewater engineering (such as CEE 3510 or CEE 3515) assumed.

#### **CEE 5600. Principles of Hydrology. 3 Credits.**

Understanding and applying theory of precipitation, run-off, infiltration, and ground water; precipitation and run-off data; application of data for use in development of water resources; review and synthesis of relevant scientific literature. Prerequisites: Content knowledge of hydraulics/fluid mechanics assumed.

#### **CEE 5620. Advanced Hydrology. 3 Credits.**

Introduces computer modeling of hydrological systems. Project-based. Simple overland flow, flood routing, water quality, and groundwater models are developed using finite difference techniques. Stochastic hydrology and hydrologic time series analysis are also introduced. Prerequisite: Graduate student or Instructor permission; content knowledge of hydrology (such as CEE 4600) assumed.

#### **CEE 5630. Applied River Engineering. 3 Credits.**

Application of fundamental principles of fluid dynamics and open channel flow to the design and retrofit of river-connected infrastructure, including road embankments, road drainage systems, berms, culverts, bridges and impoundments. Project-based. Prerequisites: Graduate student or Instructor permission; content knowledge of hydraulics/fluid mechanics (such as CEE 3600, CEE 3615, or ME 2230) assumed.

#### **CEE 5650. Groundwater Hydrolo & Modeling. 3 Credits.**

Principles of ground water hydraulics, well characteristics, aquifers, and use of numerical methods to solve ground water flow problems. Modeling of groundwater and contamination remediation design. Prerequisites: Content knowledge hydraulics/fluid mechanics is assumed.

#### **CEE 5660. Climate Change Impacts. 3 Credits.**

Introduces the physical basis of climate change and explores a number of climate change impacts, particularly those that affect the built environment; primary focus on hydro-climate impacts, specifically flood risk, water resources, coastal flooding, and stormwater infrastructure; various modeling techniques are introduced and applied to engineering problems. Prerequisite: Graduate student or Instructor permission; programming skills (such as in Python or Matlab) and content knowledge of hydraulics/fluid mechanics (such as CEE 3600, CEE 3615, or ME 2230) assumed.

#### **CEE 5700. Advanced Structural Analysis. 3 Credits.**

Virtual work, energy theorems, analysis of structures by the displacement method and the finite element method, non-linear structural analysis. Project-based. Prerequisite: Graduate student or Instructor permission; content knowledge of structural analysis (such as CEE 3700) assumed.

#### **CEE 5720. Structural Dynamics. 3 Credits.**

Vibrations, matrices, earthquake engineering, stability and wave propagation. Project-based. Prerequisites: Graduate student or Instructor permission; content knowledge of calculus through differential equations (such as MATH 3201) and Physics (such as PHYS 1500) assumed.

#### **CEE 5730. Structural Design - Wood. 3 Credits.**

Analysis and design of solid and glue laminated timber members and structural systems including tension members, beams, columns, beam-columns, diaphragms, shear walls, and connections; LRFD and ASD design methods; application of IBC for timber systems; current developments in wood design/construction; project-based. Prerequisite: Graduate student or Instructor permission; content knowledge of structural analysis (such as CEE 3700) assumed.

#### **CEE 5850. Geo-energy Systems. 3 Credits.**

An introduction to Geoenery technologies for subsurface energy extraction (shallow and deep geothermal systems, enhanced oil recovery, shale gas extraction) and secure storage of byproducts of energy production (carbon dioxide and nuclear wastes); project-based. Prerequisite: Graduate student or Instructor permission; content knowledge of soil mechanics (such as CEE 3800 or CEE 3815) assumed.

#### **CEE 5870. Design of Earth Structures. 3 Credits.**

Soil and rock properties using laboratory, field and in-situ testing; analysis and design of slopes, embankments and retaining structures. Prerequisites: Graduate Student or Instructor permission; content knowledge of soil mechanics (such as CEE 3800 or CEE 3815) assumed.



**CEE 5980. Numerical Methods for Engineer. 3 Credits.**

Foundational concepts of numerical integration, numerical differentiation, and numerical approximation and solution of differential and partial differential equations of the type encountered in the analysis of engineering problems and data processing; project-based. Prerequisite: Graduate student or Instructor permission; content knowledge of calculus through differential equations (such as MATH 3201) and linear algebra (such as MATH 2522 or MATH 2544) assumed. Cross-listed with: ME 5980.

**CEE 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CEE 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CEE 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**CEE 6392. Master's Project Research. 1-6 Credits.**

Independent project related to Civil & Environmental Engineering under the supervision of a Civil & Environmental Engineering faculty member, concluding with a written technical report and an oral presentation to a committee of two Civil & Environmental Engineering faculty members. Prerequisite: Permission of Civil & Environmental Engineering Graduate Coordinator or Civil & Environmental Engineering Department Chair.

**CEE 6840. Site Characterization. 3 Credits.**

A comprehensive approach to subsurface site characterization for geotechnical and environmental designs and a systems approach for integrating the two. Prerequisites: Graduate Student or Instructor permission; content knowledge of hydraulics/fluid mechanics (such as CEE 3600, CEE 3615, or ME 2230) and soil mechanics (such as CEE 3800 or CEE 3815) assumed.

**CEE 6880. Advanced Geoenvironmental Eng. 3 Credits.**

Site characterization, site restoration, geotechnical aspects of waste disposal and containment, landfill design, geosynthetics. Prerequisite: Content knowledge of soil mechanics (such as CEE 3800 or CEE 3815) assumed.

**CEE 6930. CEE Graduate Seminar. 0 Credits.**

Presentation and discussion of advanced problems, research, and current topics in Civil & Environmental Engineering by faculty, Graduate students, and outside guest speakers. Prerequisite: Civil & Environmental Engineering Graduate student.

**CEE 6990. Special Topics. 1-18 Credits.**

Advanced topics in recently developed technical areas.

**CEE 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CEE 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CEE 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CEE 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**CEE 7900. Uncertainty & Risk in Eng Sys. 3 Credits.**

Modeling uncertainty and risk, random variables, modeling and simulation of functions of random variables and random processes, propagation of uncertainties in computational models, analytical and computational methods for computing failure probability of engineering systems, Bayesian updating of risk measures, communicating uncertainty and risk. Prerequisite: Content knowledge of probability and statistics (such as STAT 2430 or STAT 2510) is assumed.

**CEE 7920. Appld Artificial Neural Ntwrks. 1-3 Credits.**

Introduction to artificial neural networks. A broad range of example algorithms are implemented in MATLAB. Research applications to real data are emphasized. Prerequisites: Programming skills (such as in Python or Matlab) and content knowledge of multivariate statistics (such as STAT 5230) are assumed. Cross-listed with: CSYS 7920.

**CEE 7980. Applied Geostatistics. 3 Credits.**

Introduction to the theory of regionalized variables, geostatistics (kriging techniques): special topics in multivariate analysis; Applications to real data subject to spatial variation are emphasized. Prerequisites: Programming skills (such as in Python or Matlab) and content knowledge of multivariate statistics (such as STAT 5230) are assumed. Cross-listed with: CSYS 7980, STAT 7980.

**CEE 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CEE 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CEE 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## CLASSICS (CLAS)

### Courses

**CLAS 5901. Topics In: Gr Classics. 3 Credits.**

Exploration of topics in Classics. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**CLAS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CLAS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**CLAS 6392. Master's Project Research. 1-6 Credits.**

Final project under the direction of a graduate faculty mentor.

**CLAS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CLAS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CLAS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CLAS 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**CLAS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## CLINICAL&TRANSLATIONAL SCIENCE (CTS)

### Courses

**CTS 6010. Design Clin&Translational Res. 3 Credits.**

Seminar emphasizing the skills for designing and executing clinical and translational research.

**CTS 6070. Cell to Society. 3 Credits.**

A seminar that addresses a medical issue from molecule to market. By the end of the seminar, students will understand and appreciate the full range of translational science. A theme is selected and announced each year.

**CTS 6100. Conduct Clin&Translational Res. 3 Credits.**

Seminar emphasizing the ethics and mechanics of clinical and translational research.

**CTS 6150. Report Clin&Translational Res. 3 Credits.**

Seminar emphasizing communication skills for writing, editing and presenting science.

**CTS 6200. Analyze Clin&Translational Res. 3 Credits.**

Seminar emphasizing basic and analytical skills for clinical and translational research. Prerequisite: CTS 6200 or Instructor permission.

**CTS 6250. Multi Analysis Clin&Trans Res. 3 Credits.**

Introduction to multivariate regression; models that account for effects of multiple predictors on a single outcome, including linear and logistic regression and survival analysis. Prerequisite: CTS 6200 or Instructor permission.

**CTS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**CTS 6990. Special Topics. 1-18 Credits.**

Special topics in Clinical & Translational Research.

**CTS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CTS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CTS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**CTS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CTS 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CTS 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CTS 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## COMM SCIENCES & DISORDERS (CSD)

### Courses

**CSD 5480. Gr Cognition and Language. 3 Credits.**

Familiarizes students with the study of cognition and language in terms of mental representation models, models of memory, and theories of language comprehension and production. Designed to increase understanding of language in order to place language in biological, behavioral, and social contexts. Prerequisite: Instructor permission.

**CSD 5740. Gr Culture of Disability. 3 Credits.**

Focus on theoretical questions of how societies understand disability and its consequences for social justice, by examining the multiple determinants of the societal construction of disability. Pre/Co-requisites: EDSP 2170, CSD 2010, or ASL 2990; Graduate student; or Instructor permission. Cross-listed with: EDSP 5250.



**CSD 5899. ASD: Assessment & Intervention. 3 Credits.**

Discusses knowledge/research regarding assessment of and interventions for children, youth and adults on the autism spectrum, the use of evaluation tools, implementation of communication, social interaction and play interventions, and application of knowledge to case studies, assessment planning, intervention efficacy and transition planning.

**CSD 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CSD 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CSD 6110. Intrdisc Sem Neurodev Disabil I. 3 Credits.**

Seminar with focus on cultural competence and family-centered care, interdisciplinary collaborative teaming, policy and health disparities related to children and families affected by neurodevelopmental and related disabilities, including ASD. Prerequisite: Instructor permission.

**CSD 6120. Intrdisc Sem Neurodev Disabil 2. 3 Credits.**

Seminar exploring interdisciplinary process, collaborative teaming, teaching, cultural competence and family-centered care as they relate to children and families affected by neurodevelopmental and related disabilities, including ASD. Prerequisite: Instructor permission.

**CSD 6200. Clinic Preparation&Management. 3 Credits.**

Principles of behavioral observation, analysis and modification as they apply to the assessment and remediation of communication disorders.

**CSD 6210. Clinic Practicum Study 1. 1 Credit.**

Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. Pre/Co-requisites: CSD 6200; Communication Sciences & Disorders Graduate student.

**CSD 6220. Clinic Practicum Study 2. 2 Credits.**

Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. Prerequisites: CSD 6200; Communication Sciences & Disorders Graduate student.

**CSD 6230. Clinic Practicum Study 3. 3 Credits.**

Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6240. Clinic Practicum Study 4. 2 Credits.**

Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6250. Clinic Practicum Study 5. 3 Credits.**

Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6260. Clinic Practicum Supplemental. 1 Credit.**

Supervised practicum experiences with children and adults presenting disorders of speech, hearing, and language. Prerequisites: CSD 6200, CSD 6210; Communication Sciences & Disorders Graduate student.

**CSD 6290. School Based Issues for SLPs. 1 Credit.**

An overview of topics necessary for employment as a school based SLP. Specific topics will be covered related to federal and state special education regulations. Prerequisite: CSD 6200. Co-requisite: CSD 6220.

**CSD 6300. Spch Snd Disorders in Children. 3 Credits.**

Etiology, diagnosis, pathology, and habilitation and rehabilitation of articulation of speech. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6310. Language Disorders. 3 Credits.**

Identification, evaluation, and rehabilitation procedures for children with language disabilities. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6320. Seminar Lang/Lrng Disabilities. 3 Credits.**

LLD assessment and intervention; oral language-literacy connections. Reading and written language disorders; related challenges. Role of the SLP; evidence-based approaches. Prerequisite: Communication Sciences & Disorders Graduate student or Instructor permission.

**CSD 6330. Assmt & Treatmt of Stuttering. 3 Credits.**

Study of adult and child fluency disorders with focus on symptomatology, etiology, diagnosis, and rehabilitation of people with stuttering disorders including cluttering and neurogenetic populations. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6340. Swallowing Disorders. 3 Credits.**

Introduction to normal and disordered swallowing function across the life span including etiologies, signs/symptoms of dysphagia, diagnostic procedures and treatment within an interdisciplinary model. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6350. Neurogenic Comm. Disorders 1. 3 Credits.**

The study of linguistic and cognitive-communication impairments associated with stroke and other acquired neurogenic communication disorders. Aphasia, Right Hemisphere Communication Disorders (RHD) and communication disorders associated with dementia are explored. Emphasis on the principles and procedures of assessment and intervention are emphasized. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6381. Research Methods II. 1 Credit.**

Students will critically review the professional literature in preparation for carrying out a systemic review.

**CSD 6385. Non-thesis Research. 1-6 Credits.**

Students complete a systematic review or research project under the direction of faculty.

**CSD 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**CSD 6430. Augmentative Communication. 3 Credits.**

An introduction to development and selection of augmentative/alternative communication strategies and systems for persons with severe communication challenges. Prerequisite: Communication Sciences & Disorders Graduate student or Instructor permission.

**CSD 6450. Neurogenic Comm. Disorders 2. 3 Credits.**

Covers the study of motor speech disorders associated with damage to the central or peripheral nervous system. Cognitive-communication impairments associated with Traumatic Brain Injury (TBI) and related disorders are also explored. Principles and procedures of assessment and intervention are emphasized. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6460. Voice Disorders. 3 Credits.**

Study of normal and abnormal laryngeal anatomy and physiology as they relate to diagnoses and treatment of a wide variety of vocal pathologies. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6720. Hearing Rehab for SLPs. 3 Credits.**

Familiarize students with the effects of hearing loss, both on a child's development and on general communication as an adult. Using the WHO-ICF model, obtain theoretical and practical information to develop a working understanding of the habilitation of hearing in children, including educational management, and rehabilitation of hearing in adults. Become familiar with personal and school sensory devices as well as assistive devices for those with hearing loss. Prerequisite: Communication Sciences & Disorders Graduate student.

**CSD 6890. Practicum. 1-18 Credits.**

A required component of a curriculum that is an on-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded.

**CSD 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CSD 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CSD 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## COMMUNITY DEVELOPMENT & APPLIED ECONOMICS (CDAE)

### Courses

**CDAE 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CDAE 6210. Econ of Sustainable Food Syst. 3 Credits.**

Utilizes common economic tools, ideas and applications to analyze issues concerning the sustainability of food using a combination of readings, lectures and discussions. Cross-listed with: FS 6210.

**CDAE 6260. Community Economic Development. 3 Credits.**

Examines how rural and urban communities address poverty, unemployment and other economic problems through job creation and retention, workforce training and support, and other development strategies. Cross-listed with: PA 6260.

**CDAE 6350. Qualitative Research Methods. 3 Credits.**

Provides an overview of qualitative research methods and an opportunity to apply such research methods for topics focusing on food systems and health. Cross-listed with: FS 6350.

**CDAE 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**CDAE 6510. Research & Evaluation Methods. 0 or 3 Credits.**

Conceptualization, collection and analysis of primary and secondary data; interpretation, and communication of results of applied research and/or evaluation studies for decision makers. Separate lab required. Prerequisite: Three hours of Statistics. Cross-listed with: PA 6030.

**CDAE 6540. Advanced Microeconomics. 3 Credits.**

Principles and applications of advanced microeconomics: consumer and market demand, firm and market supply, perfect and imperfect markets, partial and general equilibrium, and policy analysis.

**CDAE 6590. Applied Econometrics. 3 Credits.**

Presents common econometric methods to perform regression analysis on empirical data. Upon completion, students will understand and apply econometric methods to conduct rigorous regression analysis. Students will also better read, interpret and discern research papers' quality using econometric methods.

**CDAE 6760. Inclusive ScienceCommunication. 3 Credits.**

Advanced exploration, application of science communication theories, contexts, practices with a focus on inclusion, equity, and intersectionality. Examine the relationship between science and society while learning communication skills that promote respect and shared understandings of science among researchers, extension professionals, journalists, public relations specialists, policy officials, and public.

**CDAE 6890. Practicum in Extension Educ. 1-12 Credits.****CDAE 6920. Graduate Seminars. 1 Credit.**

Report and discuss research projects and findings of Graduate students and faculty, and offer workshops on selected topics in community development and applied economics. May enroll more than once for up to three credits.

**CDAE 6990. Special Topics. 1-18 Credits.**

Lectures or readings on contemporary issues in Community Development & Applied Economics.

**CDAE 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CDAE 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CDAE 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CDAE 7000. Sustainable Dev PEG Doc Sem. 1 Credit.**

Focus will rotate among three main themes: project resource development skills and techniques (e.g. grant writing and management); stakeholder engagement; and dissertation proposal preparation. Prerequisite: Sustainable Development Policy, Economics, & Governance Doctoral student.

**CDAE 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**CDAE 7700. Political Econ of Sustain Dev. 3 Credits.**

Introduction to the political economy of sustainable development from the theoretical perspective of complex adaptive socio-ecological systems. Political economy assesses relationships between the state, market, and civil society to understand how humans satisfy their material needs (human provisioning) through interaction with their social and natural environments.

**CDAE 7710. Sustain Dev Policy & Gov. 3 Credits.**

History, evolution and foundations of sustainable development policy at multiple levels of governance, ranging from the United Nations to local communities/cities. Learn about analyzing/evaluating wide range of sustainable development policies. Emphasis on understanding complex system dynamics modeling and adaptive management approaches to address sustainable development challenges.

**CDAE 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CDAE 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CDAE 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CDAE 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**COMPLEX SYSTEMS (CSYS)****Courses****CSYS 5766. Gr Chaos, Fractals & Dynamical Syst. 3 Credits.**

Discrete and continuous dynamical systems, Julia sets, the Mandelbrot set, period doubling, renormalization, Henon map, phase plane analysis, and Lorenz equations. Prerequisite: Graduate student or Instructor permission. Cross-listed with: MATH 5766.

**CSYS 5870. Data Science I - Experience. 3 Credits.**

Data harvesting, cleaning, and summarizing; working with non-traditional, non-numeric data (social network, natural language textual data, etc.); scientific visualization; advanced data pipelines with a practical focus on real datasets and developing good habits for rigorous and reproducible computational science; Project-based. Prerequisites: Knowledge of CS 1210 and either STAT 1410 or STAT 2430 required; knowledge of CS 2100 and MATH 2522 or MATH 2544 recommended; Graduate student or Instructor permission. Cross-listed with: STAT 5870, CS 5870.

**CSYS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CSYS 6020. Modeling Complex Systems. 3 Credits.**

Integrative breadth-first introduction to computational methods for modeling complex systems; numerical methods, cellular automata, agent-based computing, game theory, genetic algorithms, artificial neural networks, and complex networks. Semester team-based project. Pre/Co-requisites: Computer programming in any language; calculus, linear algebra recommended. Cross-listed with: CS 6020.

**CSYS 6391. Master's Thesis Research. 1-18 Credits.**

Master's thesis research under the supervision of a graduate faculty member. Prerequisite: Instructor permission.

**CSYS 6392. Master's Project Research. 1-6 Credits.**

Masters project under the supervision of a graduate faculty member. Prerequisite: Instructor permission.

**CSYS 6520. Evolutionary Computation. 3 Credits.**

Theory and practice of biologically-inspired search strategies including genetic algorithms, genetic programming, and evolution strategies. Applications include optimization, parameter estimation, and model identification. Significant project. Students from multiple disciplines encouraged. Pre/co-requisites: Familiarity with programming, probability, statistics. Cross-listed with: CS 6520.

**CSYS 6540. Deep Learning. 3 Credits.**

Introduction to Deep Learning algorithms and applications, including basic neural networks, convolutional neural networks, recurrent neural networks, deep unsupervised learning, generative adversarial networks and deep reinforcement learning. Includes a semester team-based project. Prerequisite: CS 3540. Cross-listed with: CS 6540.

**CSYS 6701. Principles of Complex Systems 1. 3 Credits.**

Introduction to fundamental concepts of complex systems. Topics include: emergence, scaling phenomena and mechanisms, multi-scale systems, failure, robustness, collective social phenomena, complex networks. Students from all disciplines welcomed. Pre/co-requisites: Calculus, statistics required; linear algebra, differential equations, computer programming recommended. Cross-listed with: MATH 6701.

**CSYS 6713. Principles of Complex Systems 2. 3 Credits.**

Detailed exploration of distribution, transportation, small-world, scale-free, social, biological, organizational networks; generative mechanisms; measurement and statistics of network properties; network dynamics; contagion processes. Students from all disciplines welcomed. Pre/co-requisites: Calculus, statistics required. Cross-listed with: MATH 6713.



**CSYS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CSYS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CSYS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CSYS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CSYS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**CSYS 7980. Applied Geostatistics. 3 Credits.**

Introduction to the theory of regionalized variables, geostatistics (kriging techniques), special topics in multivariate analysis. Applications to real data subject to spatial variation are emphasized. Prerequisites: Programming skills (such as in Python or Matlab) and content knowledge of multivariate statistics (such as STAT 5230) are assumed. Cross-listed with: CEE 7980, STAT 7980.

**CSYS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CSYS 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**COMPUTER ENGINEERING (CMPE)****Courses****CMPE 5410. Digital VLSI Circuit Design. 0 or 3 Credits.**

Covers the techniques for the design, analysis and layout of digital CMOS circuits and systems. Major topics include MOSFET basics (structure and behavior of a MOSFET, CMOS fabrication, and design rules), detailed analysis of the CMOS circuits and systems (static behavior, ratioed vs. ratioless design), noise margins, computing rise and fall times, delay models, resistance. Prerequisite: Electrical Engineering Graduate student, Computer Science Graduate student, or Instructor permission. Cross-listed with: EE 5410.

**CMPE 5540. Real-Time Control Systems. 3 Credits.**

Digital control systems analysis and design. Topics include: difference equations, the Z-transforms, discrete-time transfer functions, state-space models, sampled-data systems, discretization, real-time control, microprocessor implementation, and optimal control. Project-based final. Prerequisite: Electrical Engineering Graduate student, Computer Science Graduate student, or Instructor permission. Cross-listed with: EE 5540.

**CMPE 5810. Digital Computer Design. 3 Credits.**

To gain a solid understanding of digital computer operating mechanisms and reconfigurable computing, and advance into hands-on experiences to design and debug digital computer system and embedded system. Field programmable gate arrays (FPGAs) will be utilized as the development platform. Prerequisite: Electrical Engineering Graduate student, Computer Science Graduate student, or Instructor permission. Cross-listed with: EE 5810, CS 5810.

**CMPE 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CMPE 5991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CMPE 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CMPE 5994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**CMPE 5995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CMPE 6391. Master's Thesis Research. 1-18 Credits.**

Research for Master's Thesis.

**CMPE 6392. Master's Project Research. 1-3 Credits.**

Research for Master's Project.

**CMPE 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CMPE 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CMPE 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CMPE 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**CMPE 6995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CMPE 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for Doctoral Dissertation.

**CMPE 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CMPE 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CMPE 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CMPE 7994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**CMPE 7995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## COMPUTER SCIENCE (CS)

### Courses

**CS 5040. Gr Database Systems. 3 Credits.**

Covers the theory and practice of database design and application programming, and basic internals of a database management system. Topics include database concepts, data models and database design, query languages, database programming concepts and languages, files and physical design, query processing and optimization, transaction concepts, concurrency control and recovery, and security and authentication. Prerequisites: Familiarity with basic data structures, algorithms, discrete mathematics, computer organization; Graduate student.

**CS 5060. Advanced Evolutionary Robotics. 3 Credits.**

Explores the automated design of autonomous machines using evolutionary algorithms. Covers relevant topics in evolutionary computation, artificial neural networks, robotics, simulation and xenobots. Students complete weekly programming assignments, formulate research a research hypothesis, and use their system to test that hypothesis. Prerequisite: Graduate student.

**CS 5110. Advanced Data Privacy. 3 Credits.**

Explores the research field of data privacy, including privacy attacks on anonymized data, and formal approaches like k-Anonymity and differential privacy. Applies the theory of data privacy to real problems in programming projects. Prepares students to perform independent research in the field. Prerequisite: Graduate student.

**CS 5120. Adv Secure Distributed Comput. 3 Credits.**

Techniques for secure computation involving multiple distributed parties, including applied cryptography, homomorphic encryption, secure multiparty computation, and zero-knowledge proof. Applications including Bitcoin and other blockchain systems, encrypted databases, federated learning, and computing on encrypted data. Prerequisites: Proficiency in Python programming; familiarity with LaTeX typesetting system; Graduate student.

**CS 5220. Advanced Computer Architecture. 3 Credits.**

Provides a thorough and sophisticated examination of various hardware aspects of modern computers, including: virtual memory, instruction-set architectures, instruction-level parallelism through pipelining, caches and cache coherence, threads, vector processors, and GPUs. Prerequisites: Familiarity with topics of computer organization as would come from the equivalent of CS 2210; Graduate student.

**CS 5240. Advanced Algorithm Design. 3 Credits.**

Studies how to design and analyze computer program algorithms to solve real-world problems. Begins with a review of the concept of algorithm complexity and basic graph algorithms; and then covers algorithm design approaches such as greedy, divide and conquer, dynamic programming, and network flow; then, computational intractability will be treated. Prerequisite: Familiarity with data structures and elementary algorithms.

**CS 5540. Advanced Machine Learning. 3 Credits.**

Provides a broad introduction to machine learning and statistical pattern recognition. Topics include: supervised learning (linear regression, logistic regression, neural networks, support vector machines, decision tree, ensemble models, random forest); unsupervised learning (clustering, dimensionality reduction, kernel methods); Also introduces deep learning such as convolutional neural networks and discusses recent applications.

**CS 5737. Gr Intro to Numerical Anyl. 3 Credits.**

Error analysis, root-finding, interpolation, least squares, quadrature, linear equations, numerical solution of ordinary differential equations. Prerequisite: Graduate student or Instructor permission. Cross-listed with: MATH 5737.

**CS 5810. Digital Computer Design. 3 Credits.**

To gain a solid understanding of digital computer operating mechanisms and reconfigurable computing, and advance into hands-on experiences to design and debug digital computer system and embedded system. Field programmable gate arrays (FPGAs) will be utilized as the development platform. Prerequisite: Electrical Engineering Graduate student, Computer Science Graduate student, or Instructor permission. Cross-listed with: CMPE 5810, EE 5810.



**CS 5870. Data Science I - Experience. 3 Credits.**

Data harvesting, cleaning, and summarizing; working with non-traditional, non-numeric data (social network, natural language textual data, etc.); scientific visualization; advanced data pipelines with a practical focus on real datasets and developing good habits for rigorous and reproducible computational science; Project-based. Prerequisites: Knowledge of CS 1210 and either STAT 1410 or STAT 2430 required; knowledge of CS 2100 and MATH 2522 or MATH 2544 recommended; Graduate student or Instructor permission. Cross-listed with: STAT 5870, CSYS 5870.

**CS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles. Subject will vary from year to year. May be repeated for credit with instructor permission.

**CS 6020. Modeling Complex Systems. 3 Credits.**

Integrative breadth-first introduction to computational methods for modeling complex systems; numerical methods, cellular automata, agent-based computing, game theory, genetic algorithms, artificial neural networks, and complex networks. Semester team-based project. Pre/Co-requisites: Computer programming in any language, calculus; linear algebra recommended. Cross-listed with: CSYS 6020.

**CS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**CS 6392. Master's Project Research. 1-6 Credits.**

Research for Master's project. Prerequisite: Department permission.

**CS 6520. Evolutionary Computation. 3 Credits.**

Theory and practice of biologically-inspired search strategies, including genetic algorithms, genetic programming, and evolution strategies. Applications include optimization, parameter estimation, and model identification. Significant project. Students from multiple disciplines encouraged. Pre/co-requisites: Familiarity with programming, probability, statistics. Cross-listed with: CSYS 6520.

**CS 6540. Deep Learning. 3 Credits.**

Introduction to Deep Learning algorithms and applications, including basic neural networks, convolutional neural networks, recurrent neural networks, deep unsupervised learning, generative adversarial networks and deep reinforcement learning. Includes a semester team-based project. Prerequisite: CS 3540. Cross-listed with: CSYS 6540.

**CS 6550. Usable Privacy and Security. 3 Credits.**

Covers human factors in privacy and security, usability problems in today's computer security and privacy mechanisms, as well as the human-centered empirical research methods to understand and address these usability problems. Students will work individually or in small groups toward semester-long course research projects. Co-requisite: Knowledge of STAT 1410 or equivalent.

**CS 6570. Social Computing Systems. 3 Credits.**

Social computing systems include online social networks, microblogging systems, social recommendation platforms, etc. Via a research-centric lens, explores the underlying nature/structure of social computing systems, studies various issues that plague them, and explores the methods by which researchers investigate such systems. Prerequisites: Proficiency in graph theory and computer programming (preferred language Python); knowledge of CS 3240 (or equivalent) and CS 2300 (or equivalent) assumed.

**CS 6870. Data Science II. 3 Credits.**

Advanced data analysis, collection, and filtering; statistical modeling, monte carlo statistical methods, and in particular Bayesian data analysis, including necessary probabilistic background material; a practical focus on real datasets and developing good habits for rigorous and reproducible computational science. Prerequisites: STAT 5870, CS 5870, CSYS 5870, or Instructor permission. Cross-listed with: CSYS 6870, STAT 6870.

**CS 6990. Special Topics. 1-18 Credits.**

Subject will vary from year to year. May be repeated for credit with Instructor permission.

**CS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**CS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**CS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**CS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CS 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**CS 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## COUNSELING (CNSL)

### Courses

**CNSL 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**CNSL 6000. Research Methods in Counseling. 3 Credits.**

This course is designed to assist counseling students in understanding research methods, qualitative and statistical analysis, needs assessment, and program evaluation relevant to the field of counseling. This course or an approved equivalent is required for Clinical Mental Health Counseling and School Counseling students.

**CNSL 6200. Dev. Perspectives in CNSLNG. 3 Credits.**

Survey of major theories of human development and application of theoretical concepts to self and others from a counseling perspective. This course is required for Clinical Mental Health Counseling and School Counseling students. Prerequisite: Counseling Graduate student or Instructor permission.

**CNSL 6400. Development Guidance in Schls. 3 Credits.**

Provides an introduction to the role of the professional counselor working in the school setting. Topics include state and national trends in school counseling, classroom and small group work in schools, advocacy, leadership, consultation, special education services, parenting skills, classroom and behavior management, and crisis intervention. Required for the School Counseling program. Prerequisite: Counseling Graduate student or Instructor permission.

**CNSL 6410. Diagnosis in School Counseling. 1 Credit.**

This course reviews the presentation and etiology of child and adolescent and mental health disorders as included in the DSM-5. A comparison of the DSM to other categorization processes used within school environments is delineated. The emphasis will be on strength-based assessment that is culturally appropriate. Prerequisite: Counseling Graduate student or permission.

**CNSL 6420. Assessment in School CNSLNG. 1 Credit.**

Students will learn about common assessment tools and processes used in professional school counseling. Prerequisites: CNSL 6200, CNSL 6500, CNSL 6740, CNSL 6750, CNSL 6770; Counseling Graduate student; or Instructor permission.

**CNSL 6440. Modalities: Counsel Child & Ad. 3 Credits.**

This course provides a study of counseling practices for working with children and adolescents. Learning will be facilitated through assigned readings, lectures, discussions, demonstrations, and student practice of skill. This course is required for Clinical Mental Health Counseling and School Counseling students. Prerequisites: Counseling Graduate student and concurrent with internship or permission.

**CNSL 6450. Diagnosis in CMH Counseling. 1-3 Credits.**

Etiology and diagnosis of mental disorders in children, adolescents, and adults according to DMS. Includes intake, evaluation, treatment planning, and clinical documentation skills. Prerequisite: Counseling Graduate student or Instructor permission.

**CNSL 6500. Prof Issues in Counseling. 3 Credits.**

A seminar in which professional, ethical, and legal issues facing counselors in schools and mental health settings are addressed through reading, research, presentation, and discussion.

**CNSL 6520. Assessment in CMH Counseling. 1-3 Credits.**

Provides students with knowledge about common assessment tools and processes used in clinical mental health practice. Prerequisites: CNSL 6200, CNSL 6500, CNSL 6740, CNSL 6750, CNSL 6770; Counseling Graduate student; or Instructor permission.

**CNSL 6610. Practice of Mental Hlth Cnslng. 3 Credits.**

Introduction to issues, needs, models and sociopolitical factors present in community and private-practice mental health counseling, with an emphasis on prevention and wellness. Prerequisite: Counseling Graduate student or Instructor permission.

**CNSL 6630. Counseling Practicum. 3 Credits.**

Introductory supervised experience in counseling in a field setting. Includes 100 hours working as a counselor with a minimum of 40 direct service hours. Prerequisites: CNSL 6200, CNSL 6500, CNSL 6740, CNSL 6750 (School and Clinical Mental Health Counseling Programs), CNSL 6400 (School Program), CNSL 6610 (Clinical Mental Health Program).

**CNSL 6740. Counseling Theory & Practice. 3 Credits.**

Theoretical and practical approach to understanding the counseling process. Refinement of personal philosophy, theory of counseling, and implementation in practice.

**CNSL 6750. Lab Experience in Counseling. 3 Credits.**

Students learn and practice basic counseling skills and techniques. Videotaped practice sessions are supervised by course instructor. Prerequisite: Counseling Graduate student. Pre/Co-requisite: CNSL 6740.

**CNSL 6760. Addictions Counseling. 3 Credits.**

Development and culturally responsive treatment of addictions, e.g., Motivational Interviewing, family systems, Cognitive Behavioral Therapy (CBT) techniques, recovery maintenance, and an integrative approach to treatment. Prerequisite: Counseling Graduate student or Instructor permission.

**CNSL 6770. Diversity & Intersectionality. 3 Credits.**

Designed to assist students in recognizing and acknowledging diversity in society, and developing the knowledge and skills to recognize, interrupt and redress inequity within their spheres of influence. Prerequisite: Counseling Graduate student or Instructor permission.

**CNSL 6810. Counsel/Career&Lifestyle Dev. 3 Credits.**

An exploration of the theories, assessment instruments, counseling techniques, and issues most relevant in counseling for career and lifestyle development. Prerequisites: CNSL 6740, CNSL 6750, Counseling Graduate student; or Instructor permission.

**CNSL 6870. Therapeutic Psychopharmacology. 3 Credits.**

Introduction to neuroanatomy, neurophysiology, and pharmacology as they pertain to mental health counseling. Course also covers commonly prescribed medications, ethical issues and the referral process. Prerequisite: Counseling Graduate student or program permission.

**CNSL 6880. Family and Couples Counseling. 3 Credits.**

Theory and process of counseling with families and couples including family theory and family therapy orientations and intervention skills. Includes practice of counseling interventions. Prerequisites: CNSL 6200, CNSL 6500, CNSL 6740, CNSL 6750, CNSL 6770, CNSL 6920; or Instructor permission.

**CNSL 6920. Group Counseling Experience. 1 Credit.**

Encounter group experiences for prospective clinical mental health and school counselors providing increased awareness of self and models relating to others.

**CNSL 6930. Adv Group: Theory and Practice. 0 or 3 Credits.**

Group leadership skills are developed, practiced, and refined through in-class and laboratory experiences that focus on live group supervision, theory, feedback exchange, and ethical issues. Prerequisites: CNSL 6200, CNSL 6500, CNSL 6630, CNSL 6740, CNSL 6750, CNSL 6770, CNSL 6920, CNSL 6991; Instructor permission.

**CNSL 6990. Special Topics. 1-18 Credits.**

Special issues in counseling, administration and planning, social work or higher education not appropriate to content of existing courses. Courses reflect the social services orientation of the Department of Integrated Professional Studies.

**CNSL 6991. Counseling Internship. 1-18 Credits.**

A supervised experience in counseling in a field (school or mental health) setting. Prerequisites: CNSL 6200, CNSL 6500, CNSL 6740, CNSL 6630; Counseling Graduate student.

**CNSL 6993. Independent Study. 1-18 Credits.**

Individual work on a research problem selected by the student in consultation with a staff member. Prerequisite: Twelve hours in education and related areas; endorsement by a sponsoring faculty member.

**CNSL 7010. Doctoral Sem Current Topics. 1 Credit.**

Examines current topical and political issues in counseling, and how these issues affect the daily work of counselors and counselor educators in the profession.

**CNSL 7020. Professional Writing. 1 Credit.**

Provides an overview of different types of professional writing, including peer and non-peer reviewed publications, grant submissions (internal university and external grants), and conference proposals. Designed to de-mystify these processes and provide opportunities for students to practice these skills and further their professional repertoire.

**CNSL 7040. Diversity Equity in Cou Ed. 3 Credits.**

Assists students in developing a more critical understanding of intersectional equity issues related to the field of counseling so they can develop into effective social justice-oriented counselor educators. Interrogates the influence of subjugating discourses on the counseling practice, clinical supervision, and research, and how we might engage. Prerequisite: Counselor Education and Supervision Doctoral student.

**CNSL 7050. Leadership in Counselor Ed. 3 Credits.**

Students will become familiar with different models of leadership, their own strengths and weaknesses, and how to best work with others in leadership roles within counselor education and counseling. They will learn and apply leadership skills in a hands-on practical way. Prerequisite: Counselor Education & Supervision Doctoral student.

**CNSL 7060. Counseling Theory & Research. 3 Credits.**

Designed to assist students in developing a more critical understanding of the epistemological, ontological, and axiological assumptions that undergird counseling theory and research methodology. By gaining a more critical understanding, students will develop skills to decolonize the dominant paradigms within the discipline. Prerequisite: Counselor Education & Supervision Doctoral student.

**CNSL 7100. Professional Identity Course Ed. 1 Credit.**

Students examine their professional identity, roles, functions, and responsibilities related to educating counselors and counselor educators and supervisors; the responsibilities associated with professional gate keeping and student retention, mentoring and advising, equity centered and culturally responsive training, ethical and professional responsibilities of educators and their programs including strategies for success in the academy are examined. Prerequisite: Counselor Education & Supervision Doctoral student or Instructor permission.

**CNSL 7110. Pathway to the Professoriate. 1 Credit.**

Students examine the dynamics of the dissertation completion process, impediments to success and strategies for a successful dissertation completion process. The pathway to the professoriate is explored including market analysis, dynamics of interviews for tenure track and non-tenure track positions and strategies for preparation for the counselor ed job market and transition to the professoriate.

**CNSL 7200. Advanced Group and Supervision. 3 Credits.**

Examines modalities, theories, and approaches to group work, including understanding contemporary literature and research supporting evidence-based clinical practices and clinical supervision of group work. Also examines the impact of socio-cultural factors within the various group domains, between members and the leader, and among group members; and the supervisory dynamics of group work practice. Prerequisites: CNSL 7800, CNSL 7060.

**CNSL 7210. Clinical Sup Theory & Practice. 3 Credits.**

Examines various modalities, theories, and approaches to clinical supervision, including understanding contemporary literature and research supporting evidence based clinical supervision practices. Explores the impact of socio-cultural factors within the supervisory relationship, the supervision triad (counselor/client/supervisor), and how attention to cultural implications can enhance the supervisory experience and outcomes. Prerequisites: CNSL 7800, CNSL 7060.

**CNSL 7491. Doctoral Dissertation Research. 1-18 Credits.**

The dissertation is an original research project that provides an opportunity to demonstrate the ability to engage in independent supervised research. Twenty-one dissertation credit hours are required. Prerequisite: Successful completion of Comprehensive Examinations and Oral Dissertation proposal.

**CNSL 7800. Doctoral Counseling Practicum. 3 Credits.**

Provides the practicum student with an opportunity to refine and expand their counseling skills at a designated field site location and advance their knowledge of evidence-based practices. Doctoral practicum students will receive weekly group supervision by a Counseling Program faculty member and individual/triadic supervision by a field site supervisor. Prerequisite: Counselor Education & Supervision Doctoral student.

**CNSL 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.



**CNSL 7991. Doctoral Internship. 1-18 Credits.**

Doctoral internship in 3 of 5 core areas of specialization to include: counseling, teaching, supervision, research and scholarship, and leadership and advocacy. Doctoral students must enroll in 2 separate internship courses, each consisting of 300 hours of applied work. Prerequisites: CNSL 7040, CNSL 7060, CNSL 7800, EDHI 6850, CNSL 7050, CNSL 7010, Counselor Education & Supervision Doctoral student.

**CURRICULUM & INSTRUCTION (EDCI)****Courses****EDCI 5001. Python Program for Educators. 4 Credits.**

Covers the fundamentals of programming, using the Python programming language. Students will write non-trivial Python programs, assess programming assignments, read, analyze and discuss relevant literature in CS and Education and create lesson plans and other CS resources for their teaching practice.

**EDCI 5002. Java Programming for Educators. 4 Credits.**

Intermediate programming concepts including common data structures, algorithms, design, documentation, testing and debugging techniques, and an introduction to object-oriented programming. Focuses on learning fundamentals of Java programming and the pedagogical theories, principles methods for integrating Java into the grade 7-12 classroom. Prerequisite: EDCI 5001.

**EDCI 5003. Web Design for Educators. 4 Credits.**

Covers the fundamentals of HTML, CSS, working with images, PHP programming, and web design needed to create a functional website. Assess programming assignments, read, analyze, and discuss relevant literature in CS and education and create lesson plans and other CS resources for students' teaching practice. Prerequisites: EDCI 5001, EDCI 5002.

**EDCI 5004. Computer Organization for Educ. 3 Credits.**

Covers computer system organization including performance, assembly language, machine-level data representation, arithmetic for computers, processor datapath control, memory, and input/output. Students will read, analyze, and discuss education literature and create lesson plans/units and other CS resources for their teaching practice. Prerequisites: EDCI 5001, EDCI 5002, EDCI 5003.

**EDCI 5005. Data Science for Educators. 3 Credits.**

Extracting meaning from data remains one of the most important tasks of research and industry. The modern age of computers and the Internet has made vast amounts of data available, making it more important than ever to understand how to collect, process, and analyze these data ethically and responsibly. Focuses on learning data science fundamentals and the pedagogical methods to integrating data science into the grade 7-12 classroom. Prerequisites: EDCI 5001, EDCI 5002, EDCI 5003, EDCI 5004.

**EDCI 5990. Special Topics. 1-18 Credits.**

See Schedule of Course for specific titles.

**EDCI 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDCI 5994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

**EDCI 6008. Curriculum Theory. 3 Credits.**

Explores curriculum theory from a practitioner-oriented perspective and critical stance. Investigates how dominant social, political, and economic ideologies influence teaching and learning priorities. Aims to unsettle dominant curricular imaginaries to inquire about what else curriculum might be and become. Engage curriculum theories practiced and posed by educators, policy makers, scholars, school leaders, and youth leaders.

**EDCI 6009. Critical Pedagogies. 3 Credits.**

Explores the philosophical and sociological underpinnings of various critical social, decolonial, and anticolonial theories and how they have contributed to educators' pedagogical practice. Course themes include: education as the practice of freedom, the theorization of criticality and critical social theory, critical pedagogies in practice, and youth influence on critical pedagogical practices.

**EDCI 6210. Learning, Design & Technology. 3 Credits.**

This course examines the relationship between learning theory and technology integration in K-12 classrooms and integrates backward design in standards-based units of study. Prerequisite: Teaching experience.

**EDCI 6220. Differentiation & Technology. 3 Credits.**

This course enables educators to develop and utilize instructional frameworks based on current research related to differentiating instruction, universal design for learning and assistive technology.

**EDCI 6230. Inquiry and Technology. 3 Credits.**

This course examines how technology can promote a student-centered active learning classroom environment that promotes problem-solving and critical thinking skills. Prerequisite: Prior teaching experience.

**EDCI 6240. Assessment and Technology. 3 Credits.**

Students will cover assessment basics, the role of technology in education, information & knowledge management, and methods for integrating technology into assessment practice.

**EDCI 6250. Leadership and Technology. 3 Credits.**

This course explores leadership and the role of the Integration Specialist and/or teacher leader in the context of educational technology integration planning.

**EDCI 6310. Society, Stress and the Brain. 3 Credits.**

Explores brain development and the learning process under complex social conditions such as poverty, instability, and fear. Students study the effects of stress on learning and consider methods of instruction and interaction that address developmental needs of children and families from diverse contexts.



**EDCI 6391. Master's Thesis Research. 1-18 Credits.**

Thesis topic must be approved by a faculty committee. Credit as arranged.

**EDCI 6430. Fndns in Ed for Sustainability. 3 Credits.**

Prepares educators to use sustainability as an integrating lens for learning. Provides an introduction to Education for Sustainability (EFS), an approach that links teaching of social, environmental, and economic systems to foster the knowledge, inquiry, and action needed to build a healthy and just future for communities, both locally and globally.

**EDCI 6440. Mthds in Ed for Sustainability. 3 Credits.**

Explores designing for education for sustainability (EFS). Participants should have a foundation in EFS, associated pedagogies, and curriculum or project development strategies. Action-oriented, culminating in a project or curriculum to implement. Pre/Co-requisite: EDCI 6430.

**EDCI 6450. Trnsfrm Ldrshp Edu for Sustain. 3 Credits.**

Focuses on developing students' education for sustainability leadership practices and offers tools to transform ourselves and our community. Explores a whole-systems and ecological approach for leading change in complex and emergent times. A core element of this course is the community that will be co-developed through collective work. Prerequisite: EDCI 6430. Pre/Co-requisite: EDCI 6440.

**EDCI 6460. Edu for Sustain Inquiry Action. 3 Credits.**

Designed to support practitioners advanced in EFS. In collaboration with education experts, systems-thinking and leadership, students will develop a peer network committed to ecological integrity, economic vitality, and social justice. Students will also use inquiry and action research frameworks to investigate a personally meaningful question about their EFS practice. Prerequisite: EDCI 6430. Pre/Co-requisites: EDCI 6440, EDCI 6450.

**EDCI 6800. Professional Problems in Ed. 3 Credits.**

Designed to cover selected educational problems in depth. The major emphasis will be on intensive and critical analysis of the literature and practice in a given area.

**EDCI 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDCI 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**EDCI 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDCI 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**DOCTOR OF PHYSICAL THERAPY (DPT)****Courses****DPT 7030. Health Policy & Business Mgmt. 3 Credits.**

Physical therapist practice management including evidence-based business and financial management, administration, and health informatics. Topics will incorporate business management from a physical therapist perspective, while expanding knowledge on health systems and the role of physical therapist in various practice settings. Prerequisite: Doctor of Physical Therapy student.

**DPT 7040. Health Sys IV-Health Promotion. 3 Credits.**

Fundamental concepts of health behavior, health education, and health promotion. Examination of health promotion programs at the level of policy, community, social spheres, and individuals. Experiential learning through health promotion in consideration of health behavior science and evidence-based practice. Prerequisite: Doctor of Physical Therapy student.

**DPT 7050. Clinical Medicine. 4 Credits.**

Foundational knowledge and application of pathophysiology as it pertains general health and systemic disease and its relationship to the role of the physical therapist as a movement system expert and a primary care practitioner. Prerequisite: Doctor of Physical Therapy student.

**DPT 7060. Exercise Science. 3 Credits.**

Principles and applications of exercise assessment/testing, prescription and progression of the exercise program, including response to exercise. Course will emphasize understanding and application of the ACSM guidelines to exercise testing and prescription to individuals across the lifespan. Prerequisite: Doctor of Physical Therapy student.

**DPT 7070. Pharmacology and Nutrition. 2 Credits.**

Foundational knowledge of pharmacology and nutrition pertinent to physical therapist practice. Introduction to pharmacokinetics, pharmacodynamics, mechanisms of action of various drugs, and adverse reactions. Topics will also include nutrition in relation to primary, secondary, and tertiary prevention. Co-requisite: Doctor of Physical Therapy student.

**DPT 7080. Fundamentals Critical Inquiry. 3 Credits.**

In-depth application of scientific inquiry inclusive of research design, statistical methods, research question development, critical appraisal and interpretation of evidence related to clinical practice are explored. Diagnostic, intervention, and prognostic studies are used in the application of the inquiry process. Prerequisite: Doctor of Physical Therapy student.

**DPT 7090. Foundations of Imaging for PT. 1 Credit.**

An introduction to medical imaging for the physical therapist. Topics include principles of diagnostic imaging, imaging equipment, and application of imaging in physical therapy. Imaging modalities covered include: plain radiographs, magnetic resonance, computed tomography, bone scan, ultrasound, and fluoroscopy. Co-requisite: Doctor of Physical Therapy student.

**DPT 7100. Fundamentals of Clinical Pract. 3 Credits.**

Fundamental skills for physical therapists including patient/client management principles and practices such as examination techniques, history taking and interviewing skills, fundamental patient handling skills, clinical documentation and patient handling skills. Prerequisite: Doctor of Physical Therapy student.

**DPT 7110. Movement System I. 3 Credits.**

Application of kinesiology and biomechanical principles to the analysis and management of human movement, posture, joint structure and function, and gait. Examination of mechanical properties of tissue with respect to lifespan, injury and healing, and principles of diagnostic imaging. Prerequisite: Doctor of Physical Therapy student.

**DPT 7120. Movement System II. 3 Credits.**

Motor control/learning and development across the lifespan, and a theoretical framework to develop intervention strategies. Principles of examination and evaluation of normal and dysfunctional movement will be discussed, including posture, gait, reach and grasp. Electrodiagnostic testing will also be covered. Co-requisite: Doctor of Physical Therapy student.

**DPT 7130. Movement System III. 3 Credits.**

Utilize a movement systems approach to address the management of patients with multi-system involvement. Focus on the role of the physical therapist as primary care practitioner including emergency scenarios across the lifespan. Prerequisite: Doctor of Physical Therapy student.

**DPT 7140. Clinical Reasoning. 2 Credits.**

Fundamental clinical-decision making frameworks in contemporary physical therapy practice, using the International Classification of Functioning, Disability and Health (ICF) and the Hypothesis Oriented Algorithm for Clinicians within the context of patient/client management model. Prerequisite: Doctor of Physical Therapy student.

**DPT 7150. Psychsoc Aspects Hlth Wellbeing. 3 Credits.**

Psychosocial dimensions of health, illness, and disability across the lifespan and in consideration of diverse perspectives. Consideration of physical therapy implications for management of common mental health conditions and integrate patient and family-centered communication skills in simulated clinical situations. Prerequisite: Doctor of Physical Therapy student.

**DPT 7160. Rehabilitation Technology. 3 Credits.**

Evaluation, prescription, and patient / client education of rehabilitation technology used in physical therapy management of individuals to address or enhance movement across the lifespan. Topics will include prescription of and training with technology, devices, and environmental modifications. Prerequisite: Doctor of Physical Therapy student.

**DPT 7200. Musculoskeletal Management I. 4 Credits.**

Screening, examination, evaluation, diagnosis, prognosis, management and outcomes for patients with musculoskeletal dysfunction of the extremities are covered. Topics include pathophysiology, risk appraisal, medical and surgical management, and biopsychosocial considerations in the management of these conditions across the lifespan. Prerequisite: Doctor of Physical Therapy student.

**DPT 7210. Musculoskeletal Management II. 4 Credits.**

Screening, examination, evaluation, diagnosis, prognosis, management and outcomes for patients with musculoskeletal dysfunction of the spine are covered. Topics include pathophysiology, risk appraisal, medical and surgical management, and biopsychosocial considerations in the management of these conditions across the lifespan. Prerequisite: Doctor of Physical Therapy student.

**DPT 7220. Musculoskeletal Management III. 4 Credits.**

Screening, examination, evaluation, diagnosis, prognosis, intervention and outcomes for patients with complex musculoskeletal system dysfunction are covered. Case management as movement system experts of patient/client populations with complex primary or underlying conditions across the lifespan are explored. Co-requisite: Doctor of Physical Therapy student.

**DPT 7230. Neurological Management I. 3 Credits.**

Focus on movement system dysfunction among individuals with neuromuscular conditions across the lifespan. Introduction to the principles and components of neurological examination and interventions emphasizing body structure/function with neuropathology considerations will be discussed and practiced. Co-requisite: Doctor of Physical Therapy student.

**DPT 7240. Neurological Management II. 3 Credits.**

Screening, examination, diagnosis, prognosis, management and outcomes for individuals with neurological impairments across the life span are covered. Evaluation and interventions of the movement system deficits considering pathophysiology and biopsychosocial framework will be addressed through case-based learning. Emphasis will be on neuroplasticity, postural control, gait, clinical reasoning and diagnosis-specific considerations. Co-requisite: Doctor of Physical Therapy student.

**DPT 7250. Neurological Management III. 4 Credits.**

Incorporate advanced clinical decision making in the plan of care of complex patients across the lifespan. Consideration of differential diagnosis, patient environment and case management will be discussed. Prevention, risk reduction strategies and continuum of care will be emphasized. Co-requisites: Doctor of Physical Therapy student.

**DPT 7260. Cardiovasc and Pulmonary Mgt. 4 Credits.**

Screening, examination, evaluation, diagnosis, prognosis, management and outcomes for patients with cardiovascular and pulmonary conditions are covered. Topics include pathophysiology, risk appraisal, medical and surgical management, and biopsychosocial considerations in the management of these conditions across the lifespan. Co-requisite: Doctor of Physical Therapy student.

**DPT 7270. Integmnt, Endocrine, Multi Sys. 3 Credits.**

Screening, examination, evaluation, diagnosis, prognosis, management and outcomes for patients with integumentary, endocrine, lymphatic, oncology, autoimmune and multisystem conditions are covered. Topics include pathophysiology, risk appraisal, medical and surgical management, and biopsychosocial considerations across the lifespan. Prerequisite: Doctor of Physical Therapy student.

**DPT 7491. Doctoral Dissertation Research. 1-18 Credits.****DPT 7500. Professional Form/Leadershp I. 2 Credits.**

Introduces professionalism, leadership, ethics, cultural competence, interprofessional education-practice and teaching-learning within the role of a doctoring professional, physical therapist contemporary practice and the healthcare environment. Prerequisite: Doctor of Physical Therapy student.

**DPT 7510. Prof Formation/Leadrsph II-ICE. 2 Credits.**

Advanced study of professional formation and personal leadership development within the role of a doctoring professional. Focuses on role identity, professional practice expectations within ethical/legal standards of practice, teaching-learning, supervision/delegation, and introduces IPE role within Integrated Clinical Experiences (ICE). Prerequisite: Doctor of Physical Therapy student.

**DPT 7520. Prof Formatn/Leadrsph III-ICE. 2 Credits.**

Advanced concepts of professional formation and personal leadership development within the role of a doctoring professional. Focuses on collaborative practice expectations within ethical/legal standards of practice, teaching-learning, supervision/delegation, and IPE. Prepares for assuming responsibilities within Integrated Clinical Experiences (ICE). Prerequisite: Doctor of Physical Therapy student.

**DPT 7600. Clinical Edu Experience I. 3 Credits.**

Eight week supervised clinical experience in one of the following settings: outpatient, inpatient, or specialty clinics. Experience will include safe, effective, and comprehensive patient care. Students will demonstrate proficiency with skills applying foundational knowledge associated with patient care and management. Prerequisite: Doctor of Physical Therapy student.

**DPT 7610. Clinical Edu Experience IIA. 3 Credits.**

First of terminal clinical education experiences. Six week supervised clinical experience in one of the following settings: outpatient, inpatient, or specialty clinics. Experience will include safe, effective, and comprehensive patient care. Students will demonstrate proficiency with skills applying foundational knowledge associated with patient care and management. Prerequisite: Doctor of Physical Therapy student.

**DPT 7620. Clinical Edu Experience IIB. 3 Credits.**

Six week supervised clinical experience in one of the following settings: outpatient, inpatient, or specialty clinics. Experience will include safe, effective, and comprehensive patient care. Students will demonstrate proficiency with skills applying foundational knowledge associated with patient care and management. Prerequisite: Doctor of Physical Therapy student.

**DPT 7630. Clinical Edu Experience III. 6 Credits.**

Twelve week supervised clinical experience in one of the following settings: outpatient, inpatient, or specialty clinics. Experience will include safe, effective, and comprehensive patient care. Students will demonstrate proficiency with skills applying foundational knowledge associated with patient care and management. Prerequisite: Doctor of Physical Therapy student.

**DPT 7700. Seminar: Integrative Health. 1 Credit.**

Explores integrative health (IH) in the context of the patient/client management model, where physical therapists may collaborate with or refer to other health care practitioners to optimize patient health outcomes utilizing the principles of IH. Examines specific IH disciplines and modalities such as tai chi, etc. Co-requisite: Doctor of Physical Therapy student.

**DPT 7701. Seminar: Oncology Rehab. 1 Credit.**

Examination of the heterogeneity of cancer, and cancer treatment, as well as life after cancer and cancer treatment. Explores oncology rehabilitation including phase II and phase III exercise programs, lifestyle factors, nutrition, and lymphedema management. Introduces evidence-based oncology rehabilitation patient management. Co-requisite: Doctor of Physical Therapy student.

**DPT 7930. Doctoral Research Project I. 2 Credits.**

Covers research principles and design relevant to rehabilitation and physical therapy practice as it relates to systematic reviews, clinical epidemiology, intervention, diagnostic, and prognostic studies. Students will apply outcomes measurement science, comparative effectiveness research, and critical appraisal of original research studies, systematic reviews and clinical practice guidelines. Co-requisite: Doctor of Physical Therapy student.

**DPT 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**DPT 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**DPT 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EARLY CHILDHOOD PRE K-3 (EDEC)****Courses****EDEC 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDEC 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



## EARLY CHILDHOOD SPECIAL EDUC (ECSP)

### Courses

#### **ECSP 5110. EI for Infants and Toddlers-GR. 3 Credits.**

An introduction to the field of Early Intervention for supporting infants and toddlers with and at risk for developmental delay or disability and their families. Stresses a routines-based and family-centered approach within the natural environment. Prerequisite: Early Childhood Special Education student or Instructor permission.

#### **ECSP 6100. Curriculum in ECSP. 3-4 Credits.**

Designing and implementing services and supports for young preschool-age children with diverse abilities. Topics include IEPs, embedding instruction, specialized instruction, and inclusion. Three credits, four credits with 30-hour field experience. Pre/Co-requisites: Special Education Graduate student; Praxis Core requirement fulfilled.

#### **ECSP 6120. Assessment in EI/ECSE. 3 Credits.**

Overview of the strengths and limitations of traditional and nontraditional assessments; legal responsibilities, eligibility, family, and cultural aspects. Pre/co-requisite: Special Education Graduate student.

#### **ECSP 6190. Seminar in EI/ECSE. 3 Credits.**

This seminar accompanies the student teaching or internship experiences. Students will create a variety of evidence-based products and complete their portfolios for licensure. Co-requisite: ECSP 6991.

#### **ECSP 6391. Master's Thesis Research. 1-18 Credits.**

Research leading toward completion of the Master's Thesis.

#### **ECSP 6550. Implementation Science in ECSP. 3 Credits.**

This course will focus on increasing the quantity and quality of ECI practitioners who can meet the diverse needs of children and families by increasing their knowledge of evidence-based strategies for addressing barriers to implementing EBPs in home and school.

#### **ECSP 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ECSP 6991. Internship: EI/ECSE. 1-18 Credits.**

Provides opportunity to integrate, deepen and challenge students' understanding of the multiple roles of early childhood special educators and early interventionists in their efforts to support infants, toddlers and/or preschoolers with diverse abilities and their families in a variety of contexts. Pre/Co-requisites: ECSP 5110, ECSP 6100, ECSP 6120; Praxis Core requirement fulfilled; GPA of at least 3.

#### **ECSP 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **ECSP 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

#### **ECSP 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## EDUCATION (EDSS)

### Courses

#### **EDSS 6391. Master's Thesis Research. 1-18 Credits.**

Thesis topic must be approved by a faculty committee.

#### **EDSS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **EDSS 6991. Internship. 1-18 Credits.**

Students will undertake an approved internship in an institution which reflects the particular area of interest and needs of the student. Prerequisite: Instructor permission.

#### **EDSS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **EDSS 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

#### **EDSS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## EDUCATION FOR CULTURAL AND LINGUISTIC DIVERSITY (ECLD)

### Courses

#### **ECLD 5005. Bilingual Education & Policy. 3 Credits.**

Provides a foundation of bilingual education policy and practices. Explores theories of language acquisition and their relevance to current policies affecting linguistically diverse students and how these policies have developed through history. Prerequisites: ECLD 1560, ECLD 2890; Graduate student; or Instructor permission.

#### **ECLD 6030. Language Policy, Race,&Schools. 3 Credits.**

Designed to provide a fundamental overview of theory and policy related to race and language, and how it shapes and impacts English acquisition for English learners in U.S. schools.

#### **ECLD 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **ECLD 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



## EDUCATION RESEARCH METHODS (EDRM)

### Courses

#### **EDRM 6110. Qualitative Research I. 3 Credits.**

Introduces qualitative methods as a research paradigm and develops skills in ethnographic techniques of field observation, interviewing, and data analysis. Out-of-class fieldwork required. Prerequisites: EDRM 6300 or its equivalent; Instructor permission.

#### **EDRM 6120. Adv Qual: Analysis & Writing. 3 Credits.**

Extends knowledge of and experience with qualitative research analysis and writing. Students must come with data collected previous to the start of the course. Prerequisite: EDRM 6110.

#### **EDRM 6130. Ethnographic Methods. 3 Credits.**

Immersive seminar in reading and analyzing ethnographic studies in education, including journal articles and book-length ethnographies matched to student interests. Examines the purpose, process, and production of ethnography in the field of education. Students conceptualize and design their own ethnographic research study. Prerequisite: An introduction to qualitative methods class (EDRM 6110 or equivalent).

#### **EDRM 6210. Quantitative Research I. 3 Credits.**

Provides knowledge and skill in conducting quantitative research studies for education and social services. Students apply social science research methods in a laboratory setting and produce a model study. Prerequisites: EDRM 6300 or its equivalent; Instructor permission.

#### **EDRM 6220. Adv Quant: Research Methods. 3 Credits.**

Covers advanced statistical techniques that are commonly used in education and social sciences. Prerequisite: EDRM 6210. Pre/Co-requisite: EDRM 6210.

#### **EDRM 6230. Adv Quant: Survey Research. 3 Credits.**

Introduces survey research design, implementation and planning processes. Prerequisite: EDRM 6210. Pre/Co-requisite: EDRM 6210.

#### **EDRM 6250. Adv Quant: Multilevel Mod MLM. 3 Credits.**

Introduction to the concepts and applications of multilevel modeling, also known as mixed effects modeling, and hierarchical linear modeling (HLM) in the education world Prerequisite: EDRM 6210. Co-requisite: EDRM 6210.

#### **EDRM 6300. Applied Educational Research. 3 Credits.**

Introduction to philosophical and methodological foundations of interpretive and empirical-analytic research; overview of qualitative, quantitative, and mixed-methods approaches. Preparation of critical readers and synthesizers of research studies.

#### **EDRM 6310. Mixed Methods Research: Adv. 3 Credits.**

An advanced research seminar designed to introduce students to mixed methods research, which integrate qualitative and quantitative approaches, inquiries, and data collection and analysis strategies into a single study or research project. Prerequisites: EDRM 6110, EDRM 6210. Pre/Co-requisites: EDRM 6110, EDRM 6210.

#### **EDRM 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **EDRM 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **EDRM 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **EDRM 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

#### **EDRM 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **EDRM 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **EDRM 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **EDRM 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **EDRM 7994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

#### **EDRM 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## ELECTRICAL ENGINEERING (EE)

### Courses

#### **EE 5310. Power System Analysis. 3 Credits.**

Transmission system modeling, operations and planning and energy policy are discussed to prepare students for the electricity and energy industry and power/energy systems research. Topics include: transmission line models, generator capability curves, transformer modeling and control, per-unit conversion, power flow calculations and software, smart grid. Prerequisite: Graduate Electrical Engineering student or Instructor permission.

**EE 5410. Digital VLSI Circuit Design. 0 or 3 Credits.**

Covers the techniques for the design, analysis and layout of digital CMOS circuits and systems. Major topics include MOSFET basics (structure and behavior of a MOSFET, CMOS fabrication, and design rules), detailed analysis of the CMOS circuits and systems (static behavior, ratioed vs. ratioless design), noise margins, computing rise and fall times, delay models, resistance. Prerequisite: Electrical Engineering Graduate student or Instructor permission. Cross-listed with: CMPE 5410.

**EE 5430. RF Circuit Design. 3 Credits.**

Design and analysis of radio frequency and microwave circuits. Covers radio frequency and microwave behavior of passive components, various transmission line structures, electromagnetic (EM) wave propagation in dielectric media, reflection coefficient and load impedance, network properties and applications, impedance matching network design, scattering parameters and their usage for RF. Prerequisite: Electrical Engineering Graduate student or Instructor permission.

**EE 5440. Gr Semiconductor Materials/Dev. 0 or 4 Credits.**

Covers energy band theory, effective mass, band structure and electronic properties of semiconductors. Transport of electrons and holes in bulk materials and across interfaces. MOSFETs, BJTs, pn junctions, and Schottky barriers. Experimental portion of course will have a laboratory component for electronic measurements of semiconductor devices. Prerequisite: Electrical Engineering Graduate student, Materials Science Graduate student, or Instructor permission. Cross-listed with: PHYS 5675.

**EE 5540. Real-Time Control Systems. 3 Credits.**

Digital control systems analysis and design. Topics include: difference equations, the Z-transforms, discrete-time transfer functions, state-space models, sampled-data systems, discretization, real-time control, microprocessor implementation, and optimal control. Project-based final. Prerequisite: Electrical Engineering Graduate student or Instructor permission. Cross-listed with: CMPE 5540.

**EE 5550. Autonomy. 3 Credits.**

Students learn how to make engineered systems autonomous/intelligent. Covers logic and algorithms, real-time estimation and control of dynamical systems, optimization and optimal planning, path planning for robots and autonomous vehicles, basics of artificial intelligence and machine learning, and ethics of automation. Applications include hover flight of quadrotor drones, perception and navigation of robots including robotic arms and self-driving vehicles, and autonomous control of the power grid. Prerequisites: Graduate student or Instructor permission; content knowledge of control systems (such as EE 3515) assumed.

**EE 5610. Information Theory. 3 Credits.**

Introduction to probability concepts of information theory; entropy of probability models; theoretical derivations of channel capacity; coding methods and theorems, sampling theorems. Prerequisite: Graduate student or Instructor permission.

**EE 5810. Digital Computer Design. 3 Credits.**

To gain a solid understanding of digital computer operating mechanisms and reconfigurable computing, and advance into hands-on experiences to design and debug digital computer system and embedded system. Field programmable gate arrays (FPGAs) will be utilized as the development platform. Prerequisite: Electrical Engineering Graduate student, Computer Science Graduate student, or Instructor permission. Cross-listed with: CMPE 5810, CS 5810.

**EE 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EE 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EE 6110. System Theory. 3 Credits.**

Linear vector spaces. State equations and solution. Diagonalization and Jordan canonical form. Orthogonal and biorthogonal projections. Quadratic forms. Spectral resolution. Principal component analysis, singular value decomposition and Karhunen-Loeve transform. Compressive sensing. Prerequisites: MATH 3230 or MATH 3201; MATH 2544; EE 3150 or ME 2120.

**EE 6120. Stochastic Processes. 3 Credits.**

Probability theory, random variables and stochastic processes. Response of linear systems to random inputs. Applications in engineering. Prerequisites: EE 3150 or ME 2120; STAT 2510 or STAT 2430.

**EE 6130. Convex Optimization. 3 Credits.**

Provides advanced mathematical tools to recognize optimization problems from applications, presents rigorous theory of convex optimization with an emphasis on results that are helpful for implementation/computation/modeling, providing student with the experience and understanding necessary to use the tools in their own research work or applications. Prerequisites: Linear Algebra, multi-variable calculus.

**EE 6391. Master's Thesis Research. 1-18 Credits.****EE 6392. Master's Project Research. 1-3 Credits.**

Master's Project.

**EE 6520. Nonlinear System Theory. 3 Credits.**

Basic nonlinear methods including computational and geometrical techniques for analysis of nonlinear systems. Describing function methods and bifurcation and catastrophe theory. Sensitivity and stability considerations. Prerequisite: MATH 3230 or MATH 3201. Pre/Co-requisite: EE 6110 recommended.

**EE 6530. Estimation Theory. 3 Credits.**

Foundations of linear and nonlinear least squares estimation, smoothing and prediction, computational aspects, Kalman filtering, nonlinear filtering, parameter identification, and adaptive filtering. Applications to students' research. Pre/co-requisite: STAT 2510.

**EE 6990. Special Topics. 1-18 Credits.**

Advanced topics of current interest in Electrical Engineering. Prerequisite: Instructor permission.

**EE 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**EE 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EE 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EE 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**EE 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EE 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**EE 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ELEMENTARY EDUCATION (EDEL)****Courses****EDEL 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis. Thesis topic must be approved by a faculty committee.

**EDEL 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDEL 6991. Teaching Internship. 1-18 Credits.**

Supervised teaching experiences on a full-time basis, with related seminars in teaching subject. Prerequisite: Permission of coordinator of Professional Laboratory Experiences.

**EDEL 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EMERGENCY MEDICINE (EMED)****Courses****EMED 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EMED 5994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**EMED 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EMED 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EMED 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**EMED 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EMED 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EMED 7994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**ENGINEERING (ENGR)****Courses****ENGR 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ENGR 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ENGINEERING MANAGEMENT (EMGT)****Courses****EMGT 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EMGT 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**EMGT 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EMGT 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



**EMGT 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ENGINEERING AND MATHEMATICAL SCIENCES (CEMS)****Courses****CEMS 6010. Resrch Methds Ethics Communica. 3 Credits.**

Introduction to research methods for Graduate students including the development of research questions, literature review, principles of effective written and oral technical communication, and the publishing process. Ethical issues associated with data collection, accuracy and peer-review will be addressed. Prerequisite: College of Engineering and Mathematical Sciences Graduate student.

**ENGLISH (ENGL)****Courses****ENGL 5010. Topics in Lang/Critical Theory. 3 Credits.**

Exploration of topics in Lang/Critical Theory. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**ENGL 5100. Topics in Theme and Genre. 3 Credits.**

Exploration of topics in theme and genre. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**ENGL 5300. Topics in Literature to 1800. 3 Credits.**

Topics in literature before 1800. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**ENGL 5901. Topics In: Gr English. 3 Credits.**

Exploration of topics in English. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**ENGL 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles. May be repeated for credit with different content.

**ENGL 6010. Surv of Lit Theory & Criticism. 3 Credits.**

Theory and Criticism. Prerequisite: Graduate student.

**ENGL 6060. Topics in Cultural Studies. 3 Credits.**

Advanced textual analyses that broaden the concept of text to include music, film and television, the visual arts, popular culture and everyday meanings and practices. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**ENGL 6391. Master's Thesis Research. 1-18 Credits.**

Research leading toward completion of the Master's Thesis.

**ENGL 6510. Topics in Literary Period. 3 Credits.**

Advanced survey of authors, themes, genres, and/or cultural context in a British or American literary period. Representative topics: British Renaissance; Restoration and Eighteenth Century; Victorian; American Renaissance. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**ENGL 6515. Topics in Major Author. 3 Credits.**

In-depth study of the works, critical reception, and context of an author writing in English. Representative topics: Chaucer; Shakespeare; Milton; Austen; Dickinson; Morrison. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**ENGL 6780. Topics in Comp & Rhetoric. 3 Credits.**

Introduction to current issues in the field. Representative topics: Rhetorical theory; gender, class, and composing; writing across the curriculum; collaborative learning, literature and composition. May be repeated for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**ENGL 6790. Teaching Writing I. 3 Credits.**

Introduces students to best practices in teaching college composition. Provides support for graduate teaching assistants' first semester teaching ENGL 1001. Prerequisites: Graduate student.

**ENGL 6795. Teaching Writing II. 3 Credits.**

Continued mentoring and professional development for graduate teaching assistants who have completed ENGL 6790. May be repeated once for credit. Prerequisites: ENGL 6790, appointment to a graduate teaching assistantship.

**ENGL 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ENGL 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**ENGL 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ENGL 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**ENGL 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



## EXERCISE SCIENCE (EXSC)

### Courses

#### **EXSC 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **EXSC 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **EXSC 6020. EBP in Physical Activity. 3 Credits.**

The course addresses the role of research in physical activity promotion and practice including utilization, dissemination and models of evidence-based practice. Refereed research and systematic reviews will be utilized to examine issues and consensus on aspects of measurement of-, factors influencing-, and promoting physical activity. Prerequisite: Undergraduate Statistics course or Instructor permission.

#### **EXSC 6030. Phys Act & Chronic Dis Epidem. 3 Credits.**

Understanding health benefits of physical activity on chronic disease prevention and health promotion throughout the life span, from clinical and public health perspectives. Discussion and application of real-life physical activity assessment, research, guidelines, and promotion in population levels.

#### **EXSC 6450. Exercise Assessment & Prescrip. 3 Credits.**

Expand upon the clinical aspects of exercise physiology to evaluate and prescriptive aspects of exercise programming. Students will gain an understanding of how to evaluate testing results and prescribe safe and effective exercise programs using ACSM guidelines. Prerequisite: Physical Activity & Wellness Science Graduate student.

#### **EXSC 6500. Physical Activity and Disease. 3 Credits.**

Empirically based exploration of the relationship between physical activity and chronic disease conditions such as obesity, cardiovascular disease, and type 2 diabetes. Co-requisite: Physical Activity & Wellness Science Graduate student.

#### **EXSC 6540. Phys Act & Wellness Promotion. 3 Credits.**

Examines leading theories of health behavior with emphasis on applying theoretical constructs in effective physical activity promotion. Multiple levels of influence on promoting behavior change, including policies, environments, social and personal factors, will be considered in light of contemporary challenges in health promotion. Prerequisite: Physical Activity & Wellness Science Graduate student.

#### **EXSC 6600. Energy Balance. 3 Credits.**

Empirically based exploration of human metabolism, energy balance, and weight management. An in-depth study of gold- standard and cutting- edge scientific literature regarding the impact of energy expenditure through physical activity and energy. Prerequisite: Physical Activity & Wellness Science Graduate student.

#### **EXSC 6650. Activity in the Underserved. 3 Credits.**

Emphasizes content areas related to access and accommodation in physical activity for individuals from underserved populations. Foci will include health promotion, physical activity barriers, and designing and modifying physical activity programs in schools, recreational programs, community settings, and sport. Prerequisite: Physical Activity & Wellness Science Graduate student.

#### **EXSC 6680. Phys Act Prog Design and Mngmt. 3 Credits.**

Comprehensive overview of the practical and theoretical skills needed to plan and implement physical activity and wellness programs in a variety of settings. An examination of the best practices in programming and recommendations for designing evidence- and theory-based interventions will be covered. Over the course of the semester, students will develop components of a health promotion program ultimately leading to the development of a comprehensive health promotion program. Co-requisite: Physical Activity & Wellness Science Graduate student.

#### **EXSC 6700. Phys Act: Communication & Eval. 3 Credits.**

Focus on implementation of physical activity promotion which includes effective communication strategies, assessing methods of implementation, and evaluation of program outcomes. Prerequisite: Physical Activity & Wellness Science Graduate student.

#### **EXSC 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **EXSC 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **EXSC 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **EXSC 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

#### **EXSC 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## FAMILY MEDICINE (FM)

### Courses

#### **FM 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **FM 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

## FOOD SYSTEMS (FS)

### Courses

#### **FS 6210. Econ of Sustainable Food Syst. 3 Credits.**

Utilizes common economic tools, ideas and application to analyze issues concerning the sustainability of food systems, using a combination of readings, lectures and discussions. Cross-listed with: CDAE 6210.

#### **FS 6350. Qualitative Research Methods. 3 Credits.**

Provides an overview of qualitative research methods and an opportunity to apply such research methods for topics focusing on food systems and health. Cross-listed with: CDAE 6350.

#### **FS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

#### **FS 6392. Master's Project Research. 1-4 Credits.**

Food Systems Professional Track students are required to complete a final project. Students will design a project that must be approved by the Project Faculty Committee.

#### **FS 6400. Food Systems & Society. 3 Credits.**

Examines key questions being asked about our contemporary food systems by examining social science and humanities scholarship and the applications for public policy.

#### **FS 6450. Food Systems & Science. 3 Credits.**

Examines key questions being asked about our contemporary food system by examining natural and life sciences scholarship and the applications for public policy.

#### **FS 6475. Food Systems & Policy. 3 Credits.**

The third in the series of required core courses for Food Systems graduate students. Focuses on understanding the research and policy interface of food systems. Includes a variety of experiential and hands-on methods and approaches including self-reflection, group work, policy analysis, direct policy engagement, and case studies. Prerequisite: Graduate student standing.

#### **FS 6510. Professional Development Sem.. 1 Credit.**

This seminar will prepare students to successfully navigate the graduate school experience.

#### **FS 6520. Research Design Seminar. 3 Credits.**

The Research Design Seminar will develop the students' abilities to conduct academic research and formulate a relevant study design with an emphasis on mixed-methods.

#### **FS 6550. Ethics and the Food System. 3 Credits.**

Focus on certain food ethics issues. The in-depth consideration of these issues will build philosophical skills as well as knowledge as to the interdependence and interconnection of the food system. Prerequisite: Instructor permission only.

#### **FS 6600. Dissertation Writing Seminar. 1 Credit.**

This seminar will prepare students to successfully navigate the dissertation process. The course serves as a Doctoral competency.

#### **FS 6810. Issues & Solutions Seminar. 1 Credit.**

Focuses on transdisciplinary research intended to address the 'wicked problems' of contemporary food systems through weekly presentations of on-going research by University of Vermont faculty and Doctoral students.

#### **FS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **FS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **FS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **FS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **FS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research requirement (up to 30 research credits) for Food Systems Doctoral students.

#### **FS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **FS 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **FS 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## FORESTRY (FOR)

### Courses

#### **FOR 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **FOR 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **FOR 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **FOR 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**FOR 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**FOUNDATIONS (EDFS)****Courses****EDFS 6010. Intro to Interdisciplinarity. 3 Credits.**

Introduction to the long-standing tradition of interdisciplinary inquiry. Begins with a short overview of this diverse field and then explores particular innovations in the humanities, arts, and sciences that have formed around interdisciplinarity. Examines a variety of interdisciplinary research and analyze the flexibilities and challenges of interdisciplinary inquiry.

**EDFS 6020. Philosophy of Education. 3 Credits.**

Critical examination of key issues in historical and contemporary philosophy of education including the aims of education, the relationship between justice and education, and how education may both reinforce inequities and also challenge them.

**EDFS 6050. Race, Justice, and Education. 3 Credits.**

Introduces students to key readings in theories and histories of the relationship among race, justice, and education. Starting with abolitionists in the 19th century and practices of literacy in enslaved communities, examines how education has played a key role in encouraging racial equity and justice up to contemporary times.

**EDFS 6060. Genders Sexualities Schooling. 3 Credits.**

Introduction to how gender, gender identity, and sexuality have shaped educational experiences in the U.S. Explores how enduring forms of bias, including sexism, racism, homophobia, and transphobia continue to pose challenges for all genders. Interdisciplinary readings will combine contemporary social science literature, historical analyses, and theoretical engagement with the core themes of the class.

**EDFS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis. Thesis topic must be approved by a faculty committee.

**EDFS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDFS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**EDFS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDFS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDFS 7040. Soc Process & Institutional Chg. 3 Credits.**

Critical analysis of theory and research related to justice, caring, and change in education and other social institutions. Focus: ideology, diversity, and management of knowledge.

**EDFS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDFS 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**EDFS 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOLOGY (GEOL)****Courses****GEOL 5405. Gr Geochem of Natural Waters. 3 Credits.**

Basic concepts of chemical equilibria applied to natural waters, including thermodynamics, pH, oxidation-reduction, weathering, and solution equilibria. Prerequisite: Graduate student.

**GEOL 5510. Gr Geomaterial Analysis. 3 Credits.**

Advanced knowledge and practical skills in the analysis and characterization of geological materials is a necessary first step in countless research projects. Geomaterial is all inorganic material that constitutes the Earth layers. As such, virtually every research project in geosciences, engineering, environmental science, physical geography, archeology, etc, starts with a thorough characterization of geomaterials. Prerequisite: Graduate student in Chemistry, Geology, Natural Resources, Physics, Plant & Soil Sciences, Civil & Environmental Engineering, or Material Sciences.

**GEOL 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOL 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**GEOL 6400. Topics in Env't & Surface Geo. 1-3 Credits.**

Exploration of geologic constraints on environmental problems such as groundwater flow, contaminant transport, slope stability, climate change, sedimentation, deforestation, and earthquake hazards. Extensive readings and student-led discussions. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student in science, natural resources, or engineering.

**GEOL 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GEOL 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.



**GEOL 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GEOL 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**GEOL 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GRADUATE (GRAD)****Courses****GRAD 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GRAD 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**GRAD 9010. Continuous Reg Less Half. 0.25-4 Credits.****GRAD 9020. Continuous Reg Half Time. 5-8 Credits.****GRAD 9030. Continuous Reg Full Time. 9 Credits.****GRADUATE MEDICAL (GRMD)**

GRMD graduate courses are currently inactive.

**GRADUATE NURSING (GRNS)****Courses****GRNS 5130. Gr Pathophysiology. 3 Credits.**

Designed to provide the student with a working foundation of both pathophysiology and pharmacology. The phenomena that result in dysfunction in human physiologic response will be examined within a holistic context across the lifespan. An understanding of the basic concepts underlying common pathways in disease is emphasized. Prerequisite: Direct Entry to Professional Nursing, Direct Entry to Clinical Nurse Leader student. Co-requisite: GRNS 5280.

**GRNS 5280. Pharmacology. 3 Credits.**

Addresses pharmacological management pertaining to patients across the lifespan, while defining the professional nurse's role and responsibilities in drug therapy. Pharmacological principles such as; pharmaceuticals, pharmacokinetics, and pharmacodynamics will be introduced, discussed and incorporated into instructional activities to ensure that students possess the knowledge necessary to actively apply pharmacological principles in the delivery. Prerequisite: Direct Entry to Professional Nursing, Direct Entry to Clinical Nurse Leader student. Co-requisite: GRNS 5130.

**GRNS 5320. Science of Nursing:Children. 3 Credits.**

Focuses on the human experience of children and adolescents with alterations in health. An integration of theory, research, and practice will be utilized to cover (1) illnesses, (2) anticipatory guidance with patients and their families for the purposes of disease prevention, and (3) deliver individualized nursing care according to the patient's needs. Prerequisites: GRNS 5280, GRNS 5130; Direct Entry to Professional Nursing, Direct Entry to Clinical Nurse Leader standing.

**GRNS 5990. Special Topics. 0.25-18 Credits.**

See Schedule of Courses for specific titles.

**GRNS 5993. Independent Study. 0.25-6 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GRNS 6000. Professional Nursing Issues. 2 Credits.**

Issues affecting nursing practice provide framework for examination of and socialization into professional nursing. The historical, legal, ethical, cultural, structural, and economic aspects of nursing practice will be explored. Prerequisite: Admission to Direct Entry Program in Nursing. Co-requisites: GRNS 5280, GRNS 6020, GRNS 6030. Pre/co-requisite: GRNS 5130.

**GRNS 6020. Sci Nsg:Adults Across Life I. 3 Credits.**

Identification and treatment of human responses to pathophysiological problems in adults with acute, chronic, or terminal conditions, with principles of general acute nursing practice emphasized. Prerequisite: Admission to Direct Entry Program in Nursing. Co-requisites: GRNS 6000, PRNU 3228, GRNS 6030, NURS 3220.

**GRNS 6030. Practicum:Adults Lifespan I. 3.75 Credits.**

An initial experience in the simulation lab followed by a supervised practicum in which students care for adults with acute, chronic, and/or terminal conditions. During the instruction in the simulation lab, attention focuses on the development of scientific understanding of nursing practice, psychomotor skills, and communication skills. Prerequisite: Admission to the Direct Entry Program in Nursing or Direct Clinical Nurse Leader program. Co-requisites: GRNS 6000, GRNS 5280, GRNS 6020, GRNS 5130.

**GRNS 6040. Pract:Adults Lifespan II. 1.25 Credit.**

Supervised clinical nursing practicum provides an 80 hour immersion experience in the medical/surgical acute care setting. Prerequisites: GRNS 6000, PRNU 3228, GRNS 6020, GRNS 6030, NURS 3220.

**GRNS 6050. Pract:Cmplx Nsg Care Adults. 2.5 Credits.**

Provides knowledge and skills while caring for adults with acute, chronic, and terminal health conditions. Students will develop skills in organizing and prioritizing care for multiple patients while demonstrating practice consistent with the ANA Scope and Standards of Practice (2010). Daily clinical discussions will provide an opportunity to process interpersonal and professional issues. Prerequisite: GRNS 6040. Co-requisites: GRNS 5320, GRNS 6060, GRNS 6080, GRNS 6090, GRNS 6120.



**GRNS 6060. Sci of Nsg: Mental Health. 3 Credits.**

Theories of human behavior form the foundation for understanding mental health and acute and chronic mental illnesses. Focus on assessment, treatment, and nursing care. Prerequisite: GRNS 6040. Co-requisite: GRNS 6120. Pre/Co-requisites: GRNS 6050, GRNS 6080, GRNS 6090, GRNS 5320.

**GRNS 6070. Practicum: Mental Health. 1.5 Credit.**

The implementation of holistic nursing care for clients with mental illness based on theoretical and conceptual models and rationale. Faculty supervise students in complex practice settings using all steps of the nursing process based on psychiatric-mental health scope and standards. Collaboration is emphasized with all members of the interprofessional team. Prerequisites: GRNS 6050, GRNS 6060.

**GRNS 6080. Sci of Nsg: Gyn Care & Family. 3 Credits.**

Focus on healthy maternal-newborn care, and promotion of wellness and family integrity during transition within a family-centered framework. Prerequisite: GRNS 6040. Co-requisites: GRNS 6090, PRNU 3232.

**GRNS 6090. Practicum: Women & Newborns. 1.25 Credit.**

Attention is focused on provision of nursing care to the expectant, laboring, or post-partum mother and to the newborn infant. Prerequisite: GRNS 6040. Pre/Co-requisite: GRNS 6080.

**GRNS 6110. Practicum: Children. 1.25 Credit.**

Faculty guide students in clinical settings to maximize exposure to all aspects of the nursing process with children having selected pathophysiological problems. Prerequisite: GRNS 5320. Pre/co-requisites: GRNS 6070, GRNS 6140, GRNS 6150.

**GRNS 6120. Sci of Nsg: Adults Lifespan II. 2 Credits.**

Continued exploration of pathophysiological phenomena of health conditions commonly experienced in an acute care setting. Prerequisite: GRNS 6040. Co-requisites: GRNS 6060, GRNS 6080, GRNS 6090, PRNU 3232.

**GRNS 6140. Public Health Nursing. 2 Credits.**

Emphasis on the epidemiological and biostatistical indicators of population health, methods of community health analysis, structure and function of federal, state and local health organizations. Prerequisites: GRNS 5320, GRNS 6110, GRNS 6120. Co-requisite: GRNS 6150.

**GRNS 6150. Practicum: Public Health Nurs. 1 Credit.**

Statewide population-focused public health nursing experience involving needs assessment, program development, case management, health promotion, disease prevention, and protection strategies, with opportunities for interdisciplinary collaboration. Co-requisite: GRNS 6140.

**GRNS 6210. Professional Role Development. 3 Credits.**

Examination of role development in advanced generalist and advanced nursing practice; including the development of competencies, licensing, and other specialized roles in nursing.

**GRNS 6220. Org, Deliv & Finance Hlth Care. 3 Credits.**

Structure, organization, financing, and delivery of health care through complex systems in the United States. Focus on economic, social, ethical, political, and global structures. Prerequisite: Registered nurse licensure or Graduate Nursing student.

**GRNS 6240. Theoretical Foundation Nsg Sci. 3 Credits.**

Exploration of philosophy of science, theory, and development of nursing knowledge. Nursing and non-nursing philosophies and theories relevant to advanced nursing practice will be discussed.

**GRNS 6250. Genetics for Clinicians. 3 Credits.**

This course provides an overview of contemporary human genetics and genomics with application to clinical practice. Cross-listed with: PATH 6250.

**GRNS 6260. Hlth Care Eth, Policy, Politics. 3 Credits.**

Examination of the processes of policy analysis and development with focus on advocacy. Prerequisite: Registered nurse licensure or Graduate Nursing student.

**GRNS 6270. Adv Topics in Hlth Informatics. 3 Credits.**

This course provides an overview of informatics, the transformation of data into information, knowledge, decisions and actions to improve outcomes. This course offers the student an opportunity to study advanced topics in health informatics. Topics vary by offering; periodic offering at intervals that may exceed four years. Pre/Co-requisites: GRNS 6220, GRNS 7000.

**GRNS 6280. Quality in Healthcare. 3 Credits.**

Introduces students to the principles and practices of health care quality and quality improvement. Principles in the design and management of continual improvement activities will be presented and applied. Cross-listed with: CTS 6020.

**GRNS 6300. Adv Concepts in HAPP. 5 Credits.**

Designed to provide students with the knowledge, skills, and competencies necessary for providing exceptional patient-centered care. Students will delve deep into various aspects of advanced pathophysiology, pharmacology, and health assessment, fostering effective interdisciplinary collaboration, and ensuring ethical and legal competence for advanced nursing practice. Prerequisite: Direct Entry to Master of Science in Nursing or Master of Science in Nursing student.

**GRNS 6301. Research, QI & EBP. 3 Credits.**

Provides nursing professionals with the knowledge and skills to critically appraise, conduct, apply, and disseminate research in healthcare settings. Students will integrate and apply advanced research, quality improvement methodologies, and evidence-based practice principles to develop the conceptual basis and methodological approach to their master's project or thesis. Principles of ethics, interprofessional, and collaborative practice are incorporated in proposal development. Prerequisite: STAT 5000. Co-requisite: GRNS 6302.

**GRNS 6302. Quality & Informatics. 3 Credits.**

Nursing professionals play a pivotal role in delivering high-quality patient care while harnessing the power of technology and data-driven insights. This course is designed to empower students with the knowledge and skills necessary to excel in a dynamic healthcare environment. Students will be introduced to core concepts from both the informatics and quality domains, allowing them to integrate new concepts and apply reflective practice to the ways in which they use these skills every day. Prerequisite: STAT 5000. Co-requisite: GRNS 6301.

**GRNS 6303. Mindfulness & Compassion. 2 Credits.**

Critically examines the current body of knowledge associated with the development of compassion fatigue and professional burnout. Students will evaluate and apply integrative health practices that promote nurse, healthcare provider, and patient wellness. With an emphasis on reflective practice, students will contribute to an environment that promotes self-care, personal health, and wellbeing for self and others.

**GRNS 6304. Planetary Health for HCP. 3 Credits.**

Delves into the nexus between population health and the Earth, emphasizing the repercussions of human-induced environmental degradation, climate change, and biodiversity loss on planetary wellbeing. Students will grasp the intricacies of these challenges and develop strategies to foster a sustainable, equitable, and just future that safeguards the health and flourishing of not only humans but also non-human species and the Earth itself, broadening the scope of care to encompass the entire ecosystem.

**GRNS 6305. Transformational Leadership. 3 Credits.**

Delves into the dynamic and evolving field of nursing leadership. Through comprehensive study and critical analysis, students explore innovative leadership models, ethical dilemmas, and effective communication strategies specific to healthcare settings. By integrating theory and practice, this course empowers nursing professionals to become transformational leaders capable of driving positive change within healthcare organizations. Prerequisite: Passing comprehensive exam. Pre/co-requisite: GRNS 6306.

**GRNS 6306. Project & Thesis Seminar. 1 Credit.**

Builds on previous work completed in Research, Quality Improvement Methods, and Evidenced Based Practice course. Students refine and operationalize their master's thesis or project. Through class discussions, peer feedback, and faculty guidance, students focus on finalizing their pre-proposal as well as formulating a thesis or project committee and an appropriate timeline for completion of key elements and criterion. Prerequisites: STAT 5000, GRNS 6301, GRNS 6302, GRNS 6240.

**GRNS 6350. Adv Pathophysiology. 3 Credits.**

In-depth examination of the biological and physical manifestations of disease as they correlate with pathophysiology to guide clinical decision making of the APRN and CNL. Prerequisite: Registered Nurse license or completion of Direct Entry Program in Nursing. Pre/Co-requisite: GRNS 7040.

**GRNS 6392. Master's Project Research. 1-3 Credits.**

Self-designed clinical paper or innovative production pertinent to advanced nursing practice. Prerequisites: Instructor permission. Pre/Co-requisite: Comprehensive Exam (completed prior to project presentation).

**GRNS 6430. CNL Project Seminar I. 1 Credit.**

Provides an overview of the role of the Clinical Nurse Leader as a change agent at the point of care. Prerequisites: GRNS 6270, GRNS 6350. Co-requisites: GRNS 6280, NH 6899.

**GRNS 6440. CNL Practicum I. 1 Credit.**

Students explore the clinical microsystem and identify areas to improve patient safety and health care outcomes. Students complete a minimum of 120 practicum hours in a practice setting(s) with clinical mentor(s) agreed upon by the student and the course faculty. Pre/Co-requisites: GRNS 6260, GRNS 6270, GRNS 6280, GRNS 6350, GRNS 6430, NH 6899.

**GRNS 6450. CNL Project Seminar II. 1 Credit.**

Focuses on further refinement and completion of the Clinical Nurse Leader project proposal. The Clinical Nurse Leader project emphasis is on unit and organizational culture, structure and function, and effectiveness while considering relevant cost, quality, and patient outcome data. Prerequisites: GRNS 6430, GRNS 6280. Co-requisites: GRNS 6210, GRNS 6220, GRNS 7060.

**GRNS 6460. CNL Practicum II. 0.75 Credits.**

Students explore the clinical microsystem and identify areas to improve patient safety and health care outcomes in the inpatient and outpatient setting to inform the Clinical Nurse Leader project. A minimum of 90 practicum hours will be completed in a setting(s) with clinical mentor(s) agreed upon by the student and the course instructor. Prerequisites: GRNS 6430, GRNS 6440. Co-requisites: GRNS 6210, GRNS 6220, GRNS 7060.

**GRNS 6470. CNL Project Seminar III. 0.5 Credits.**

Students complete the implementation phase of the Clinical Nurse Leader project and initiate project evaluation measures. Details of process measures and outcomes, observed associations between outcomes, interventions, and relevant contextual elements, consequences of project implementation, and analytic strategies will be emphasized. Prerequisites: GRNS 6450, GRNS 6460. Co-requisite: GRNS 6480.

**GRNS 6480. CNL Clin Immersion Practicum. 2.5 Credits.**

Designed to implement and evaluate the Clinical Nurse Leader quality improvement project. Students will implement and evaluate the select microsystem change aimed to improve patient safety and outcomes. Students will evaluate the impact of the practice change and disseminate findings and implications for practice change. Prerequisite: GRNS 6460. Co-requisite: GRNS 6430.

**GRNS 6990. Special Topics. 0.25-18 Credits.**

Topics of interest to Graduate Nursing which are based on theory, research or advanced practice. Course content will deal with topics beyond the scope of existing formal courses or Doctor of Nursing Practice project. Prerequisite: Instructor permission.

**GRNS 6993. Independent Study. 0.25-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GRNS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GRNS 7000. Population-Based Hlth for APN. 3 Credits.**

The role of advanced practitioners in the care of populations with an emphasis on the U. S. health care system.

**GRNS 7010. Leadership of HlthCare Systems. 3 Credits.**

Planning and implementation of programs, projects or systems of health care delivery. Prerequisite: GRNS 6220.

**GRNS 7040. Adv Pharmacology APRN. 3 Credits.**

In-depth examination of the pharmacokinetics and pharmacodynamics of select drugs for acute and chronic health conditions. Ethical and legal standards of prescriptive authority explored. Pre/Co-requisite: GRNS 6350.

**GRNS 7050. Adv Neuropsychopharmacology. 3 Credits.**

In-depth examination of the pharmacokinetics and pharmacodynamics of drugs used to treat individuals with acute and chronic pain, neurologic and psychiatric illnesses across the lifespan. Prerequisites: GRNS 6350, GRNS 7040.

**GRNS 7060. Adv Hlth Assessment. 3 Credits.**

Development of advanced knowledge and skills in systematic collection, organization, interpretation, and communication of data necessary for formulation of nursing and medical diagnoses. Lab fee required. Prerequisite: Basic physical examination course. Pre/co-requisite: GRNS 6350.

**GRNS 7070. Opt Hlth & Mgt Com Hlth Issues. 2 Credits.**

Assessment and optimization of health of adolescents and adults. Diagnostic reasoning and management of common acute health conditions. Prerequisites: GRNS 6350, GRNS 7040, GRNS 7060. Co-requisites: GRNS 7050, GRNS 7080.

**GRNS 7080. Prac:Opt Hlth&Mgt Com Hlt Iss. 1 Credit.**

Assessment and optimization of health of adolescents and adults. Diagnostic reasoning and management of common acute health conditions. Prerequisites: GRNS 6350, GRNS 7040, GRNS 7060. Co-requisites: GRNS 7050, GRNS 7070.

**GRNS 7090. Pediatric Concepts APRN. 3 Credits.**

APN care to children and their families with an emphasis on the developmental, psychosocial, cultural, ethical, and spiritual needs of children and families. Pre/Co-requisites: GRNS 7050, GRNS 7070, GRNS 7080.

**GRNS 7100. Primary Care Mgmt Child & Adol. 3 Credits.**

Application in a clinical setting(s): assessment, evaluation, diagnostic reasoning, and management of common episodic and chronic health conditions in provision of primary care to children and adolescents. Prerequisites: GRNS 7050, GRNS 7070, GRNS 7080, GRNS 7090. Co-requisite: GRNS 7110.

**GRNS 7101. Radiology for Primary Care. 0.5 Credits.**

Focuses on the basic and applied principles of ordering and interpreting radiologic studies within the clinical setting. Focus on the understanding of basic principles of interpretation primarily of plain film, but will touch on CT, MRI and ultrasound evaluation as well, and how these diagnostic strategies may be wisely used in a clinical setting. Prerequisites: GRNS 7070, GRNS 7080, GRNS 7300.

**GRNS 7102. EKG for Primary Care. 0.5 Credits.**

Provides students with the fundamental skills and knowledge necessary to interpret and analyze electrocardiograms (EKGs) in a primary care setting. Through a combination of lectures, hands-on practice, and case studies, participants will gain proficiency in identifying common cardiac arrhythmias, recognizing ischemic changes, and assessing the overall cardiac health of their patients. Prerequisites: GRNS 7070, GRNS 7080, GRNS 7300.

**GRNS 7103. Procedures for Primary Care. 0.5 Credits.**

Provides hands on instruction using a combination of lectures, task trainers, and simulation to learn the indications for, techniques of, and application of common office procedures in the primary care setting. Prerequisites: GRNS 7070, GRNS 7080, GRNS 7300.

**GRNS 7110. Practicum: Child & Adolescents. 1 Credit.**

Application in a clinical setting(s): assessment, evaluation, diagnostic reasoning, and management of common episodic and chronic health conditions in provision of primary care to children and adolescents. Prerequisites: GRNS 7050, GRNS 7070, GRNS 7080, GRNS 7090. Co-requisite: GRNS 7100.

**GRNS 7120. Adv Nsg Prac of Older Adult. 3 Credits.**

Focus on health and disease and associated care and treatment of older persons by the advanced practice nurse. Prerequisites: GRNS 6350, GRNS 7040, GRNS 7060, GRNS 7070, GRNS 7080. Pre/Co-requisite: GRNS 7050.

**GRNS 7130. Practicum: Nursing Older Adult. 0.5 Credits.**

Practice assessment and care coordination skills in a practicum working with older adults in a variety of settings. Prerequisites: GRNS 7070, GRNS 7080. Co-requisite: GRNS 7120.

**GRNS 7140. Prim Care Acute&Comm Hlth Cond. 3 Credits.**

Focus will be on the assessment, evaluation and management of common episodic conditions in primary care in the Family Nurse Practitioner and Adult/Gerontology Nurse Practitioner tracks. Prerequisites: GRNS 7070, GRNS 7080, GRNS 7170, GRNS 7180. Co-requisite: GRNS 7150.

**GRNS 7150. Practicum:Acute&Com Cond AGNP. 1 Credit.**

Practicum experience for assessment, evaluation and management of common episodic conditions in primary care in the Adult/Gerontology Nurse Practitioner track. Prerequisites: GRNS 7070, GRNS 7080, GRNS 7170, GRNS 7180. Co-requisite: GRNS 7140.

**GRNS 7160. Practicum:Acute&Com Cond FNP. 1 Credit.**

Practicum experience for assessment, evaluation and management of common episodic conditions in primary care in the Family Nurse Practitioner track. Prerequisites: GRNS 7070, GRNS 7080, GRNS 7090, GRNS 7100, GRNS 7110, GRNS 7170, GRNS 7180. Co-requisite: GRNS 7140.

**GRNS 7170. Mgt Women & Gendered Hlth Care. 2.25 Credits.**

Advanced nursing practice focusing on the assessment, diagnosis, management, and evaluation of acute and chronic health conditions commonly encountered in the area of women's and gendered related health conditions. Prerequisites: GRNS 7070, GRNS 7080, GRNS 7120. Co-requisite: GRNS 7180.



**GRNS 7180. PRAC: Women & Gender Incl Hlth. 0.5 Credits.**

Focuses on the healthcare needs and disparities that affect individuals across the gender spectrum, with an emphasis on the health of individuals assigned female at birth (AFAB). Through a combination of interactive seminars and hands-on practicum experiences, participants will gain the expertise needed to provide culturally humble, evidence-based care in diverse clinical settings. Prerequisites: GRNS 7070, GRNS 7080. Co-requisite: GRNS 7170.

**GRNS 7181. Care of Indiv AFAB. 0.25 Credits.**

Delve into the multifaceted realm of individuals assigned female sex at birth (AFAB), guided by a lens that prioritizes inclusivity and sensitivity. Through this experience, actively participate in patient care, concentrating on the comprehensive assessment, diagnosis, management, prevention, and evaluation of both acute and chronic health conditions prevalent in AFAB. Prerequisites: GRNS 7070, GRNS 7080. Pre/Co-requisites: GRNS 7170, GRNS 7180.

**GRNS 7190. Prim Care Chron/Cmplx Hth Cond. 3 Credits.**

Focuses on the refinement diagnostic and therapeutic interventions in the provision of primary health care to individuals and families with chronic and complex health conditions. Prerequisites: GRNS 7140; GRNS 7150 or GRNS 7160; Comprehensive Exam. Co-requisites: GRNS 7200 or GRNS 7210.

**GRNS 7200. Practicum:Chrn&Cplx Cond AGNP. 2.5 Credits.**

Practicum focuses on the refinement diagnostic and therapeutic interventions in the provision of primary health care to individuals and families with chronic and complex health conditions. Prerequisites: GRNS 7120, GRNS 7140, GRNS 7150. Co-requisite: GRNS 7190.

**GRNS 7210. Practicum:Chrn&Cmplx Cond FNP. 2.5 Credits.**

Focuses on the refinement diagnostic and therapeutic interventions in the provision of primary health care to individuals and families with chronic and complex health conditions. Prerequisites: GRNS 7140, GRNS 7160. Co-requisite: GRNS 7190.

**GRNS 7220. DNP Project Seminar I. 1 Credit.**

Provides structure for the development of a conceptual framework and methodological approach to the Doctor of Nursing Practice project, a project where a clinically relevant problem is addressed through application of the best evidence. Prerequisites: GRNS 6210, GRNS 6240, NH 6899, GRNS 6260, GRNS 6270. Pre/Co-requisite: GRNS 6280.

**GRNS 7230. DNP Project Practicum I. 1-6 Credits.**

This practicum guides project initiation including summary tasks and milestones, business plan, identification of resources assigned to tasks, and task interdependencies. Project monitoring, reporting, and management are required. Prerequisite: GRNS 7220.

**GRNS 7240. DNP Project Seminar II. 1 Credit.**

Students will prepare and implement the Doctor of Nursing Practice project. Prerequisites: GRNS 7220, GRNS 7230. Co-requisite: GRNS 7250.

**GRNS 7250. DNP Project Practicum II. 1-6 Credits.**

Doctor of Nursing Practice project will be implemented including critical analysis of data and evidence for improving nursing practice. Project monitoring, reporting, and management are required. Prerequisites: GRNS 7220, GRNS 7230. Co-requisite: GRNS 7240.

**GRNS 7260. DNP Project Seminar III. 1 Credit.**

Requires the analysis, completion, and dissemination of the Doctor of Nursing Practice project for the preparation of advanced practice nurse with the practice doctorate. Prerequisites: GRNS 7240, GRNS 7250; GRNS 7270 or GRNS 7280.

**GRNS 7270. Ex Nurse Leader Role Transform. 1-6 Credits.**

This individualized practicum focuses on synthesis and application of prerequisite learning in a mentored nurse executive role.

**GRNS 7280. Executive Nurse Leader Immersi. 1-6 Credits.**

A continuation of the Executive Nurse Leader Role Transformation Practicum learning experience. Prerequisite: GRNS 7270.

**GRNS 7300. Practicum: Clin Immersion APRN. 0.5 Credits.**

Provides an immersion clinical practicum of 60 hours for the primary care management of acute and common health problems encountered in primary care. To provide an opportunity for the student to promote optimal levels of well-being and functioning. Prerequisites: GRNS 7070, GRNS 7080, GRNS 7120, GRNS 7170, GRNS 7180.

**GRNS 7350. Health and Culture: Oaxaca. 3 Credits.**

Gain appreciation for cultural diversity by exploring the social, psychological, health practices and historical trajectories of Oaxacan perceptions within the overarching theme of health.

**GRNS 7491. Doctoral Dissertation Research. 1-18 Credits.****GRNS 7990. Special Topics. 0.25-18 Credits.**

See Schedule of Courses for specific titles.

**GRNS 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## GREEK (GRK)

### Courses

**GRK 5600. Topics in Greek Prose. 3 Credits.**

Representative topics: Greek Historians (Thucydides, Herodotus, Xenophon), Greek Orators (Lysias, Demosthenes), Greek Philosophers (Plato, Aristotle, Presocratic philosophers). May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Classics Graduate student.

**GRK 5650. Topics in Greek Poetry. 3 Credits.**

Representative topics: Greek Epic (Iliad, Odyssey), Greek Lyric Poetry (Archilochus to Pindar, including Sappho, Alcaeus, Simonides, Bacchylides), Greek Comedy (Aristophanes), Greek Tragedy (Sophocles' Antigone, Euripides' Medea, or two equivalent plays). May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Classics Graduate student.

**GRK 5901. Topics In: Gr Greek. 3-4 Credits.**

Exploration of topics in Classical Greek. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Classics Graduate student.



**GRK 5990. Special Topics. 1-18 Credits.**

Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

**GRK 6990. Special Topics. 1-18 Credits.**

Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

**GRK 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**GRK 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

**GRK 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**HEALTH EDUCATION (EDHE)****Courses****EDHE 6391. Master's Thesis Research. 1-18 Credits.**

Thesis topic must be approved by a faculty committee.

**EDHE 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDHE 6991. Teaching Internship. 1-18 Credits.**

Supervised teaching experiences on a full-time basis, with related seminars in teaching subject. Prerequisite: Permission of coordinator of Professional Laboratory Experiences.

**EDHE 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDHE 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**EDHE 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**HEALTH (HLTH)****Courses****HLTH 5850. Gr Health&Wellness Coaching. 4 Credits.**

Covers theoretical framework, strategies and techniques of motivational interviewing, clinical application of behavioral change theory, and the structure of Health & Wellness Coaching. Experience integrative therapies and explore tenets of health and wellness. Required for NBHWC National Certification. Prerequisite: Integrative Health & Wellness Coaching mCGS Graduate student or Instructor permission.

**HLTH 5860. Health & Well Coaching Advance. 4 Credits.**

Covers the theoretical framework, strategies and techniques of effective communication, advanced motivational interviewing, positive psychology and behavioral change and the application of these to the practice of Integrative Health & Wellness Coaching. Advanced coaching skills/structure with complex patients/situations will be covered. Integration of skill set into different professions will be explored. Required for NBHWC Exam. Prerequisites: HLTH 3840, HLTH 3850 or equivalent; Graduate student; Instructor permission.

**HLTH 5870. Health & Well Coach Practicum. 3 Credits.**

The integration of relevant knowledge from academic Integrative Health and Wellness Coaching studies through a practical learning opportunity. Builds mentoring and leadership skills through work alongside academic and clinical health coaches while gaining practice hours necessary for the NBHWC exam. Prerequisite: HLTH 5860.

**HLTH 5880. Gr Professional Prep HWC. 1 Credit.**

Advanced course for Integrative Health & Wellness Coaching students interested in taking the NBHWC exam and preparing for a career as a Health & Wellness Coach. Students will: prepare for the national exam, understand professional continuing education and entry into the workforce expectations, as well as learn from health coaches and other professionals on all facets of health coaching. Prerequisite: HLTH 5860.

**HIGHER EDUCATION (EDHI)****Courses****EDHI 6110. Foundations & Functions of CSP. 3 Credits.**

Overview of the work of the student affairs profession, including philosophical base, historical development, current practices, and future trends. Prerequisite: Higher Education & Student Affairs student.

**EDHI 6120. Social Justice/Inclusion in HE. 3 Credits.**

Explores cultural pluralism philosophies, racial identity development, racial incidences, and educational practices related to racism and diversity for implementation in higher education.

**EDHI 6130. Helping Skills in Stdn Affairs. 3 Credits.**

An exploration of studies, techniques, and methods for advising and helping skills in higher education and student affairs administration.

**EDHI 6210. College Students and Contexts. 3 Credits.**

An overview of college and university contexts, including the impact of various environments on student success.

**EDHI 6220. Problems in Education. 1-6 Credits.**

Individual work on a research problem selected by the student in consultation with a staff member. Prerequisite: Twelve hours in education and related areas; endorsement by a sponsoring faculty member.

**EDHI 6310. Student Development Theory. 3 Credits.**

Explores student development theories and research relevant to student learning and personal development; includes the ability to apply theory to improve and inform student affairs and teaching practice.

**EDHI 6320. Higher Education Law. 3 Credits.**

Examines the relationship between higher education and the law, including how various substantive areas of the law affect colleges/universities and their stakeholders. Focuses on the major topical areas, key concepts, sociocultural contexts, and precedential cases pertinent to the law and higher education.

**EDHI 6330. Prgrm Eval & Assess in HESA. 3 Credits.**

Focuses on promoting an understanding of assessment and evaluation in student affairs with particular emphasis on the ACPA/NASPA Assessment, Evaluation, and Research professional competency area. Students will learn how to implement an assessment plan and effectively report assessment efforts to broad audiences.

**EDHI 6391. Master's Thesis Research. 1-18 Credits.**

Thesis topic must be approved by a faculty committee.

**EDHI 6410. Higher Ed Admin & Organization. 3 Credits.**

Introduction to concepts of administration and organization as applied to contemporary higher education setting. Characteristics of organizations, dynamic elements of administration, and theories and processes of change.

**EDHI 6420. Capstone:Eth,Val&Mean/High Ed. 3 Credits.**

An applied student affairs seminar featuring ethical problem-solving, appreciation of religious pluralism, and approaches to facilitating the search for moral and spiritual meaning in the American university.

**EDHI 6850. Seminar in Higher Education. 1-3 Credits.**

Designed for Graduate students concentrating in programs in Higher Education. Analysis and discussion of current issues and problems in higher education.

**EDHI 6890. Lab Experience in Education. 2 Credits.**

Practica internships, offered in various University departments and offices, enable students to integrate conceptual knowledge with professional practices. Prerequisite: Higher Education & Student Affairs Administration student.

**EDHI 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDHI 6991. Internship. 1-18 Credits.**

Students will undertake an approved internship in an institution which reflects the particular area of interest and needs of the student. Prerequisite: Instructor permission.

**EDHI 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDHI 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDHI 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for Doctoral Dissertation.

**EDHI 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDHI 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**EDHI 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**HISTORIC PRESERVATION (HP)****Courses****HP 5200. Am Architectural History I. 2 Credits.**

Study of architectural history to gain fluency in the stylistic terms so essential to historic preservation and to public support for conserving our architectural heritage. Prerequisites: Historic Preservation Graduate student; or twelve hours of History, minimum Junior standing; or Instructor permission.

**HP 5201. History on the Land. 3 Credits.**

Identifying and interpreting evidence of the cultural forces - early settlement patterns, transportation, industry, agriculture, planning, conservation - that have shaped our land, buildings, towns, and cities. Prerequisites: Historic Preservation Graduate student; or twelve hours of History, minimum Junior standing; or Instructor permission.

**HP 5202. Am Architectural History II. 2 Credits.**

Continuation of HP 5200. Study of architectural history to gain fluency in the stylistic terms so essential to historic preservation and to public support for conserving our architectural heritage. Prerequisite: HP 5200 or Instructor permission.

**HP 5206. Rschg Historic Structure/Sites. 2 Credits.**

Methods for researching historic structures and sites using archival and physical evidence, deciphering archaic building technologies, and documenting structures through professional reports, architectural photography, measured drawings. Prerequisite: Historic Preservation Graduate student.

**HP 5250. Practicum: Arch History I. 1 Credit.**

Practicum accompanying HP 5200 American Architectural History I. Co-requisite: HP 5200.

**HP 5252. Practicum: Arch History II. 1 Credit.**

Practicum accompanying HP 5202 American Architectural History II. Co-requisite: HP 5202.

**HP 5256. Practicum: Researching. 1 Credit.**

Practicum accompanying HP 5206 Researching Historic Structures and Sites. Co-requisite: HP 5206.

**HP 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**HP 6301. Culture, Nature, and Community. 2 Credits.**

Seminar drawing from UVM's important relationships with the National Park Service and using the country's National Parks as places where the merger of cultural and natural resources provides opportunities for meaningful communication about the American experience and current issues in historic preservation. Prerequisite: Historic Preservation Graduate student.

**HP 6302. Community Preservation Project. 3 Credits.**

Third-semester Graduate students apply developed professional skills to actual community preservation problems. Projects include strategy development, securing and allocating funds, research, advocacy, and implementation. Prerequisite: Historic Preservation Graduate student.

**HP 6304. HstPres Policy and Planning. 2 Credits.**

Introduction to the professional practice of preservation planning. Traces the evolution of the historic preservation movement and examines contemporary preservation policy-making issues. Prerequisite: HP 5200.

**HP 6305. HstPres Practice Methods. 2 Credits.**

Introduces students to professional practice methods for conducting historic site and structures surveys. National Register nominations and rehabilitation investment tax credit application projects. Prerequisite: HP 5200.

**HP 6306. Architectural Conservation I. 2 Credits.**

An examination of the physical properties of historic building materials, their deterioration mechanisms, and strategies for assessing conditions, conserving and rehabilitating historic resources. Prerequisite: HP 5206.

**HP 6307. Architectural Conservation II. 2 Credits.**

Further exploration of architectural conservation emphasizing an integrated examination of historic preservation through lectures, seminars, and field and laboratory research projects. Prerequisite: HP 6306.

**HP 6308. Mgmt of Historic Site Museums. 2 Credits.**

Provides essential training for the management of historic site museums and will give students an opportunity to study and apply best practices established by national standards for preservation and restoration in the context of Vermont's state historic sites as study models. Prerequisite: HP 6306.

**HP 6309. Roles of Tech in Preservation. 2 Credits.**

Applications of a broad range of technologies available for documenting, assessing, monitoring, and interpreting cultural heritage; case studies involving technology use in historic preservation. Prerequisite: HP 6306.

**HP 6351. Practicum: Culture, Nature. 1 Credit.**

Practicum accompanying HP 6301 Culture, Nature, and Community. Co-requisite: HP 6301.

**HP 6354. Practicum: Policy and Planning. 1 Credit.**

Practicum accompanying HP 6304 Historic Preservation Policy and Planning. Co-requisite: HP 6304.

**HP 6355. Practicum: Practice Methods. 1 Credit.**

Practicum accompanying HP 6305 Historic Preservation Practical Methods. Co-requisite: HP 6305.

**HP 6356. Practicum: Conservation I. 1 Credit.**

Practicum accompanying HP 6306 Architectural Conservation I. Co-requisite: HP 6306.

**HP 6357. Practicum: Conservation II. 1 Credit.**

Practicum accompanying HP 6307 Architectural Conservation II. Co-requisite: HP 6307.

**HP 6358. Practicum: Management. 1 Credit.**

Practicum accompanying HP 6308. Co-requisite: HP 6308.

**HP 6359. Practicum: Technology. 1 Credit.**

Practicum accompanying HP 6309 Roles of Technology in Preservation. Co-requisite: HP 6309.

**HP 6391. Master's Thesis Research. 1-18 Credits.**

Total of six hours required.

**HP 6392. Master's Project Research. 1-6 Credits.**

Final project under the direction of a graduate faculty mentor.

**HP 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**HP 6991. Internship. 1-18 Credits.**

Participants will devote a semester to preservation within an appropriate institution or agency. Prerequisite: HP 6304 or HP 6305.

**HP 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**HP 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**HP 6995. Graduate Independent Research. 1-18 Credits.**

Student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## HISTORY (HST)

### Courses

**HST 5050. Graduate Historiography. 3 Credits.**

Historical methods, philosophy of history, and the history of history writing. Prerequisite: Graduate student.



**HST 5100. Topics in Themes in History. 3 Credits.**

Exploration of topics in themes in History. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**HST 5300. Topics in Global History. 3 Credits.**

Exploration of topics in global history. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**HST 5500. Topics in Hst of the Americas. 3 Credits.**

Exploration of topics in the history of the Americas. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**HST 5700. Topics in European History. 3 Credits.**

Exploration of topics in European history. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**HST 5901. Topics In: Gr History. 3 Credits.**

Exploration of topics in History. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Graduate student.

**HST 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles. Prerequisite: Three hours of History.

**HST 6391. Master's Thesis Research. 1-18 Credits.**

Required of all candidates for the M.A. who are writing a thesis. Normally arranged for two semesters at three hours each.

**HST 6392. Master's Project Research. 1-6 Credits.**

Final project under the direction of a graduate faculty mentor.

**HST 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**HST 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member the instructor of record, for which academic credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**HST 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**HST 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**HST 6995. Graduate Independent Research. 1-18 Credits.**

Directed individual study of areas not appropriately covered by existing courses. Prerequisite: Instructor permission.

**HUMAN DEVELOPMENT & FAMILY SCIENCE (HDF)****Courses****HDF 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**HUMANITIES (HUMN)****Courses****HUMN 5990. Special Topics. 1-18 Credits.**

Intermediate courses or seminars on topics beyond the scope of existing offerings. See Schedule of Courses for specific titles.

**HUMN 5991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**HUMN 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**HUMN 5994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded.

**HUMN 5995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**HUMN 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**HUMN 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**HUMN 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**HUMN 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**HUMN 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion. Offered at department discretion.



## INTERNSHIP (SINT)

### Courses

#### **SINT 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member/faculty-staff team with faculty member as instructor of record; academic credit not degree eligible; offered at department discretion. May be crosslisted with departmental internship courses. Prerequisite: Degree students only.

## INTERPROFESSIONAL HEALTH SCIENCES (IHS)

### Courses

#### **IHS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **IHS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **IHS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **IHS 6994. Teaching Assistantship. 1-3 Credits.**

On-site teaching experience combined with a structured teaching learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at program discretion.

#### **IHS 7001. Doctoral Seminar. 1 Credit.**

The purpose of the Journal Study and Graduate Seminar is to 1) participate in a thoughtful discussion of a research problem that the student is interested in or is endeavoring to address in his/her research, 2) create opportunities for students to become collaborators in their colleagues' research endeavors and, 3) expose students to a wide range of topics and research issues in the health professions so as to foster interdisciplinary knowledge and teaming.

#### **IHS 7010. Topics & Measurement in IHS. 2 Credits.**

Fundamental interprofessional health sciences (IHS) concepts, principles, equipment, and tools for conduction quantitative research in the areas of human movement, communication, and physical activity.

#### **IHS 7020. Applying the ICF Model in IHS. 3 Credits.**

Application of International Classification of Functioning (ICF) concepts to translational research in human function and rehabilitation science.

#### **IHS 7300. Sem/Pract Teach & Learn IHS. 3 Credits.**

Students will be exposed to an mentored in the fundamentals of health professions teaching and learning and gain applied experience in the university classroom.

#### **IHS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Directed interprofessional dissertation research in Interprofessional Health Sciences.

#### **IHS 7500. Prof Writing & Grantsmanship. 3 Credits.**

Topics include grant selection and approval processes, selection of appropriate publication outlets for a given research study, and report of research results.

#### **IHS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **IHS 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

#### **IHS 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **IHS 7994. Teaching Assistantship. 1-3 Credits.**

On-site teaching experience combined with a structured teaching learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at program discretion.

#### **IHS 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## LATIN (LAT)

### Courses

#### **LAT 5600. Topics in Latin Prose. 3 Credits.**

Representative topics: Republican Prose (Caesar, Sallust, Cicero), Roman Oratory (Cicero's De Oratore, Orator, Brutus), Historians of the Empire (Augustus, Tacitus, Suetonius, Ammianus Marcellinus), Roman Letters (Cicero, Horace, Pliny). May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Classics Graduate student.

#### **LAT 5650. Topics in Latin Poetry. 3 Credits.**

Representative topics: Roman Epic Poetry (Lucretius, Vergil, Ovid), Roman Lyric Poets (Catullus, Horace, Propertius, and Tibullus), Roman Comedy (Plautus and Terence), Satire (Horace, Persius, Juvenal, Petronius). May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Classics Graduate student.

#### **LAT 5901. Topics In: Gr Latin. 3-4 Credits.**

Exploration of topics in Latin. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Classics Graduate student.

**LAT 5990. Special Topics. 1-18 Credits.**

Courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

**LAT 6990. Special Topics. 1-18 Credits.**

Advanced courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles.

**LAT 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**LAT 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**LAT 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## LEADERSHIP AND POLICY STUDIES (EDLP)

### Courses

**EDLP 6000. Leading Learning Organizations. 3 Credits.**

Course topics include the roles, functions, relationships and responsibilities in creating learning communities; leadership values, styles and behavior; trends and issues that impact organizations.

**EDLP 6008. Inequalities and Ed Policy. 3 Credits.**

Examines how the institution of education has historically created, maintained, and has also challenged inequalities. Explores this in relationship to race, ethnicity, immigration, social class, gender, LGBTQIA+ issues, and disability, among others, covering key readings in history and theory as well as key court cases and movements for equity.

**EDLP 6100. Effecting & Managing Change. 3 Credits.**

Change processes and models, the dynamics of change within the organization, and external factors affecting change. Prerequisite: Twelve hours of graduate study.

**EDLP 6200. Collaborative Consultation. 3 Credits.**

Adult development and group dynamics theory provide the knowledge base for collaborating with parents and teachers to meet the diverse needs of students with disabilities. Cross-listed with: EDSP 6130.

**EDLP 6330. Education Finance & Policy. 3 Credits.**

Examines national, state and local policies of educational financing, measurement of equity, state aid to schools, taxation, school finance litigation and cost-effectiveness analysis. Prerequisite: Twelve hours in education or Instructor permission.

**EDLP 6350. Staff Evaluation & Development. 3 Credits.**

Supervisory roles, behavior, responsibilities, and relationships in educational and social service organizations; processes for evaluating the performance, promoting the development of staff, and increasing organization effectiveness.

**EDLP 6360. Curr Mgmt in Ed & Soc Srv Org. 3 Credits.**

Approaches to coordinating and managing curriculum or programs at the classroom, department, or organizational level; examination of factors effecting design and delivery of curriculum; developing curriculum guides and assessment methods. Prerequisite: Eighteen hours of education and related areas or appropriate professional certification.

**EDLP 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis. Thesis topic must be approved by a faculty committee.

**EDLP 6650. Policy to Practice. 3 Credits.**

Education policy development and governance; frameworks for understanding and assessing education policy implementation by agencies, districts, schools, and classroom teachers.

**EDLP 6800. Professional Problems in Educ. 0-3 Credits.**

Designed to cover selected educational problems in depth. The major emphasis will be on intensive and critical analysis of the literature and practice in a given area.

**EDLP 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDLP 6991. Internship. 1-18 Credits.**

Students will undertake an approved internship in an institution which reflects the particular area of interest and needs of the student. Prerequisite: Instructor permission.

**EDLP 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDLP 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

**EDLP 7010. ProSeminar: Doctoral Intro. 3 Credits.**

Designed to build a learning community among students and faculty to explore issues related to careers and research in educational policy; provides opportunities for collaboration, planning, academic research, relevant practical experiences and site visits. Pre/Co-requisite: Educational Policy and Leadership Studies Doctoral student.

**EDLP 7020. Epistemologies in Education. 3 Credits.**

Introduces students to foundational traditions and practices related to epistemologies that shape conceptual frameworks in educational research. Provides both breadth and depth to students' understandings of definitions of knowledge, criteria for evaluating knowledge claims, and the potentials and limitations to each epistemology.

**EDLP 7030. Adv Sem Organizational Ldrshp. 3 Credits.**

Explores new theories on leadership and students' cognitive processes that define the intentions, values, beliefs, and future perspectives of themselves as leaders.

**EDLP 7050. Sem on Educational Policy. 3 Credits.**

An examination of the nature and function of education policy, emphasizing the structure and processes in education policy formulation and implementation.

**EDLP 7060. Improvement Science in Ed & SS. 3 Credits.**

Improvement science is a framework to facilitate educational and organizational improvements through applied research. Provides a comprehensive overview of improvement science philosophies, research designs, methods that center equitable outcomes for learning communities. Students will develop skills to evaluate institutional problems of practice, identify possible interventions, and operationalize planned improvements.

**EDLP 7090. Dissertation Writing Seminar. 3 Credits.**

Designed for Graduate students working on their dissertation proposals or dissertations.

**EDLP 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**EDLP 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDLP 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**EDLP 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDLP 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**LIBRARY SCIENCE (EDLI)****Courses****EDLI 6710. Children's/YA Literature. 3 Credits.**

Designed as a survey of the context and merit of children's and young adult literature, that is, books written for and read by readers from ages Pre K-Grade 12. Prerequisite: Twelve hours in education and related areas.

**EDLI 6720. Manage Schl Library Media Ctrs. 3 Credits.**

Examines the fundamental principles and issues of school librarianship in contemporary educational communities. Overview of administrative issues, including development of policies and procedures, budget preparation, personnel administration, and public relations. Prerequisite: Twelve hours in education and related areas or Instructor permission.

**EDLI 6730. Dev/Org Schl Libr Collections. 3 Credits.**

Principles for developing and organizing physical and virtual library collections, including evaluation, selection, and acquisition of resources appropriate for students, staff and other patrons; methods used to access library collections, standard cataloging practices, and selection of integrated library systems (ILS). Prerequisite: EDLI 6720 or equivalent.

**EDLI 6740. Design Learning in Libr/Med Ct. 3 Credits.**

Explores theories and best practice for teaching and learning in today's library/media learning centers. It also examines the school librarians role as teacher and instructional collaborator with an emphasis on curriculum design, inquiry learning, and information literacy standards. Prerequisite: EDLI 6720 or equivalent.

**EDLI 6760. Information Sources & Services. 3 Credits.**

Focuses on the librarian's role in curating, using, teaching, evaluating, and providing service with multimedia reference materials for the physical and virtual library learning spaces to meet the needs of a diverse learning community. Prerequisite: EDLI 6720 or equivalent.

**EDLI 6770. Info Tech Schl Libr Media Ctrs. 3 Credits.**

Designed to provide both a theoretical and a pragmatic understanding of information technology in the modern school library with a focus on the integration of technology within teaching and learning. Prerequisite: EDLI 6720 or equivalent.

**EDLI 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDLI 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**LITERACY (EDLT)****Courses****EDLT 5220. Cltvate Chil Lit in El/Mid Sch. 3 Credits.**

Contemporary research and practice related to the development of strategic, motivated, and independent readers and writers. Emphasis on integrating reading and writing within collaborative environments. Prerequisite: Twelve hours in education and/or related areas including an introductory course in reading; or Instructor permission.

**EDLT 5360. Culturally Responsive Lit. 3 Credits.**

Explore a variety of topics related to representation and diversity in the broad field of literacy and children's literature. Students will further develop their understanding of the role that culturally responsive approaches to literacy and children's/adolescent literature selection can play in multicultural and social justice education.

**EDLT 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**EDLT 6750. Lit Assmt: Understand Indiv Dif. 3 Credits.**

Designing and using assessment strategies to improve and adapt instruction. Identify, evaluate, and document literacy development, emphasizing students at risk of reading failure. Prerequisite: EDLT 5220 or Instructor permission.



**EDLT 6760. Lit Instruct/Interv Practicum. 3-6 Credits.**

Approaches for instruction, prevention, intervention of reading and written language skills. Supervised teaching of individuals and/or small groups experiencing reading and language problems. Apprenticeships in reading instructional program. Pre/co-requisite: Three graduate credits in Reading/Language Arts or Instructor permission.

**EDLT 6770. Literacy Leadership. 3 Credits.**

Addresses the essential elements and dispositions of being a literacy leader in a K-12 education setting. Topics include: creating, maintaining and improving literacy systems, literacy coaching, understanding the role of assessment as well as supporting literacy instruction and systems that promote equitable access to literacy learning for all students.

**EDLT 6850. Critical Issues in Lang&Litrcy. 3 Credits.**

Explores the relationships between language and literacy and cultural-linguistic influences on language/literacy development. Topics include phonemic awareness, phonics instruction, fluency, comprehension, spelling and writing. Pre/co-requisites: EDLT 5220; nine graduate credits in related areas; Instructor permission.

**EDLT 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific title.

**EDLT 6991. Internship for Spec Pers in Ed. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**EDLT 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDLT 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MASTER OF BUSINESS ADMIN (MBA)****Courses****MBA 6010. Foundations of Management. 0 or 10 Credits.**

Provides background on sustainable business practices and offer tools to analyze a business and structure a business opportunity, including how to: develop/defend competitive advantage, perform financial analysis, implement marketing strategy, organize a firm, and manage technological innovation. Prerequisite: Master of Business Administration student.

**MBA 6020. Bldg a Sustainable Enterprise. 0 or 9 Credits.**

Provides students with the tools for starting and building a sustainable business. Topics include: public policy, value creation, assessments under market uncertainty, the meaning of sustainability and CSR, triple bottom line reporting, ethics for entrepreneurs, and mindfulness. Prerequisite: Master of Business Administration student.

**MBA 6030. Growth of Sust Enterprise. 0 or 9 Credits.**

Provides tools for managing the growth of a sustainable business. Topics include: entrepreneurial leadership, systems tools for sustainability, business law, negotiations, financing an innovative venture, and sustainable operations/green supply chains. Students will frame and research their practicum project. Prerequisite: Master of Business Administration student.

**MBA 6040. Focusing on Sustainability. 0 or 9 Credits.**

Provides students with an understanding of how to run a responsible/sustainable business within the constraints of finite physical resources and legal frameworks. Students will explore how management approaches, creativity, and technology can find opportunities within those constraints. Prerequisite: Master of Business Administration student.

**MBA 6050. Sus Entrepreneurship in Action. 0 or 6 Credits.**

Provides a meaningful hands-on experience through the development of a business plan for a new sustainable venture. Students will spend three months conceptualizing, designing, and presenting a business case for a new sustainable venture. Prerequisite: Master of Business Administration student.

**MBA 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific title.

**MATERIALS SCIENCE (MATS)****Courses****MATS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**MATS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MATS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**MATS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MATS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**MATS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MATS 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**MATS 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



## MATHEMATICS (MATH)

### Courses

#### **MATH 5230. Adv Ordinary Diff Equations. 3 Credits.**

Linear and nonlinear systems, approximate solutions, existence, uniqueness, dependence on initial conditions, stability, asymptotic behavior, singularities, self-adjoint problems. Prerequisite: Graduate student or Instructor permission; knowledge of differential equations required.

#### **MATH 5678. Combinatorial Graph Theory. 3 Credits.**

Paths and trees, connectivity, Eulerian and Hamiltonian cycles, matchings, edge and vertex colorings, planar graphs, Euler's formula and the Four Color Theorem, networks. Prerequisite: Graduate student or Instructor permission.

#### **MATH 5737. Gr Intro to Numerical Anyl. 3 Credits.**

Error analysis, root-finding, interpolation, least squares, quadrature, linear equations, numerical solution of ordinary differential equations. Prerequisite: Graduate student or Instructor permission. Cross-listed with: CS 5737.

#### **MATH 5766. Gr Chaos,Fractals&Dynamcl System. 3 Credits.**

Discrete and continuous dynamical systems, Julia sets, the Mandelbrot set, period doubling, renormalization, Henon map, phase plane analysis and Lorenz equations. Prerequisites: Graduate student or Instructor permission. Cross-listed with: CSYS 5766.

#### **MATH 5788. Mathematical Biology&Ecol. 3 Credits.**

Mathematical modeling in the life sciences. Topics include population modeling, dynamics of infectious diseases, reaction kinetics, wave phenomena in biology, and biological pattern formation. Prerequisites: Graduate student or Instructor permission; knowledge of linear algebra and differential equations required.

#### **MATH 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

#### **MATH 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

#### **MATH 6230. Partial Differential Equations. 3 Credits.**

Classification of equations, linear equations, first order equations, second order elliptic, parabolic, and hyperbolic equations, uniqueness and existence of solutions. Prerequisite: Knowledge of differential equations required.

#### **MATH 6344. Algebraic Topology. 3 Credits.**

Homotopy, Seifert-van Kampen Theorem; simplicial, singular, and Cech homology. Prerequisite: Knowledge of real analysis or topology required.

#### **MATH 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

#### **MATH 6441. Theory of Func of Complex Var. 3 Credits.**

Complex functions, differentiation and the Cauchy-Riemann equations, power and Laurent series, integration, calculus of residues, contour integration, isolated singularities, conformal mapping, harmonic functions. Prerequisite: Two semesters of real analysis required.

#### **MATH 6444. Thry Functions Real Variables. 3 Credits.**

Lebesgue measure and integration theory, Monotone and Dominated Convergence Theorems and applications, product measures, basic theory of LP-spaces. Prerequisite: Two semesters of real analysis required.

#### **MATH 6551. Abstract Algebra III. 3 Credits.**

Advanced group theory and field theory. Prerequisite: Two semesters of abstract algebra required.

#### **MATH 6555. Abstract Algebra IV. 3 Credits.**

Ring theory and module theory at the graduate level, with emphasis on commutative algebra. Prerequisite: MATH 6551.

#### **MATH 6678. Topics in Combinatorics. 3 Credits.**

Topics will vary each semester and may include combinatorial designs, coding theory, topological graph theory, cryptography. Course is repeatable for credit. Prerequisite: MATH 3551 or MATH 5678.

#### **MATH 6701. Principles of Complex Systms 1. 3 Credits.**

Introduction to fundamental concepts of complex systems. Topics include: emergence, scaling phenomena, and mechanisms, multi-scale systems, failure, robustness, collective social phenomena, complex networks. Students from all disciplines welcomed. Pre/co-requisites: Calculus and statistics required; linear algebra, differential equations, and computer programming recommended but not required. Cross-listed with: CSYS 6701.

#### **MATH 6713. Principles of Complex Systms 2. 3 Credits.**

Detailed exploration of distribution, transportation, small-world, scale-free, social, biological, organizational networks; generative mechanisms; measurement and statistics of network properties; network dynamics; contagion processes. Students from all disciplines welcomed. Pre/co-requisites: MATH 6701, CSYS 6701, calculus, and statistics required. Cross-listed with: CSYS 6713.

#### **MATH 6737. Numerical Diff Equations. 3 Credits.**

Numerical solution and analysis of differential equations: initial-value and boundary-value problems; finite difference and finite element methods. Prerequisites: Calculus and linear algebra required in addition to differential equations or numerical analysis.

#### **MATH 6990. Special Topics. 1-18 Credits.**

Subject will vary from year to year. May be repeated for credit.

#### **MATH 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**MATH 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MATH 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MATH 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**MATH 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MATH 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**MATH 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MECHANICAL ENGINEERING (ME)****Courses****ME 5040. Adv Engineering Analysis I. 3 Credits.**

Analytical methods for the solution of partial differential equations in engineering mechanics and physics, including: eigenfunction expansions; Fourier series; Sturm-Liouville theory and special functions. Prerequisite: Graduate student in engineering, mathematics, or physical sciences or Instructor permission.

**ME 5110. Mechanical Behavior Materials. 3 Credits.**

Isotropic and anisotropic elasticity; theory of plasticity; deformation mechanisms in crystalline solids; dislocation theory; creep behavior; advanced fatigue and fracture mechanisms. Prerequisites: Successful completion of undergraduate course Mechanics of Materials is assumed; Graduate standing or instructor permission.

**ME 5120. Adv Engineering Materials. 3 Credits.**

Advanced material processing; physical and mechanical principles of high-temperature alloys, light-weight materials, thin films, nanomaterials, and biomedical materials; elements of computational materials design. Prerequisite: Senior/Graduate student or Instructor permission.

**ME 5160. Continuum Mechanics. 3 Credits.**

Tensors, conservation laws, field equations for solids and fluids.

**ME 5220. Adv Engr Thermodynamics I. 3 Credits.**

Foundations of statistical mechanics. Gases and crystals. Chemical equilibrium. Irreversible processes. Prerequisite: Senior/Graduate student or permission.

**ME 5230. Vortex Flows. 3 Credits.**

General theorems of vorticity transport in fluids; methods for solution of vortex flows; application to wake vortices, turbulent wall-layer vortices, wing-tip vortices, intake vortices, vortex-structure interaction, vortex reconnection, vortex breakdown, tornadoes and hurricanes. Prerequisites: Content knowledge in fluid mechanics (such as ME 2230) is assumed.

**ME 5240. Advanced Heat Transfer I. 3 Credits.**

Analytical methods for multidimensional steady and transient heat conduction; phase change and moving boundaries. Thermal radiation exchange in enclosures; view factors; emitting/absorbing gases. Prerequisite: Successful completion of undergraduate Heat Transfer course or similar is assumed; Graduate Standing or Instructor permission.

**ME 5440. Biothermodynamics. 3 Credits.**

Inter-disciplinary; guides the student through the thermodynamics of living organisms, comprised of the study of energy transformation in the life sciences. Designed for students from the STEM disciplines. Covers Gibbs free energy, statistical thermodynamics, binding equilibria, and reaction kinetics. Prerequisites: Successful completion of Materials and Mechanics Lab such as ME 2111, Thermo-Fluid Labs such as ME 2321, or Biomedical design such as BME 3600 is assumed; Graduate student or Instructor permission. Cross-listed with: BME 5440.

**ME 5520. Computational Solid Mechanics. 3 Credits.**

Project-based. Computational methods using the finite element analysis (FEA) applied to linear elastic and non-linear problems in the mechanics of deformable solids and structures, contact mechanics, and fracture mechanics. Hands-on computational experience using a commercial FEA software. Prerequisites: ME 1140, MATH 2544, and MATH 3201, or equivalent.

**ME 5980. Numerical Methods for Engineer. 3 Credits.**

Foundational concepts of numerical integration, numerical differentiation, and numerical approximation and solution of differential and partial differential equations of the type encountered in the analysis of engineering problems and data processing. Prerequisite: Graduate student or Instructor permission; content knowledge of calculus through differential equations (such as MATH 3201) and linear algebra (such as MATH 2522 or MATH 2544) assumed. Cross-listed with: CEE 5980.

**ME 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ME 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ME 6120. Advanced Dynamics. 3 Credits.**

Application of Lagrange's equation, Hamilton's principle to mechanical systems. Systems with constraints. Matrix formulation of problems in kinematics, dynamics. Stability of linear, nonlinear systems.

**ME 6230. Advanced Fluid Dynamics. 3 Credits.**

Stress in continuum; kinematics, dynamics; potential fields; Wing theory; Navier-Stokes equation; hydrodynamic stability; turbulence; laminar, turbulent boundary layer theory; transient flows; free laminar, turbulent flows; mixing.

**ME 6270. Turbulence. 3 Credits.**

Description of turbulent flows; statistical and modeling of turbulent flows; Navier Stokes as a dynamical system; experimental and numerical approaches. Prerequisite: Graduate student or Instructor permission; successful completion of undergraduate Mechanical Engineering Fluid Mechanics or similar required.

**ME 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**ME 6550. Multiscale Modeling. 3 Credits.**

Computational modeling of the physics and dynamical behavior of matter composed of diverse length and time scales. Molecular simulation. Coarse-graining. Coupled atomistic/continuum methods.

**ME 6990. Special Topics. 1-18 Credits.**

Advanced topics in recently developed technical areas. Prerequisite: Three hours with Instructor permission.

**ME 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**ME 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ME 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ME 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**ME 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ME 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**ME 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MEDICAL GENERIC COM COURSE (MD)****Courses****MD 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MD 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MEDICAL LABORATORY SCIENCE (MLS)****Courses****MLS 5100. Gr Clinical Chemistry I. 4 Credits.**

This is part one of a two semester series in Clinical Chemistry. Prepares students to work in the clinical chemistry laboratory to analyze patient samples, assess whether or not lab data is accurate, think critically, and problem solve. Prerequisite: Medical Laboratory Science Graduate student or Instructor permission.

**MLS 5110. Gr Clinical Chemistry II. 3 Credits.**

Clinical Chemistry is the discipline of pathology that is concerned with the detection and measurement of biochemical changes in disease, and helps to investigate for the presence of disease with panels of biochemical tests for renal disease, electrolyte disturbances, drug levels and toxic agents, blood gas and acid-base status, bone disease, diabetes, etc. Prerequisites: MLS 5100; Medical Laboratory Science Graduate student; or Instructor permission.

**MLS 5200. Gr Hematology. 3 or 4 Credits.**

Lecture and laboratory that integrates theory with application of hematology and hemostasis diagnostic procedures, interpretation, problem solving and correlation of laboratory findings with disease states. Covers the fundamentals of blood cell development, structure, function, biochemistry, cell and molecular biology. Prerequisite: Medical Laboratory Science Graduate student.

**MLS 5300. Gr Clinical Micro II. 3 Credits.**

Comprehensive study of non-bacterial pathogenic microorganisms and their disease states in humans. Includes medical mycology, parasitology and virology. Focus on understanding the biology of these organisms and learning about evaluation, diagnosis, and treatment of diseases caused by these pathogens. Prerequisite: Medical Laboratory Science Graduate student.

**MLS 5400. Gr Immunohematology. 4 Credits.**

Combines lecture and laboratory experiences to provide knowledge in regulations, quality and compliance in Immunohematology and transfusion medicine. Provides an overview of donor blood collection, processing, testing and storage as well as the understanding of cellular therapy in the hospital transfusion service. Prerequisites: BHSC 3420 or MMG 3230; or Medical Laboratory Science Graduate student.

**MLS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MLS 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



**MLS 6000. Certification Review. 1 Credit.**

Certification review of the Medical Laboratory Science Body of Knowledge. It is designed to provide a challenging self directed assessment of practical and theoretical knowledge and will prepare students to successfully pass the ASCP certification exam in Medical Laboratory Science. Prerequisites: MLS 3300, MMG 3230, MLS 3100, MMG 3220, MLS 3110, MLS 3200, MLS 3400. Pre/Co-requisite: MLS 6700.

**MLS 6100. Advanced Immunobiology. 3 Credits.**

Advanced survey of key current topics in immunology. Focus on understanding the key concepts and experimental approaches in the major areas in immunology, with an emphasis on applications to human disease. Prerequisites: Cell Biology and Biochemistry recommended.

**MLS 6200. Clinical Correlations. 3 Credits.**

Advanced, graduate-level education in medical laboratory testing. The appropriate utilization of laboratory tests for screening, diagnosis, monitoring and determining prognosis of various human diseases will be discussed.

**MLS 6300. Emerging Diag. Technologies. 3 Credits.**

Provides advanced, graduate-level education in medical laboratory testing. Using the scientific literature, students will review and discuss historical and emerging medical laboratory strategies that relate to human health and disease and the clinical environment.

**MLS 6500. Research and Design II. 3 Credits.**

Provides students with a foundation in how to read the primary literature, understanding the major sections of a primary literature reports, and instruction on writing their own reports to facilitate their success for their capstone project. Prerequisite: MLS 6400.

**MLS 6600. Research Capstone. 1-3 Credits.**

The third course in a three-course research series. Complete the capstone project under the guidance of the research mentor or the Graduate Program Director/Course Instructor. Communicate the findings both through a formal oral presentation and a written research paper. Prerequisites: NH 6899, MLS 6400, MLS 6500.

**MLS 6700. Clinical Practicum. 12 Credits.**

Clinical Practicum involves a semester long directed clinical practice in Hematology, Chemistry, Microbiology, Immunohematology, and Molecular Biology at assigned clinical affiliate sites. Prerequisites: MLS 3300, MMG 3230, MLS 3100, MMG 3220, MLS 3110, MLS 3200, MLS 3400.

**MLS 6900. Clinical Leadership & Mgt. 3 Credits.**

Focuses on the fundamentals of clinical leadership and management, with particular emphasis on organizational design, problem solving, communication and change theories. Strategies for human resource management, project management, quality improvement, increasing productivity, and ensuring financial viability are covered.

**MLS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MLS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MEDICINE (MED)****Courses****MED 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific title.

**MICROBIOLOGY & MOLECULAR GENETICS (MMG)****Courses****MMG 5110. Gr Bacterial Genetics. 3 Credits.**

Bacterial genetics and the biology of bacteria at an intermediate to advanced level. Specific topics include regulation of replication, transcription, translation, post-translation, mRNA stability, secretion, signaling, and motility. Foci on genetic problem solving and experimental design. Prerequisite: Microbiology or Molecular Biology strongly recommended.

**MMG 5210. Gr Medical Microbiology. 3 Credits.**

Addresses the clinical importance of infectious diseases with emphasis on the appropriate collection, handling and identification of clinically relevant bacteria. Disease states, modes of transmission, prevention and antibiotic susceptibility testing will also be discussed. Prerequisite: Undergraduate course in microbiology recommended.

**MMG 5220. Gr Medical Micro w/lab. 0 or 4 Credits.**

Comprehensive study of human pathogenic bacteria and their disease states in humans. Laboratory sessions provide practical experience in handling and identifying these pathogens. Prerequisite: Undergraduate course in microbiology recommended.

**MMG 5230. Immunology Concepts. 3 Credits.**

Introduces the vast array of defenses that can be deployed by mammalian hosts to protect against infections. Explores how this powerful system can contribute to disease, but also be leveraged in vaccines and cancer immunotherapy. Covers innate and adaptive immunity and analyze the immune system in health and disease. Prerequisite: Recommended one semester of biochemistry and/or one semester of cell biology.

**MMG 5270. Advanced Cancer Genetics. 3 Credits.**

Focuses on genetic mechanisms that either protect us from cancer or increase our vulnerability to cancer. Discusses genetic methods that are being used to discover genes that influence cancer risk or may prove useful in diagnostics or cancer therapy. Prerequisites: An introductory courses in genetics and cell biology is recommended.

**MMG 5310. Bioinformatics & Data Analysis. 3 Credits.**

Designed to provide a broad overview of bioinformatics, emphasizing accessing and interpreting biological sequence data (DNA, RNA, protein) from various databases. Covers the following topics: data mining, DNA sequence alignment, genetic variation, next-generation sequencing (NGS), and transcriptomics. Highlights a direct, hands-on experience. Prerequisite: Instructor permission.

**MMG 5320. Advanced Bioinformatics. 3 Credits.**

Students will learn and execute each step in the bioinformatic workflow by processing a publicly available genomics dataset. By the end of the course, students will have accessed, processed, analyzed, visualized, and interpreted an NGS dataset of their choosing.

Prerequisite: Instructor permission.

**MMG 5990. Special Topics. 1-18 Credits.**

Supervised investigations in microbiology or molecular genetics.

Prerequisite: Instructor permission. Credit as arranged.

**MMG 6200. Cellular Microbiology. 4 Credits.**

Utilizes primary literature to explore the cellular and molecular basis of microbial pathogenesis caused by viruses, pathogenic bacteria and protozoan parasites.

**MMG 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**MMG 6890. Graduate Teaching Practicum. 3 Credits.**

Required practicum for all Microbiology and Molecular Genetics Master's Students. Students will be exposed to and mentored in the fundamentals of undergraduate teaching and learning in the laboratory setting.

**MMG 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MMG 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**MMG 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MMG 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**MMG 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MMG 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

Prerequisite: Instructor permission.

**MMG 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**MIDDLE LEVEL TEACHER EDUCATION (EDML)****Courses****EDML 5270. Inquiry for Sustainability. 3 Credits.**

Provides the knowledge and skills to teach science and social studies to young adolescents in grades 5-9. Engage with literature on place-based and sustainability topics and pedagogies, developing inquiry-based teaching skills connected with sustainability-focused topics that integrate social, economic, and environmental issues. Prerequisite: Graduate student or Instructor permission.

**EDML 5600. Middle Grades Integ Curr & Ped. 3 Credits.**

Applies frameworks to design culturally responsive, developmentally appropriate curriculum and assessments for young adolescents. Drawing on *Successful Middle Schools* (Bishop & Harrison), focuses on applying project-based, place-based, and personalized learning approaches to creating units that are challenging, exploratory, integrative, and diverse. Course is aligned with the Vermont Middle Grades Endorsement. Prerequisite: Graduate student or Instructor permission.

**EDML 5700. Middle Grades Organization. 3 Credits.**

Contemporary middle level schools are structured specifically to respond to the unique nature of young adolescents. Explores these structures in relation to middle schoolers' developmental and cultural needs. Topics include personalization, teaming, grouping, scheduling, transition planning, and family involvement.

**EDML 5770. Culturally Sustaining ML ELA. 3 Credits.**

Prepares students to teach English Language Arts (ELA) to young adolescents. Covers teaching strategies related to traditional literacies such as reading, writing, and vocabulary. Develops knowledge and skills related to critically evaluating literacy models and strategies, and using literacy to build learners' critical consciousness.

**EDML 5860. ML Internship Seminar. 3 Credits.**

Supports students engaged in their student teaching semester. Develop, share, and critically evaluate portfolio work. Process challenges experienced in the field. Prerequisite: EDML 5992.

**EDML 5890. Equitable MG Learning Environ. 3 Credits.**

Provides a school-based teaching and learning experience that will continue into student teaching in the following term. Through internship and weekly course meetings, provides an opportunity to design and engage in practices that are appropriate for the diverse experiences and identities of young adolescent learners.

**EDML 6070. Adoles Lrng&Beh&Cog Perspect. 3 Credits.**

In-depth examination of cognitive learning theory and its background in behavioral and other learning theories, with application to teaching in a middle or secondary setting. Prerequisite: EDML 3890, acceptance to Master of Arts in Teaching, or Instructor permission.

**EDML 6220. Social Justice Teaching & Adv. 3 Credits.**

Examines social justice issues in education and explores what it means to engage in social justice teaching and advocacy. Critically examines the roles of power, oppression, and privilege in education as students strive to envision ways to disrupt injustice and create a better, more just educational system. Prerequisite: Graduate student or Instructor permission.

**EDML 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDML 6991. Internship: Student Teaching. 1-18 Credits.**

A full-semester, full-time, full-day, clinical component of the teacher preparation program. Provides students with a carefully mentored experience to help develop and enhance the knowledge, skills, and dispositions necessary to positively impact student learning and development. Prerequisites: EDML 6070, EDML 5890; Instructor permission.

**EDML 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDML 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## MOLECULAR PHYSIOLOGY & BIOPHYSICS (MPBP)

### Courses

**MPBP 6010. Human Physiology & Pharm I. 4 Credits.**

An integrated examination of the physiology and pharmacology of the peripheral nervous, muscle and cardiovascular systems in the human body. Pre/co-requisites: CHEM 1450, CHEM 1580 or equivalent; two semesters general physics; two semesters calculus. May not be taken for credit with MPBP 6060.

**MPBP 6030. Critical Reading. 1 Credit.**

Critical reading of the current literature, team taught by the faculty in the Department of Molecular Physiology & Biophysics, giving broad exposure to the expertise present in the department.

**MPBP 6100. Molecular Control of the Cell. 3 Credits.**

Examines the fundamental molecular mechanisms that control dynamic cellular processes. Advanced topics in cell biology will be explored from the single molecule to the whole tissue level with an emphasis on the coordination of complex molecular systems. Prerequisites: MPBP 6010, BIOC 6001, BIOC 6002; Instructor permission.

**MPBP 6300. Biomedical Grantsmanship. 2 Credits.**

Introduces Graduate students in the biomedical life sciences to process of writing competitive research proposals for funding from federal and private agencies such as the National Institutes of Health (NIH).

**MPBP 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**MPBP 6810. Seminar. 1 Credit.**

Presentation and discussion by advanced students, staff, and invited speakers, of current topics in physiology. Prerequisite: Department permission.

**MPBP 6900. Medical Master's Capstone. 1-2 Credits.**

Advances fundamental knowledge in Biochemistry, Pharmacology, and Physiology by addressing therapeutic applications. Students will choose and research current clinical problems and will communicate new molecular strategies through formal presentations. Prerequisites: BIOC 6001, MPBP 6010; Medical Science Graduate student; or Instructor permission.

**MPBP 6990. Special Topics. 1-18 Credits.**

Topics of interest to Graduate students beyond the scope of existing courses.

**MPBP 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**MPBP 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**MPBP 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

## NATURAL RESOURCES (NR)

### Courses

**NR 5450. Data Vis & Communication. 3 Credits.**

Focuses on fundamentals and practice of data visualization and communication. Learn the ways humans use cognitive and perceptual abilities to comprehend information, best practices for creating compelling and effective data visualizations, and the many nuanced factors influencing the successful application of practices. Includes work with an existing research data set. Prerequisite: Graduate student or Instructor permission.

**NR 5460. Geospatial Computation. 3 Credits.**

Geospatial Computation is the study of general computational methods applied to spatial and spatiotemporal data for exploratory, confirmatory, descriptive or predictive analysis. Introduces foundational concepts applications in spatial data science within the context of GIS. Computational approaches in spatial simulation, exploratory data analysis, predictive analysis and geospatial data visualization. Prerequisite: Graduate student or Instructor permission.

**NR 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NR 6060. Envisioning a Sust Future. 2 Credits.**

Seminar orienting Graduate students to RSENR and providing frameworks for collaborative leadership, whole systems thinking, and intercultural competency.



**NR 6070. Applied Ecol., Env. & Society. 2 Credits.**

Critically examines the process and ethics of science, including scientific reasoning, theory, hypotheses, and integration with experimental design, discovery, and ethics. Students will begin to form their professional networks and understand the historical and contemporary influences of professional networks on research and scholarship.

**NR 6110. Leadership for Sustainability. 3 Credits.**

Provides an experiential and theoretical orientation to foundational practices, principles, and skills of sustainability leadership with an emphasis on ecological/systems thinking, sustainability, and leadership.

**NR 6120. Power Privlge & Catalyz Change. 3 Credits.**

Focuses on leadership skills and systems frameworks for engaging with issues of diversity, power, and privilege and the implications of these topics on leaders' capacity. Designed to meet the Rubenstein School of Environment & Natural Resources graduate diversity requirement. Prerequisite: NR 6110.

**NR 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**NR 6392. Master's Project Research. 1-12 Credits.**

Research for the Master's Project.

**NR 6410. Ecological Economic Theory. 3 Credits.**

A transdisciplinary study of the economic system as embedded and interdependent on social institutions and environmental systems.

**NR 6420. Ecosystem Services. 3 Credits.**

Examines the economic and other benefits nature provides to people. Covers the ecological foundations of quantifying ecosystem services, the economics of valuing them, and the practical issues involved with putting them to work for conservation. Prerequisite: Instructor permission.

**NR 6430. Fndmntls of Geog Info Systems. 0 or 3 Credits.**

Concepts and methods in Geographic Information Systems (GIS) presented at an accelerated pace for Graduate students using ArcGIS software.

**NR 6720. Transdisc Leadshp & Creatvty. 3 Credits.**

Explores the theoretical and practice-based fields and lineages associated with transdisciplinary leadership and creativity while providing a solid structural and relational grounding for students in the Transdisciplinary Leadership, Creativity & Sustainability Doctoral Program.

**NR 6730. Transdisc Mthds&Modes of Inqry. 3 Credits.**

Focuses on practices for engaging with inquiry, methods, and practice as students develop more clarity about the research questions, practices, structure, methods, and lineages that will inform their dissertation proposal and research.

**NR 6760. Graduate Teaching Practicum. 2 Credits.**

Natural Resource teaching practicum for Doctoral students in the Rubenstein School. Course is required if students are following the academic option. Should be taken concurrently or one semester in advance of completion of the doctoral teaching requirement. Prerequisite: Doctoral student.

**NR 6880. Ecological Leadership Seminar. 3 Credits.**

Explores emerging topics and themes related to the theory and practice of ecological leadership. Can be taken in successive semesters (up to two times), as learning module topics will change.

**NR 6890. Ecological Ldership Practicum. 3 Credits.**

An advanced exploration of ecological/systems thinking, sustainability, leadership skills, and leveraging change; offering students the opportunity to integrate these concepts and skills through an applied leadership practicum. Prerequisite: NR 6880.

**NR 6990. Special Topics. 1-18 Credits.**

Graduate topics and material that may eventually develop into a regular course offering.

**NR 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**NR 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NR 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NR 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**NR 7740. Creative Practice & Dissertatn. 3 Credits.**

For Doctoral students nearing the end of dissertation research and beginning the integration, diffraction, synthesis, and meaning-making process essential to their dissertation. Provides structure, support and feedback in the creative act of crafting a dissertation. Prerequisites: NR 6720, NR 6730.

**NR 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NR 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**NR 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NEUROLOGY (NEUR)****Courses****NEUR 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NEUR 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NEUROSCIENCE (NSCI)****Courses****NSCI 5220. Advanced Cellular Neurophysiol. 3 Credits.**

Discusses in detail, on both the cellular and molecular level, the physiological properties of cells within the nervous system. Focuses not only on the specific details of neuronal physiology, but also on the scientist, hypothesis, and experimental paradigm that validated the foundational ideas and concepts of this field.

**NSCI 5230. Neurochemistry. 3 Credits.**

Biochemistry of the nervous system. Topics include ion channels, synaptic function, neurotransmitters and neuropeptides, signal transduction, and hormones in brain function. Prerequisite: Instructor permission.

**NSCI 5300. Gr Comparative Neurobiology. 3 Credits.**

Many biological adaptations involve unique sensory and/or motor system skills that enable successful prey detection, predator avoidance, or mate location. Explores ways in which the nervous systems of a wide variety of animals are uniquely adapted for their survival challenges.

**NSCI 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NSCI 6010. Intr Functional Neuroimaging 2. 3 Credits.**

Part One will offer lecture-based technical background on in vivo brain-imaging techniques (e.g. MRI, PET; MEG; EEG; TMS). Part Two will focus on hands-on fMRI data processing including data collection at UVMMC research MRI unit and in-class analysis instruction. Pre/Co-requisites: Basic statistics and/or introductory physics helpful.

**NSCI 6020. Neuroscience. 3 Credits.**

Functional anatomy of the human nervous system. Lectures and laboratory providing learning experience with dissected specimens, gross and microscopic anatomy. Incorporates clinical information from physician-scientists. Prerequisite: Physical Therapy Graduate student or Instructor permission.

**NSCI 6030. Human Gross and Microanatomy. 3 Credits.**

Combination of gross anatomy, histology, embryology, physiology and medical imaging to present an integrated overview of the human body. Emphasis on peripheral nervous system including autonomic nervous system and cranial nerves. Cadaver dissection laboratory combined with lecture and/or content modules and research and teaching presentations. Pre/Co-requisites: Six credits coursework, plus two credits lab in biology, general chemistry, organic chemistry and physics; Neuroscience Graduate student or Instructor permission.

**NSCI 6071. Medical Neuroscience Part 1. 2-6 Credits.**

Explores the nervous system through integrative study of behavior, cellular and systems neurobiology, neuroanatomy, neuroethics, neuropharmacology, neurophysiology, pathophysiology, and psychopathology. Several instructional methods support learning in this course, including lecture, online independent study modules, laboratory sessions, team-based learning and case and problem based discussions. Prerequisites: Neuroscience Graduate student; Instructor permission.

**NSCI 6072. Medical Neuroscience Part 2. 2-6 Credits.**

Explores the nervous system through integrative study of behavior, cellular and systems neurobiology, neuroanatomy, neuroethics, neuropharmacology, neurophysiology, pathophysiology, and psychopathology. Several instructional methods support learning in this course, including lecture, online independent study modules, laboratory sessions, team-based learning and case and problem based discussions. Prerequisites: Neuroscience Graduate student; Instructor permission.

**NSCI 6270. Resp Conduct in Biomed Rsch. 1 Credit.**

Topics in Scientific Integrity surrounding responsible conduct and practices in biomedical research. Prerequisites: Advanced Graduate students, postdoctoral fellows and assistant professors in the biological or biomedical sciences.

**NSCI 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**NSCI 6820. Seminar in Neuroscience. 1 Credit.**

Research presentations and critical review of the literature in various areas of anatomical and neurobiological sciences.

**NSCI 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles. Prerequisite: Instructor permission.

**NSCI 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**NSCI 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NSCI 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NSCI 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**NSCI 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NSCI 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**NSCI 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NURSING & HEALTH SCIENCES (NH)****Courses****NH 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NH 5993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NH 6899. Fundamentals Critical Inquiry. 3 Credits.**

Interprofessional research/evidence-based practice course; instructs students from a variety of healthcare professions to develop skills in research/clinical question development, appraisal of literature and practice guidelines, experimental, quantitative and qualitative studies, and a fundamental understanding of evidence to inform their practice.

**NH 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NH 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NUTRITION AND FOOD SCIENCES (NFS)****Courses****NFS 5245. Nutrition for Global Health. 3 Credits.**

Exposes students to global nutrition issues, with an emphasis on maternal and child nutrition in low- and middle-income countries. Focus on the interplay between demographic, nutritional, and epidemiologic transitions. Examines nutrition issues and investigates efforts to control and prevent malnutrition. Prerequisites: NFS 1043; NFS 2113, NFS 2114, FS 2030, or ANTH 2191; or Instructor permission. Co-requisite: Minimum Junior standing. Catamount Core: GC1.

**NFS 5253. Food Regulation. 3 Credits.**

Comprehensive examination of US food laws and regulations and their relationships to the safety of the US food supply. Focus on how food-related laws and regulations are enacted and enforced, through detailed examination of selected food regulation topics. Prerequisite: NFS 2153 or equivalent course/training with Instructor permission.

**NFS 5254. Global Food Safety. 3 Credits.**

An overview of food safety issues, policies, and opportunities around the globe, with a focus on bacterial, viral, and parasite-based food safety challenges. Prerequisites: NFS 2153, NFS 2156; or NFS 2156, NFS 3203; or MMG 2010 and either NFS 2153 or NFS 2156.

**NFS 5285. Food, Exchange and Culture. 3 Credits.**

Examines practices and principles that cannot be fully understood within market based, industrially manufactured and/or globally sourced food and drink. These practices and principles shape food systems at the level of individual behavior and social institutions, including reciprocity, subsistence, charity, mutual aid and more. Prerequisites: NFS 1053 or ANTH 1140; NFS 2113 or ANTH 2152.

**NFS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**NFS 6100. MSD Journal Club. 2 Credits.**

Critical review of current scientific, peer-reviewed literature, student-led facilitated discussions, abstract writing on topics related to nutrition, sustainable food systems, hunger and food insecurity, health promotion, chronic disease prevention and management. Prerequisite: Master of Science in Dietetics student.

**NFS 6110. Supervised Practice I. 4 Credits.**

Through lecture, discussion, presentations, and practical experience, students develop competencies in clinical dietetics, community nutrition, and food service management. Prerequisite: Master of Science in Dietetics student.

**NFS 6120. Supervised Practice II. 4 Credits.**

Through lecture, discussion, presentations, and practical experience, students develop competencies in clinical dietetics, community nutrition, and food service management. Prerequisite: Master of Science in Dietetics student.

**NFS 6130. Evidence-based Practice Prjct. 2 Credits.**

On site identification, review of literature for background and possible solutions, data collection and analysis, and writing and presenting the results and conclusions of a research problem. Pre/co-requisites: Successful completion of the first year of the Master of Science in Dietetics program.

**NFS 6350. Nutrition&Food Science Seminar. 1 Credit.****NFS 6362. Intro to Research Methods. 3 Credits.**

Basic introduction to research methods at the Master's level, including formulation of a research question and hypothesis, literature searching and preparation of a literature review, analytical methods and experimental design, data analysis and presentation, and journal article publication.

**NFS 6391. Master's Thesis Research. 1-18 Credits.**

Final research thesis under the direction of a graduate faculty mentor.

**NFS 6392. Master's Project Research. 1-6 Credits.**

Final project under the direction of a graduate faculty mentor. Prerequisite: Nutrition & Food Sciences non-thesis student; Instructor permission.

**NFS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.



**NFS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**NFS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**NFS 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion.

**NFS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**OBSTETRICS & GYNECOLOGY (OBY)****Courses****OBY 5000. Understanding Human Pregnancy. 3 Credits.**

Healthy pregnancy outcome depends on a confluence of social and biological processes. Taught by a physician and research faculty through the department of Ob/Gyn. Explores how a child is conceived (or not), maternal-fetal physiology and embryology, medical management of common diseases, ethical considerations, and complex social and societal aspects of pregnancy. Prior coursework in anatomy and physiology is recommended.

**OBY 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**OBY 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**OBY 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**OCCUPATIONAL THERAPY (OT)****Courses****OT 7100. Foundations for OT Practice. 2 Credits.**

The history of occupational therapy, and exploration of theories and frames of reference that guide practice. Introduction to documentation, ethical practice, professionalism, goal writing, APA, and scholarly writing. Prerequisite: Occupational Therapy Doctoral student.

**OT 7110. Functional Anatomy. 4 Credits.**

Students will develop a working knowledge of the structure of the human body. Cardiovascular, respiratory, digestive, renal and urinary, and immune systems will be reviewed. Musculoskeletal and nervous systems will be reviewed detail in terms of normal and abnormal function. Functional implications will be explored. Prerequisite: Occupational Therapy Doctoral student.

**OT 7120. Mvt and Occup Performance. 3 Credits.**

Exploration of how movement deficits impact functional performance. Kinesiology, biomechanical concepts and everyday physics are incorporated with anatomy concepts to help students understand normal and abnormal movement patterns. Goniometers, manual muscle testing, observation, and palpation will be utilized to assess normal and abnormal movement patterns. Prerequisite: Occupational Therapy Doctoral student.

**OT 7130. Dev of Humans as Occ Beings. 2 Credits.**

Exploration of normal development of humans from birth to death through the lens of occupational science. Motor development, biological variables, social development, social determinants of health, environmental factors, and health-related factors are explored as students understand variables that influence occupational participation throughout the lifespan. Prerequisite: Occupational Therapy Doctoral student.

**OT 7140. Psych & MH Influence on Occup. 3 Credits.**

Explores the ways in which psychosocial variables and mental health can influence occupation; the history of occupational therapy in mental health; and the influence of psychosocial variables on health. Students learn motivational interviewing and mindfulness, and practice running groups. Prerequisite: Occupational Therapy Doctoral student.

**OT 7180. Analyze Activity & Performance. 2 Credits.**

Explains how to break down activities into minute pieces to gain an understanding of barriers that may impact desired participation. Performance skills and patterns, contexts and environments, and client factors will be analyzed as students explore the occupational therapy practice framework. Prerequisite: Occupational Therapy Doctoral student.

**OT 7200. Therapeutic Interventions. 3 Credits.**

Covers a variety of therapeutic interventions that can assist clients with everyday living. Includes concepts such as wheelchair fitting, orthosis fabrication, prosthetic management, modalities, telehealth, and assistive technology. Teaches 3D design and printing. Prerequisite: OT 7100.

**OT 7240. Vis&Cog-Percep Infl Occupation. 3 Credits.**

Examines how vision, cognition, and perception can be an underlying barrier to performance in desired activities. Visual screening, visual attention, visual field deficits, executive functioning, awareness and attention deficits, visual-spatial impairments, cognitive function, neurocognitive disorders, memory deficits, and perceptual problems are addressed. Prerequisite: OT 7100.

**OT 7250. Older Adults as Occup Beings. 6 Credits.**

Examines occupational performance for older adults and treatment strategies. Common health conditions and psychosocial conditions are addressed. An experiential learning course with class happening in nursing homes, assisted living facilities, and senior-citizen centers to provide hands-on experiences. Prerequisite: OT 7100.

**OT 7350. Cultural Immersion. 2 Credits.**

Immersion in a practice setting to explore cultural, socioeconomic, racial, ethnic, and diversity factors that impact occupational performance. Students may engage in local projects, or participate in a travel-study course. Students uncover methods to improve occupational performance in community and emerging practice areas. Prerequisite: OT 7200.

**OT 7370. Research I: Identifying Gaps. 2 Credits.**

Students begin the formulation of research groups and identify a research faculty mentor. Students explore the literature on a focused topic, work with their research groups and faculty mentor, formulate their research question, and write their IRB proposal. Prerequisite: OT 7200.

**OT 7400. Teaching and Advocacy. 2 Credits.**

Teaches advocacy techniques, teaching strategies, marketing concepts, and health literacy concepts. Students utilize this knowledge to explain and advocate for the occupational therapy practice to a variety of stakeholders. Prerequisite: OT 7350.

**OT 7450. Young Adults as Occup Beings. 6 Credits.**

Examines occupational performance for young adults and treatment strategies. Common health conditions and psychosocial conditions are addressed. An experiential learning course with class happening in rehabilitation facilities, hand therapy clinics, and additional centers to provide hands-on experiences. Prerequisite: OT 7350.

**OT 7470. Research II: Implementing. 2 Credits.**

Student groups from OT 7370 implement their research project. Students will learn to conduct research, implement recruitment strategies, gather and analyze data, and draw conclusions from the findings. Prerequisite: OT 7370.

**OT 7480. Designing Creative Ther Interv. 2 Credits.**

Uses traditional or modern crafts or activities to design a creative therapeutic intervention. Students will choose a skill, craft or activity that is new to them, learn it, analyze it, and demonstrate how that skill or craft can be utilized in a therapeutic manner. Prerequisite: OT 7350.

**OT 7490. OT Practice Management. 3 Credits.**

Examines the practice management side of occupational therapy including electronic medical systems, the interprofessional team, the role of the occupational therapy assistant, reimbursement systems, legislative and regulatory issues, financial management, business planning, strategic planning, program evaluation, marketing, liability, and supervision. Prerequisite: OT 7350.

**OT 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**OT 7550. Children as Occup Beings. 6 Credits.**

Examines occupational performance for children and treatment strategies. Common health conditions and psychosocial conditions are addressed. An experiential learning course with class happening in pediatric rehabilitation facilities and school settings to provide hands-on experiences. Prerequisite: OT 7450.

**OT 7560. Living Life to the Fullest. 3 Credits.**

Students utilize knowledge gained throughout the program to explore advanced cases and helping people with complex scenarios live their life to the fullest. Technology, occupational science, and occupational therapy theories will be utilized as students piece together assessment and intervention of clients with advanced, complex cases. Prerequisite: OT 7450.

**OT 7570. Research III: Disseminating. 2 Credits.**

Student groups prepare their research for presentation at the University of Vermont. Includes formatting research (1) as a poster presentation for a national conference, (2) as a presentation, and (3) submitting research posters to a regional, national, or international conference. Prerequisite: OT 7470.

**OT 7590. Becoming Life Long Pract. 3 Credits.**

Students prepare to become professionals and life-long learners by reflecting on their experiential learning courses and exploring who they are as therapists. Students learn the registration and licensure process, the value of participation in national organizations, and life-long learning. Prerequisite: OT 7450.

**OT 7600. Cap I: Prof Scholar & Explor. 2 Credits.**

First in a capstone series. Students are introduced to Boyer's four areas of scholarship: Scholarship of Discovery, Scholarship of Integration, Scholarship of Applications, Scholarship of Teaching. Students choose one area that will guide their capstone project. Prerequisite: OT 7200.

**OT 7610. Cap II: Devel & Support Evid. 1 Credit.**

Second in the capstone series. Students will find evidence to support the capstone. Quantitative and qualitative literature will be critiqued and synthesized into a comprehensive literature review. Students develop the capstone proposal. Prerequisite: OT 7600.

**OT 7620. Capstone III: Proposal Defense. 1 Credit.**

Students finalize their capstone proposal. Includes the literature review, goals/objectives, implementation plan, and an evaluation plan. Students must successfully defend their capstone proposal to a committee. Prerequisite: OT 7610.

**OT 7630. Capstone IV: Capstone Experien. 7 Credits.**

Capstone experience required for all entry-level Occupational Therapy Doctoral students. Students will spend a minimum of 14-weeks or 560 hours with their identified capstone mentor to implement and evaluate their capstone project. Most students will be off-campus for their capstone experience. Prerequisite: Level II fieldwork.

**OT 7700. Fieldwork I. 1 Credit.**

Concurrent with a traditional level I fieldwork experience. Students participate in seminars focused on professional identity and behavior, simulated case scenarios, and reflective exercises linked to the fieldwork experience. Prerequisite: OT 7200. Co-requisite: OT 7701.

**OT 7701. Fieldwork I Clinical Placement. 1 Credit.**

A traditional level I fieldwork experience. Students will be placed in a clinical setting for 10 days, within a 2-month period during the summer semester, and observe occupational therapy practice with a clinician. Prerequisite: OT 7200. Co-requisite: OT 7700.

**OT 7710. Fieldwork Level IIA. 9 Credits.**

The first Level II fieldwork experience. Students are placed full-time (minimum 30 hours/week or 360 hours total) at a clinic under the guidance of a Level II Fieldwork Supervisor. This Level II fieldwork experience is a minimum of 12 weeks. Prerequisites: OT 7700, OT 7550.

**OT 7720. Fieldwork Level IIB. 9 Credits.**

The second Level II fieldwork experience. Students are placed full-time (minimum 30 hours/week or 360 hours total) at a clinic under the guidance of a Level II Fieldwork Supervisor. This Level II fieldwork experience is a minimum of 12 weeks. Prerequisite: OT 7710.

**OT 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**OT 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**OT 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**OT 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**ORTHOPEDIC SURGERY (ORTH)****Courses****ORTH 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ORTH 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PATHOLOGY (PATH)****Courses****PATH 6000. Biomedical Research Design. 1 Credit.**

Covers the anatomy of research: what it is made of; and the physiology of research: how it works. Introduces techniques and strategies of research design, implementation, and interpretation. Provides basic tools needed to understand how research in pathology is conducted.

**PATH 6070. Molecular Pathology. 3 Credits.**

Covers mechanisms of disease, molecular biology and genetics, diagnostic molecular pathology, as well as principles, tools and applications in research of molecular pathogenesis. Prerequisite: PATH 6000.

**PATH 6080. Pathology Journal Club. 1 Credit.**

Develops ability to read and present findings communicated in peer-reviewed research articles at the level necessary to formulate and plan independent research. Co-requisites: PATH 6000, PATH 6030; or Instructor permission.

**PATH 6090. Pathology Grand Rounds. 1 Credit.**

Develops ability to prepare and deliver research presentations/Grand Rounds, and to participate in Grand Rounds discussion by critically reading related literature. Builds on the reading skills developed in PATH 6080. Prerequisites: PATH 6000, PATH 6030, PATH 6080; or Instructor permission.

**PATH 6100. Genomic Med & Cytogenetics. 2 Credits.**

Covers the basic concepts of genomic medicine and cytogenetics and their clinical applications, procedures and techniques of molecular and cytogenetic testing, and management of a clinical laboratory. Focuses on diagnostic molecular and cytogenetic testing applicable to malignancies, constitutional disorders, and pharmacogenomics. Prerequisite: PATH 6300 or Instructor permission; experience in either clinical or anatomic pathology required.

**PATH 6250. Genetics for Clinicians. 3 Credits.**

Provides an overview of contemporary human genetics and genomics with application to clinical practice. Cross-listed with: GRNS 6250.

**PATH 6280. Techniques in Microscopy. 3 Credits.**

Introduces many of the microscopy systems and techniques available in the Microscopy Imaging Center core facility in the Larner College of Medicine at UVM.

**PATH 6300. Pathology Rotations. 3-9 Credits.**

Laboratory practicum for Pathology Master's students. Engages students in clinical and anatomic pathology laboratory rotations under supervision of attending physicians and senior residents in the University of Vermont Medical Center Pathology Department.

**PATH 6310. Pathology Clinical Practice. 1 Credit.**

An opportunity to become familiar with how pathologists work in a team with other clinicians to solve difficult problems in clinical practice. Prerequisite: PATH 6000.

**PATH 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**PATH 6990. Special Topics. 1-18 Credits.**

Special Topics in Pathology. Prerequisites: Immunology desirable; Department permission.

**PATH 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.



**PATH 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PATH 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PEDIATRICS (PED)****Courses****PED 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PED 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PED 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PHARMACOLOGY (PHRM)****Courses****PHRM 5400. Molecules & Medicine. 3 Credits.**

This course conveys an understanding about drug design and the molecular mechanisms by which drugs act in the body. It highlights the importance of medicinal chemistry as it overlaps with the disciplines of Chemistry, Biochemistry, Microbiology, Cell Biology, and Pharmacology. Prerequisites: Organic Chemistry, Biology; permission.

**PHRM 5720. Gr Toxicology. 3 Credits.**

Provides an understanding of the chemical, biochemical and physiological factors that determine the pathological effects of chemicals in living systems. Prerequisite: Introductory Biology or Organic Chemistry.

**PHRM 5900. Gr Adv Pharmacology Topics. 3 Credits.**

Focuses on basic pharmacological principles, drug interactions with receptors, membranes, synapses, neurotransmitters, macromolecules, ion channels, the cytoskeleton, and membrane pumps. Recent studies of the molecular and cellular mechanisms of drug action are discussed, and state-of-the-art techniques for pharmacological analysis of various cellular target molecules are described. Prerequisite: Introductory Biology or Biochemistry or Instructor permission.

**PHRM 6010. Applied Systems Pharmacology. 3 Credits.**

A systems approach to basic and applied pharmacology, including pharmacokinetic and pharmacodynamic principles, drug receptors and mechanisms, and clinically relevant adverse effects. Develops skills in diagnostic reasoning and evidence-based medicine. Prerequisite: Graduate student or Instructor permission.

**PHRM 6020. Pharmacological Techniques. 1-4 Credits.**

Experiments conducted under supervision in the areas of drug metabolism, modes of drug action, physicochemical properties of drugs, bioassay, and toxicology. Thesis Master's students limited to three credits.

**PHRM 6050. Milestones in Pharmacology. 2 Credits.**

A critical readings class where students read and present landmark pharmacology papers and link them to modern experiments and clinical applications. Co-requisite: PHRM 3010 or Graduate student.

**PHRM 6060. Medical Cell Biology. 3 Credits.**

Explores the structure and function of eukaryotic cells in multicellular organisms with a special emphasis on the human model. Appropriate for graduate students who have a strong background in biology and chemistry and students with an interest in pursuing health-related fields. Prerequisite: Graduate student, AMP student, or Instructor permission.

**PHRM 6080. Integrative Physiol. & Pharm.. 3 Credits.**

Intended for students pursuing careers in basic scientific research or health-related fields, designed to combine general physiological principles with examples of disease-based pathophysiology and targeted pharmacological approaches. Case studies will emphasize the impact of these processes on human function. Pre/Co-requisites: Two semesters of Chemistry, two semesters of Physics, a background in Biology/Physiology or Health Sciences.

**PHRM 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**PHRM 6730. Readings in Pharmacology. 2 Credits.**

Intensive directed reading in one area of Pharmacology. Pharmacology students must choose a topic outside thesis research area. Term paper and seminar on selected topic required. Prerequisite: Instructor permission.

**PHRM 6810. Seminar. 1 Credit.**

Current developments in Pharmacology are presented for discussion by students. Prerequisite: Instructor permission.

**PHRM 6900. Medical Master's Capstone. 1-2 Credits.**

Students advance their fundamental knowledge in Biochemistry, Pharmacology, and Physiology by addressing therapeutic applications in a discussion format. Students will choose and research current clinical problems and will communicate new molecular strategies through formal presentations. Prerequisites: BIOC 6001, MPBP 6010; Medical Science Graduate student; or Instructor permission.

**PHRM 6990. Special Topics. 1-18 Credits.**

See schedule of courses for specific titles.

**PHRM 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**PHRM 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PHRM 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PHRM 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**PHRM 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PHYSICAL EDUCATION-PROF (EDPE)****Courses****EDPE 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis. Thesis topic must be approved by a faculty committee.

**EDPE 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDPE 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PHYSICS (PHYS)****Courses****PHYS 5125. Mathematical Physics. 3 Credits.**

Introduction to basic mathematical methods of theoretical physics; vector and tensor analysis, partial differential equations, orthogonal functions, complex variables and variational techniques. Prerequisites: Graduate student or undergraduate student with Instructor permission; knowledge of PHYS 2200 and PHYS 4300 topics strongly recommended.

**PHYS 5185. Nano-analysis of Materials. 1 Credit.**

Explores the theory and practical operation of advanced techniques to analyze the structure, composition, and surfaces of micro and nano-scale materials. Students will be trained as users of a Field Emission Scanning Electron Microscope (FESEM) including x-ray elemental analysis. Credit will not be given for both PHYS 3175 and PHYS 5185. Prerequisite: Graduate student.

**PHYS 5200. Advanced Dynamics. 3 Credits.**

Classical mechanics presented as the basis of the concepts and methods of modern physics. Variational, Lagrangian, and Hamiltonian formulations, canonical transformations, continuous systems. Prerequisite: Graduate student or undergraduate student with Instructor permission; knowledge PHYS 2200 topics strongly recommended.

**PHYS 5300. Electromagnetic Theory. 3 Credits.**

Development of Maxwell's theory of electromagnetism emphasizing its physical basis and the modes of mathematical description. Prerequisite: Graduate student or undergraduate student with Instructor permission; knowledge of PHYS 4300 topics strongly recommended.

**PHYS 5400. Statistical Mechanics. 3 Credits.**

Following a review of thermodynamics, covers the fundamentals of classical and quantum statistical mechanics including ensembles, identical particles, Bose and Fermi statistics, phase-transitions and critical phenomena, renormalization group, irreversible processes and fluctuations. Prerequisite: Graduate student or undergraduate student with Instructor permission; knowledge of PHYS 3400 topics strongly recommended.

**PHYS 5500. Quantum Mechanics II. 3 Credits.**

Mathematical and physical foundations of nonrelativistic quantum mechanics from the unifying point of view of Dirac. Symmetry operations and the algebraic structure of quantum mechanics are emphasized. Prerequisite: Graduate student or undergraduate student with Instructor permission; knowledge of PHYS 3400 topics strongly recommended.

**PHYS 5675. Gr Semiconductor Materials/Dev. 0 or 4 Credits.**

Covers Energy band theory, effective mass, band structure and electronic properties of semiconductors. Transport of electrons and holes in bulk materials and across interfaces. MOSFETs, BJTs, pn junctions, and Schottky barriers. Experimental portion of course will have a laboratory component for electronic measurements of Prerequisite: Electrical Engineering Graduate student, Materials Science Graduate student, or Instructor permission. Cross-listed with: EE 5440.

**PHYS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles. Prerequisites: Department permission, Graduate student.

**PHYS 6000. Teaching of College Physics. 1 Credit.**

Instructional strategies and techniques with application to the teaching of laboratories and recitations. Prerequisites: Undergraduate degree in Physics; Instructor permission.

**PHYS 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**PHYS 6700. Biological Physics II. 3 Credits.**

Physical principles of biological systems including advanced techniques in macromolecular structure (experimental and computational), molecular solvation and hydration models, thermostatics, two-state models and cooperativity, elasticity and mechanics of soft tissues, chemical equilibria and reaction kinetics including enzymes. Prerequisites: Graduate student, knowledge of PHYS 1650 and MATH 2248 topics strongly recommended.

**PHYS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PHYS 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**PHYS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PHYS 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**PHYS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PHYS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**PHYS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PHYS 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**PHYS 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PLANT BIOLOGY (PBIO)****Courses****PBIO 5220. Ecology of Invasive Species. 3 Credits.**

Focuses on reading, writing and discussing the primary scientific literature in the field of invasion biology, which draws from many disciplines, including genetics, evolution, population, community, and ecosystem ecology. Students will pursue one of these areas in depth through the preparation of a research paper and a grant proposal.

**PBIO 5750. Gr Global Change Ecology. 3 Credits.**

Survey of the drivers and mechanisms of climate change and its impacts on the distribution and abundance of species and ecological communities. Uses a systems approach that places global change ecology in the context of the Earth system, emphasizing the interactions and feedbacks within and between the ecological and climate systems.

**PBIO 5820. Botany Seminar. 0 Credits.**

Presentations of personal research by faculty, Graduate students, and outside guest speakers. Attendance required of Plant Biology Graduate students and Seniors in botanical research programs. Without credit.

**PBIO 5940. Ecological Modeling. 3 Credits.**

Provides an introduction to process-based modeling of ecological systems. Explores system dynamics and agent-based approaches to modeling ecological systems and processes. Includes a focus on the system dynamics modeling software Stella and the agent-based language Netlogo. Prerequisite: BCOR 2100 or Instructor permission.

**PBIO 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PBIO 6110. Field Naturalist Practicum. 0-3 Credits.**

Landscape analysis; planning and designing field projects; integrated problem solving. Prerequisite: Field Naturalist student.

**PBIO 6230. Fundamentals of Field Science. 3 Credits.**

From bedrock geology to experimental design, conservation science to public communications, prepares students for the varied challenges that field naturalists encounter. Consists of field exercises in natural areas and farmscapes around northwestern Vermont and discussions featuring a diversity of pieces written by naturalists, field scientists, and environmental thinkers. Prerequisite: Field Naturalist Graduate student or Instructor permission.

**PBIO 6240. Landscape Inventory&Assessment. 3 Credits.**

A comprehensive, practical, hands-on training exercise that teaches how professionals go about making sense of a landscape and its many possible values. Designed for Graduate students, the class functions as a pro bono consulting team on a specific land parcel, helping the community sponsor understand the parcel's biota, soils, hydrology, geology, and natural communities. Prerequisite: Instructor permission.

**PBIO 6330. Intro to Professional Writing. 1 Credit.**

Writing seminar that focuses on close observation of the natural world and interpreting scientific findings for public audiences. Includes preparation of an animal encounter and science brief, as well as reading of published natural history and ecology essays. Prerequisite: Field Naturalist Program Graduate student.

**PBIO 6340. Nature & Science Essays. 1 Credit.**

Writing seminar focuses on natural history and science essay writing, while producing a magazine, Field Notes, the annual publication of UVM's Field Naturalist program. Working as a team, the class takes on responsibilities of publishing: planning, writing, editing, designing, printing, and distributing the magazine. Prerequisites: PBIO 6330; Field Naturalist Program Graduate student.

**PBIO 6350. Writing: Science&Investigation. 1 Credit.**

Writing seminar on interviews, opinion writing, feature stories, and effective scientific storytelling. Students conduct interviews, investigate scientific stories of general interest, and write public-facing articles. Prerequisites: PBIO 6330; Field Naturalist Program Graduate student.



**PBIO 6360. Writing for a Popular Audience. 1 Credit.**

Writing seminar in which students pitch, write, and publish a feature story, essay, or opinion piece in a general publication such as a newspaper, a trade or professional magazine, or website. Also explores news releases, fundraising appeals, and other institutional writing. Prerequisites: PBIO 6330; Field Naturalist Program Graduate student.

**PBIO 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis. Credit as arranged.

**PBIO 6392. Master's Project Research. 1-3 Credits.**

Final project under the direction of a graduate faculty mentor. Credit as arranged.

**PBIO 6690. Field Botany for NR Profession. 3 Credits.**

Identification of flowering plants and ferns; survey of prominent Vermont plant families; natural communities, ecological determinants of plant distribution, especially soils; preparation of herbarium specimens. Prerequisite: Instructor Permission.

**PBIO 6800. Ecological Genomics. 4 Credits.**

An exploration of the merger of ecology and genomics to address the genetic basis of adaptive variation in natural populations. Emphasis on integrating quantitative approaches and hands-on analysis of large genomic and ecological data sets. Pre/Co-requisites: BCOR 2300, BCOR 2100, STAT 1410; basic knowledge of statistics, probability, genetics, and evolution required; familiarity with programming in R or bash is recommended. Cross-listed with: BIOL 6200.

**PBIO 6940. Data Modeling for Envir Scienc. 3 Credits.**

Introduction to data modeling using R statistical computing language, emphasizing likelihood, information theoretic, and Bayesian approaches to inference. Course focuses on the R language as a tool for data modeling. Class time divided between lectures that introduce statistical concepts and R language constructs and labs that stress applications. Successful participants will have some statistical background. Prerequisite: A course in introductory Statistics.

**PBIO 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PBIO 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**PBIO 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PBIO 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PBIO 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation. Credit as arranged.

**PBIO 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PBIO 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**PBIO 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PSYCHIATRY (MDPS)****Courses****MDPS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**MDPS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PSYCHOLOGICAL SCIENCE (PSYS)****Courses****PSYS 5901. Topics In: Gr Psych Science. 3-4 Credits.**

Exploration of topics in Psychological Science. May repeat for credit with different content. Topics vary by offering; periodic offering at intervals that may exceed four years. Prerequisite: Psychology or Neuroscience Graduate student.

**PSYS 5990. Special Topics. 1-18 Credits.**

Intermediate courses or seminars on topics beyond the scope of existing departmental offerings. See Schedule of Courses for specific titles. Prerequisite: PSYS 1400.

**PSYS 6000. Adv Statistical Methods I. 3 Credits.**

Statistical methods for evaluating psychological data. Emphasizes exploring data with respect to research hypotheses. Critical study of hypothesis tests on means, chi-square, and correlational techniques. Prerequisite: Psychology or Neuroscience Graduate student.

**PSYS 6005. Adv Statistical Methods II. 3 Credits.**

Continuation of PSYS 6000. In-depth study of the analysis of variance and multiple regression. Further study of analysis and interpretation of data from the behavioral sciences. Prerequisites: PSYS 6000; Psychology or Neuroscience Graduate student.

**PSYS 6010. Seminar in Psyc Research Meth. 3 Credits.**

Topics may include but are not limited to: factor analysis, discriminant function analysis, multivariate analysis of variance, advanced experimental design, and computer application in data collection and analysis. Prerequisites: PSYS 6000; Psychology Graduate student.

**PSYS 6020. Structural Equation Modeling. 3 Credits.**

Introduction to confirmatory factor analysis, path analysis, and structural equation methods, with an emphasis on applied psychological research. Prerequisites: PSYS 6000, PSYS 6005; Psychology Graduate student.

**PSYS 6200. Full Clinic Practicum Seq Seri. 1 Credit.**

All clinical students from the first through the fifth year attend monthly full clinic trainings and case presentations. Trainings include a clinic orientation, safety training, and special topics. Each vertical team has the opportunity to provide a case presentation outlining theoretical framework, case conceptualization, treatment techniques, progress, and challenges. Prerequisite: Psychology Graduate student.

**PSYS 6210. Intro Psych Intervention Skill. 0.5 Credits.**

Introduction to basic psychological intervention skills and the integration of these skills in the therapeutic setting. For first-year Doctoral students in clinical psychology. May be repeated for credit. Prerequisite: Psychology Graduate student.

**PSYS 6220. Advanced Clinical Practicum. 0 or 1 Credits.**

Year-long, 20 hours/week supervised service delivery involving psychological intervention assessment and consultation. May be repeated for credit. Prerequisite: Psychology Graduate student.

**PSYS 6230. Supervision & Consultation Sem. 1 Credit.**

An overview of theory and research associated with clinical supervision and consultation for health service psychology. A meta-supervision model is implemented for the supervision of junior colleagues with an emphasis on multicultural issues. Exploration of consultation in numerous settings including hospitals, schools, community-based organizations, and industry. Prerequisite: Psychology Graduate student.

**PSYS 6391. Master's Thesis Research. 1-18 Credits.**

Research leading toward completion of the Master's Thesis.

**PSYS 6400. Biobehavioral Proseminar. 3 Credits.**

Advanced survey and analysis of behavioral and biological psychology, with special emphasis on learning theory and behavioral neuroscience. Prerequisite: Psychology or Neuroscience Graduate student.

**PSYS 6415. Neurobio of Learning & Memory. 3 Credits.**

Exploration of the neural bases of learning and memory, using a brain systems approach, through a survey of recent journal articles. Prerequisites: PSYS 6400; Psychology or Neuroscience Graduate student.

**PSYS 6500. Proseminar in Exp Social Psych. 3 Credits.**

Advanced analysis of experimental social psychology, including examination of social psychological theories, methods, and key research findings. Prerequisite: Psychology Graduate student.

**PSYS 6600. Developmental Proseminar. 3 Credits.**

This seminar focuses on key issues in developmental psychology, including an examination and critique of psychological theories, methods, and research in child and adolescent development. Prerequisite: Psychology Graduate student.

**PSYS 6705. Child Psychopathology. 3 Credits.**

An advanced course dealing with models of classification, diagnosis, epidemiology of behavior disorders in children. Prerequisite: Psychology Graduate student.

**PSYS 6710. Child & Adolescent Psyc Assess. 0 or 3 Credits.**

Interviewing, intelligence testing, behavioral assessment, social cognition, family environments, specific disorders of childhood. Supervised assessment practicum (100 hours) in in-patient and out-patient mental health settings and schools. Prerequisite: Psychology Graduate student.

**PSYS 6715. Behavior Therapy: Children. 3 Credits.**

Review of literature relating to theory, practice, research. Emphasis on the evaluation of a variety of procedures applied to behavior disorders in children. Prerequisites: PSYS 6705; Psychology Graduate student.

**PSYS 6720. Adult Psychopathology. 3 Credits.**

An advanced course dealing with models of classification, diagnosis, epidemiology of behavior disorders in adults. Prerequisite: Psychology Graduate student.

**PSYS 6725. Adult Psychological Assessment. 0 or 3 Credits.**

Theories and strategies of psychological intervention. Supervised service delivery (150 hours) at University Counseling and Testing Center including individual and group therapy and crisis intervention. Prerequisite: Psychology Graduate student.

**PSYS 6730. Adult Cognitive & Behav Thrpy. 3 Credits.**

Review of literature relating to theory, practice, research. Emphasis on the evaluation of a variety of procedures applied to behavior disorders in adults. Prerequisites: PSYS 6720; Psychology Graduate student.

**PSYS 6735. Multicultural Issues Clin Psyc. 3 Credits.**

An advanced, experiential and didactic course with the following objectives: (1) to increase awareness of racial-cultural factors in clinical psychology; (2) to build knowledge of specific reference group identities-such as race, ethnicity, gender, sexual orientation, social class, and religion; and (3) to cultivate culturally-responsive practice through skill development and critical consciousness. Prerequisite: Psychology Graduate student.

**PSYS 6740. Professional Affairs & Ethics. 3 Credits.**

The origins of professions and of psychology in particular. Accreditation, laws affecting psychology, organization of the profession, licensing certification, and the code of ethics for psychology. Prerequisite: Psychology Graduate student.

**PSYS 6900. History of Psychology. 3 Credits.**

Review of major theoretical and empirical developments in psychology, including schools of psychology that have influenced contemporary models of psychology. Prerequisite: Psychology Graduate student.

**PSYS 6990. Special Topics. 0.5-18 Credits.**

See Schedule of Courses for specific titles. Prerequisites: Psychology Graduate Student; Instructor permission.

**PSYS 6991. Clinical Internship. 0-18 Credits.**

Clinical psychology internship experience. Prerequisite: Psychology Graduate student.

**PSYS 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PSYS 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory-level course in the discipline, for which credit is awarded. Offered at department discretion. Prerequisite: Instructor permission.

**PSYS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PSYS 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research leading toward completion of the doctoral dissertation.

**PSYS 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PUBLIC ADMINISTRATION (PA)****Courses****PA 5990. Special Topics. 1-18 Credits.**

Current issues and new developments in public policy and public administration. Prerequisite: Permission.

**PA 6010. Foundations of Public Admin. 3 Credits.**

Survey of major elements of management in the public and nonprofit sectors with special attention given to problems arising from political imperatives generated by a democratic society.

**PA 6020. Org Theory & Behavior. 3 Credits.**

Examination of basic classical and contemporary theory, research on human relations, internal structures, environments, types, diverse workplaces, general properties of complex organizations and bureaucracies.

**PA 6030. Research & Evaluation Methods. 0 or 3 Credits.**

Conceptualization, collection and analysis of primary and secondary data; interpretation, and communication of results of applied research and/or evaluation studies for decision makers. Prerequisite: Three hours of Statistics. Cross-listed with: CDAE 6510.

**PA 6050. Public and Nonprofit Budgeting. 3 Credits.**

A focus on the budget as the primary policy and planning document in public and nonprofit organizations.

**PA 6060. Policy Systems. 3 Credits.**

The study and application of system-level public policy frameworks, theories and models to contemporary policy problems and solutions.

**PA 6070. Administrative Ethics. 3 Credits.**

Administrative behavior with a focus on ethical dilemmas that arise in the bureaucracy. An examination of a number of moral issues and ways to resolve them.

**PA 6080. Decision Making Models. 3 Credits.**

Explores and analyzes normative, descriptive and prescriptive decision making models. Focuses on systems-level thinking to impart problem-solving skills in complex decision-making contexts. Emphasis placed on imparting cutting edge skills, enabling students to design and implement multiple criteria decision analysis models.

**PA 6110. Policy Analysis&Program Eval. 3 Credits.**

A seminar providing hands-on knowledge in policy analysis and program evaluation using case studies of current analysis projects and problems. Specific techniques include planning, survey administration, forecasting, cost benefit analysis, and impact assessment.

**PA 6170. Systems Anly & Strategic Mgmt. 3 Credits.**

Students will be introduced to systems thinking and network dynamics with a particular focus on managing across organizational and sectoral boundaries, including public-private partnerships, intergovernmental arrangements, and strategic alliances. Tools to undertake strategic analysis and planning will be explored.

**PA 6230. Non-Profit Administration. 3 Credits.**

Course reviews the history of, and managerial challenges inherent to, the non-profit sector in the United States and explores sector's relationship to the governmental and business sectors.

**PA 6260. Community Economic Development. 3 Credits.**

Examines how rural and urban communities address poverty, unemployment and other economic problems through job creation and retention, workforce training and support, and other development strategies. Cross-listed with: CDAE 6260.

**PA 6391. Master's Thesis Research. 1-6 Credits.**

Research for the Master's Thesis. Thesis topic must be approved by faculty advisor.

**PA 6750. Public Administration Capstone. 3 Credits.**

The Capstone is designed to provide Master of Public Administration students with a summative experience that ties learning competencies to evidence drawn from their course of study. Pre/co-requisites: Core Master of Public Administration courses either prior to Spring semester or simultaneously.

**PA 6990. Special Topics. 1-18 Credits.**

For advanced students within areas of expertise of the faculty. Varied course offerings. Contemporary topics. Instructor Permission.

**PA 6991. Internship. 3-6 Credits.**

Supervised administrative experience culminating in a written report.

**PA 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PA 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



## PUBLIC HEALTH (PH)

### Courses

#### **PH 5000. Controversies in Public Health. 3 Credits.**

Public health and health policy issues provoke controversy. Compelling scientific evidence suggests strategies to prevent disease and illness, but progress is driven by scientific advances and societal norms. Highlights current health issues through the lens of controversies to determine what impedes our collective progress towards a healthier society for individuals and communities. Prerequisite: Junior, Senior, or Graduate student; Honors College Sophomores by Instructor permission.

#### **PH 5001. Epidemiology for Practice. 3 Credits.**

Epidemiology is the basic science of understanding disease at the population level. Provides coverage of epidemiologic principles and techniques without detailed mathematical analyses. Emphasis will be on the application of epidemiologic principles to public health and health care issues and settings, through the use of readings, online resources, case studies, and class discussion. Prerequisite: Junior, Senior, or Graduate student; Honors College Sophomores by Instructor permission.

#### **PH 5002. Public Health Advocacy. 3 Credits.**

Explores how students can use their voices and position within public health to promote health and dismantle disparities. Identifies how to use public health advocacy in the different disciplines within public health and evaluate the importance of stakeholders, education, awareness, and community connectedness. Utilizes discussion-based practices to explore a myriad of existing public health campaigns and enhance communication skills and practices when advocating for positive health outcomes. Prerequisites: Junior, Senior, or Graduate student; Honors College Sophomores with Instructor permission.

#### **PH 6000. Health Equity. 3 Credits.**

Covers health equity frameworks, theories, and research approaches. Explores cultural competence, healthcare access, and health equity measurement, and then examines different population perspectives on health equity. Develops skills necessary to understand health equity concepts, critique literature, and ultimately to work towards achieving health equity.

#### **PH 6010. Public Health & Health Policy. 3 Credits.**

Course focuses on current public health issues, barriers to improving population health, and policy tensions between science, economics, education, politics, government, media, and public health.

#### **PH 6011. Cancer Epidemiology. 3 Credits.**

Prepares students to design and implement studies of cancer epidemiology in the U.S. and globally. After gaining an understanding of the statistics used to measure cancer incidence and prevalence, students will explore risk factors for various cancers in order to learn relevant factors for oncogenesis, focusing on vulnerable populations.

#### **PH 6020. Epidemiology I. 3 Credits.**

Epidemiology is the study of disease distribution and determinants in populations; we will define populations and estimate the distribution of health-related conditions and their determinants. Pre/co-requisites: College-level Mathematics course; Bachelor's degree.

#### **PH 6030. Biostatistics I: App Rsch in PH. 3 Credits.**

Biostatistics I (Applied Research Methods in Public Health) includes biostatistics, research designs, and qualitative approaches, and includes emphasis on evaluating research articles in public health. Pre/co-requisites: College-level Mathematics course; Bachelor's degree.

#### **PH 6040. Environmental Public Health. 3 Credits.**

Explores major areas of environmental public health (EPH), including environmental hazards, exposures, and related health outcomes, including emerging topics in environmental public health.

#### **PH 6060. Social&Behavioral Public Hlth. 3 Credits.**

This course addresses the behavioral, social and cultural factors related to individual and population health, and health disparities over the life course.

#### **PH 6070. Epidemiology 2. 3 Credits.**

Exposure to advanced epidemiological concepts, such as effect modifications and modeling using multiple variables, related to establishing causal relationships from observational data. Prerequisites: PH 6020, PH 6030.

#### **PH 6080. Environmental Public Health 2. 3 Credits.**

Students explore public health within the context of natural and human-made environments, and examine methods of practice and emerging environmental health topics. Prerequisite: PH 6040.

#### **PH 6090. Public Health Biostatistics II. 3 Credits.**

An advanced applied research methods course with the goal of helping students understand and apply multivariate regression analyses, non-parametric methods, survival analysis and advanced concepts with confounding and effect modification, and interpreting data in public health applications. Prerequisite: PH 6030.

#### **PH 6100. Public Health Law and Ethics. 3 Credits.**

Public health law examines the government's authority, at various jurisdictional levels, to improve the health of the general population within societal limits and norms. Prerequisite: Bachelor's degree.

#### **PH 6110. Global Public Health. 3 Credits.**

This course explores global public health challenges affecting people primarily in developing or resource- constrained countries. Cultural competency concepts will be embedded. Prerequisite: Bachelor's degree.

#### **PH 6120. Food Systems & Public Hlth. 3 Credits.**

This course explores food systems' influence on public health, and how technology, policy, biology, epidemiology, and historical knowledge can support a healthier food system. Prerequisite: Bachelor's degree.

#### **PH 6140. Environmental Risk & Risk Comm. 3 Credits.**

This course explores theory, policy and techniques for environmental risk communication from the viewpoints of government, industry, special interest groups, and the general public.

#### **PH 6150. Public Health Surveillance. 3 Credits.**

Explores surveillance of infectious and non-infectious diseases, health behaviors and population characteristics, fundamental to nearly all fields of modern public health practice. Prerequisite: PH 6020.

**PH 6160. Social Determinants of Health. 3 Credits.**

Uses an epidemiological lens to examine the major social variables that affect the health of a population. Close analysis of how our social structures impact health disparities, examines theories and empirical data to examine how gaps in our social structures lead to health disparities and inequalities.

**PH 6170. Mgmt in Hlth Services&Med Care. 3 Credits.**

Addresses major issues and challenges faced by health services managers relating to established and evolving social, economic, and professional policies in a context of practical problem assessment and appropriate resolution.

**PH 6180. Improving Health in Population. 3 Credits.**

Descriptive and chronic disease epidemiology, health determinants, and community resources will be utilized to develop strategies and interprofessional skills to improve individual and population health. Exploration of roles of health professionals in the care of populations with an emphasis on the US health care system.

**PH 6200. Public Health Communications. 3 Credits.**

An introduction to the field of Public Health Communications, focusing on three areas: Crisis and Emergency Risk Communications, Data Communications/visualization, and Social Marketing (or Behavior Change Communications). While each area relies on a theoretical foundation, the focus is professional application of the communication techniques.

**PH 6201. One Health: Theory to Practice. 3 Credits.**

Explores the One Health concept and approach. Covers the One Health Triad, the One Health practitioner, One Health competencies, One Health education and communication, and non-scientific disciplines involved in One Health decision-making and problem-solving. Enables the development of hard, One Health skills that can be integrated into daily public health practice. Readings create the course framework; primary sources will be provided to complement the material.

**PH 6210. Controversies in HlthEconomics. 3 Credits.**

Covers health economic concepts, principles and theories, as well as the application of these methods to a range of practical scenarios. Examines the advantages and disadvantages of various health economic techniques and health economic evaluation.

**PH 6211. Global Health Leadership. 3 Credits.**

Prepares students for leadership roles in global public health organizations. After identifying governance and financing structures, students apply management and leadership principles through case studies, emphasizing application of relevant analytical skills. Topics include leadership principles, human resources management, global health ethics, social marketing, global health financing, and future trends in global health.

**PH 6220. One Health: Zoonoses. 3 Credits.**

Zoonoses and vector-borne disease account for the majority of emerging and re-emerging diseases. Covers the drivers that influence infection in animals and humans, tools used for disease monitoring and prevention, and policies and programs aimed at prevention. Cross-listed with: ABIO 6090.

**PH 6240. Public Health Informatics. 3 Credits.**

Public health practice relies on timely, thorough and reliable information from a variety of sources. Informatics is an emerging field that employs information technology tools and methods to address public health challenges and to improve public health outcomes.

**PH 6250. Investigating DiseaseOutbreaks. 3 Credits.**

Investigating disease outbreaks is a fundamental responsibility of public health. This course covers field epidemiology outbreak investigation methods, working on an investigatory team, interacting with relevant agencies, and the selection and implementation of appropriate interventions.

**PH 6260. Legal Issues in Health Care. 3 Credits.**

Provides an overview of the legal environment related to healthcare. Using court decisions and other law, explores medical malpractice, negligence, liability, patient rights, healthcare reform and compliance with such laws as Medicaid, Medicare, and HIPAA.

**PH 6270. Climate Change & Human Health. 3 Credits.**

Global climate change is increasing extreme weather events, influencing air and water quality, and shifting vector habitats. Students will explore basic climate science, health, consequences of climate change, and public health approaches to assessment, communication, projection, mitigation, and adaptation.

**PH 6280. Health in Humanitarian Crises. 3 Credits.**

Offers an in-depth view of the complexities of responding to natural and conflict related disasters. Introduces a range of topics that lay the framework for humanitarian response and will generate further learning.

**PH 6300. Exploring Healthcare Systems. 3 Credits.**

Explore a healthcare system outside the USA. Common elements in all healthcare systems are required for effective and efficient delivery. Field visits, presentations, and cultural exposure are included in the program. Prerequisite: Instructor permission.

**PH 6310. Climate Change Emergencies. 3 Credits.**

Floods, droughts, severe heatwaves, wildfires, and disruptions to the food supply are a few anticipated direct effects of climate change. Examines each of these public health challenges, and their potential to cause/significantly contribute to complex humanitarian emergencies, civil unrest, military conflict, and large-scale migration, as well as policy implications going forward.

**PH 6320. Maternal and Child Health. 3 Credits.**

Introduces major national programs and policies that directly affect women and children in the US and utilize program case studies from around the world. Provides an understanding of social determinants of health and the life course approach to analyze these programs and policies.

**PH 6330. Global Mental Health. 3 Credits.**

Provides a firm grounding in what is known about mental health issues affecting global populations. Examines a wide range of issues, ranging from how mental illness is identified to innovative treatment approaches and how cultural considerations influence mental health promotion efforts.

**PH 6920. Culminating Project Experience. 1-6 Credits.**

Prepares students to apply knowledge and skills in a culminating project experience that reflects research and practice needs of actual populations. Prerequisites: PH 6010, PH 6020, PH 6030, PH 6070.

**PH 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**PH 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**PH 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**RADIOLOGY (RAD)****Courses****RAD 6890. Human Anatomy via Radiology. 3 Credits.**

Conveys the subject of human anatomy. Rather than anatomic dissection, in-vivo anatomy will be presented through medical imaging. Prerequisite: Biology 2000-level equivalent.

**RAD 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**RAD 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**SCHOOL OF THE ARTS (SOA)****Courses****SOA 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**SOA 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**SECONDARY EDUCATION (EDSC)****Courses****EDSC 5207. Development: Theory & Applctn. 3 or 4 Credits.**

Participants in this class examine adolescent developmental and learning theories. A Service Learning requirement allows students to apply understanding in the context of instructional settings. Prerequisites: EDTE 1010, EDFS 1020; or Instructor permission.

**EDSC 5209. Practicum in Teaching. 3 or 4 Credits.**

Field-experience in secondary setting. Focus on school culture and student needs while documenting effectiveness in one-on-one teaching. Professional attributes/dispositions are critically assessed. Pre/co-requisites: EDFS 3030, EDSC 5207.

**EDSC 5215. Disciplinary Literacy Sec Schl. 3 Credits.**

Theory and methods of disciplinary literacy for teaching in secondary schools. Focus on literacy skills and critical thinking across disciplines. Cultural contexts explored. Pre/co-requisites: EDSC 5207, EDSC 5209, EDSC 5216.

**EDSC 5216. Curr,Instr&Assmt Sec Schl Tchr. 3 Credits.**

Development of methods related to secondary school teaching. Study and application of constructivist learning theory, differentiation, authentic assessment in planning. Focus on cross-disciplinary collaboration. Co-requisite: EDSC 5215.

**EDSC 5225. Tchg Soc Studies in Sec Schls. 3 Credits.**

Includes multiple teaching modes, questioning techniques, micro-teaching laboratory, analysis of historical content to determine students' prerequisite cognitive skills and processes for construction of historical scenarios. Prerequisite: Twelve hours in education and related areas.

**EDSC 5227. Tchng Science in Sec Schls. 3 Credits.**

Consideration of science curricula and instructional strategies for grades 7-12. Topics may include: teaching science as problem solving, research in science teaching, affective education through science. Prerequisite: Twelve hours in education and related areas or Instructor permission.

**EDSC 5230. Teaching for Results. 3 Credits.**

Analysis of planning, curriculum design, teaching, evaluation and classroom management from the perspective of research and practice. Individual tasks culminate in production of a licensure portfolio. Co-requisite: EDSC 4226.

**EDSC 5251. Preventing School Shootings. 3 Credits.**

Issues to be explored include historical perspectives on school safety, theories of sources of violence in schools and their merit, relationship building as an antecedent intervention, the intersection of social justice and the second amendment, and action steps to be taken to help prevent further school tragedies.

**EDSC 5257. Tchng Math in Sec Schls. 3 Credits.**

Contemporary secondary school mathematics curricula and instructional strategies for grades 7-12. Topics may include problem solving, research in mathematics education, use of calculators and computers, manipulatives, and evaluation. Prerequisite: Twelve hours in education and related areas or permission.

**EDSC 5259. Tchng Foreign Lang in Sec Schls. 3 Credits.**

An overview of language teaching methodology. The learning/teaching process as it relates to language learning; techniques used in the teaching and testing of second language skills and culture. Prerequisite: Acceptance into licensure program.

**EDSC 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDSC 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDSC 6991. Internship. 1-18 Credits.**

Student teaching or some other on-site supervised experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team, for which academic credit is awarded.



**EDSC 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**SOCIAL WORK (SWSS)****Courses****SWSS 5000. Critical Reflections. 3 Credits.**

Content and structure may accommodate special issues not especially appropriate within the boundaries of an existing course. Prerequisite: Foundation year Master of Social Work student or Instructor permission.

**SWSS 5027. Foundations of SW Research. 3 Credits.**

An introduction to qualitative and quantitative methods of applied social research including program evaluation and the evaluation of practice with additional focus on interpreting research for social work context. Prerequisite: Master of Social Work student or Instructor permission.

**SWSS 5160. Th Found of Hum Beh&Soc Envr I. 3 Credits.**

This course introduces students to the biological, psychological, cultural/social, and economic forces that influence human behavior and their implication for social work practice. Prerequisite: Master of Social Work student or Instructor permission.

**SWSS 5170. Th Found Hum Beh&Soc Envr II. 3 Credits.**

Focus is on theories regarding the nature and functioning of human service organizations and communities in relation to meeting human needs. Prerequisite: SWSS 5160 or Instructor permission.

**SWSS 5200. Soc Welfare Pol & Services I. 3 Credits.**

An introduction to history and philosophy of social work and social welfare and the structure of service programs is provided. Prerequisite: Master of Social Work student or Instructor permission.

**SWSS 5210. Soc Welfare Pol & Services II. 3 Credits.**

Focus is on the analysis of the economic, political, and social forces that influence the development and implementation of social welfare policy. Prerequisite: SWSS 5200 or Instructor permission.

**SWSS 5240. Child Abuse & Neglect. 3 Credits.**

A Master of Social Work foundation elective that considers child abuse and neglect from historical, cultural, sociopolitical and psychological perspectives and examines professional social work responses to them. Prerequisite: Matriculation in the foundation year of graduate study in Social Work or Instructor permission.

**SWSS 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**SWSS 6000. Foundation Yr Field Practicum. 3 Credits.**

Supervised field-based learning of 15-20 hours per week. Students are placed in human service agencies and organizations and learn the purposeful application of generalist social work theory, ethics and skills. Prerequisite: Master of Social Work foundation year student or Coordinator of Field Education permission.

**SWSS 6120. Social Work Practice I. 3 Credits.**

A comprehensive introduction to concepts and skills employed by social workers in interactions and interventions with individuals, families, and groups is provided. Prerequisite: Master of Social Work student.

**SWSS 6130. Social Work Practice II. 3 Credits.**

Emphasizes knowledge and skills of social work practice with organizations and communities. Prerequisite: SWSS 6120.

**SWSS 6140. Transformative Social Work I. 3 Credits.**

Focuses on developing relational, profound, and generative meanings for change across populations, fields of practice and social issues. Prerequisite: Completion of Foundation Year.

**SWSS 6150. Transformative Social Work II. 3 Credits.**

Focuses on practical applications across populations at risk, field of practice and social issues. Prerequisite: Completion of Foundation Year.

**SWSS 6160. Integrative Appr Transform SW. 3 Credits.**

In this course students will synthesize their exploration of their area of focus in transformative social work through scholarly reading, research and classroom presentations. Prerequisite: Completion of Foundation Year.

**SWSS 6180. Social Work in Global Context. 3 Credits.**

Students convene in Finland to learn about how social work is understood and practiced in different parts of the world. Together with students and faculty from other countries, explores social issues, social work responses to those issues, and ways of communicating across cultural and language differences. Considers how the common identification with social work builds connection and might enable collaborative work to improve the lives of people worldwide. Prerequisite: Master of Social Work student or Instructor permission.

**SWSS 6270. Adv Social Work Research. 3 Credits.**

An analysis of social work research from methodological and theoretical perspectives is emphasized. The application of research to the student's concentration area is required. Prerequisites: Completion of SWSS 5027; a basic Statistics course; Master of Social Work advanced student; or Instructor permission.

**SWSS 6300. Crit Principles into Practice. 3 Credits.**

An advanced Master of Social Work concentration elective that analyzes competing and complementary assessment strategies and their implications in social work in health/mental health and with children and families. Prerequisite: Completion of Master of Social Work foundation course work or Instructor permission.

**SWSS 6360. Addressing Substance Abuse SW. 3 Credits.**

In this course, students will investigate the research on the etiological and contributing factors to substance abuse, and study gender specific and culturally responsive treatment strategies, than include trauma-focused, motivational interviewing and cognitive-behavioral approaches. Prerequisites: Social Work student, Concentration year status (completion of foundation year or having advanced student status in the Master of Social Work program).

**SWSS 6390. Practitioners' Own Stories. 3 Credits.**

Through weekly writing prompts, students reflect on connections between their graduate training and contexts for practice, considering organizing concepts of wellness and illness and normal and dysfunction, along with social categories of social difference. They focus on how their personal and professional subjectivities contribute to their observations and analyses of institutionally generated client concerns. Prerequisite: Completion of foundation year course work in Master of Social Work program.

**SWSS 6400. Trans. Change in SW Orgs. 3 Credits.**

This course prepares social workers to lead transformative organizational change; change that reorients the way the organization functions through critical questioning of standing organizational discourse and practices. Topics include: futures research, change models, constructivist approaches, & social inequity and difference. Prerequisite: Completion of first year of the Master of Social Work program or advanced student status in the Master of Social Work program.

**SWSS 6410. Social Work with Refugees. 3 Credits.**

The historical construction of 'refugees', the discourses and practices that surround it, and the impact of that construction on the lives of people, particularly vulnerable populations are course foci. The geopolitical, economic, ecological discourses that give rise to human flight are examined within the context of social work practice. Service learning experiences are provided. Prerequisites: SWSS 6120, SWSS 6130, SWSS 5160, SWSS 5170, SWSS 5200, SWSS 5210, SWSS 5027, SWSS 6000.

**SWSS 6800. Prof Issues in Social Work. 2-4 Credits.**

Designed to cover selected social work issues in depth. Major emphasis on intensive and critical analysis of the literature and practice in a given area. Prerequisite: Instructor Permission.

**SWSS 6890. Spec Practice Field Practicum. 3-4 Credits.**

Supervised field-based learning of 15-20 hours per week. Students are placed in human service agencies and organizations and apply advanced social work practice related to an area of specialized practice. Prerequisites: Completion of 30 Foundation Master of Social Work credit hours including SWSS 6120, SWSS 6130, SWSS 5160, SWSS 5170, SWSS 5200, SWSS 5210, SWSS 5027, SWSS 6000 (6 hours); or permission of Field Education Coordinator. Co-requisite: SWSS 6140; SWSS 6150.

**SWSS 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**SWSS 6993. Independent Study. 1-18 Credits.**

Individual work on Social Work issue(s) selected by the student in consultation with a faculty member. Prerequisite: Instructor permission required.

**SWSS 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**SPECIAL EDUCATION (EDSP)****Courses****EDSP 5100. Foundations of Special Ed. 3 Credits.**

Examination of historical and current trends in the treatment of individuals with disabilities including effects of discrimination, advocacy, litigation, legislation and economic considerations on educational services and community inclusion. Prerequisite: Twelve hours in education and related areas or Instructor permission.

**EDSP 5110. Meeting Inst Needs/All Stdnts. 3 Credits.**

Students apply principles of learning and social development to improve academic and social skills of all individuals with a focus on those who present academic and behavioral challenges. Prerequisite: Instructor permission.

**EDSP 5120. Assessment in Special Ed. 3 Credits.**

Course covers assessment knowledge and skills essential for special educators, including test selection, administration and scoring, and legal issues related to special education assessment. Prerequisite: Admission to graduate program in Special Education or Instructor permission.

**EDSP 5130. Severe Disabil Char&Intervent. 3 Credits.**

Physical, sensory, health, intellectual and behavioral characteristics of developmental disabilities. Educational approaches and supports from various professional disciplines to educate students with severe disabilities. Prerequisite: Instructor permission.

**EDSP 5200. Preventing School Shootings. 3 Credits.**

Issues to be explored include historical perspectives on school safety, theories of sources of violence in schools and their merit, relationship building as an antecedent intervention, the intersection of social justice and the second amendment, and action steps to be taken to help prevent further school tragedies. Prerequisites: EDSP 1050, EDSP 2170; Graduate student; or Instructor permission.

**EDSP 5250. Gr Culture of Disability. 3 Credits.**

Focus on theoretical questions of how societies understand disability and its consequences for social justice, by examining the multiple determinants of the societal construction of disability. Pre/Co-requisites: EDSP 2170, CSD 2010, ASL 2990; Graduate student; or Instructor permission. Cross-listed with: CSD 5740.

**EDSP 5260. GlobalDisabilityStudies:Africa. 3 Credits.**

Presents broader views of disability, advocacy, and communication in the traditional African context through the voices and experiences of African disability rights advocates globally, including African/Asian immigrants and refugees living in the USA. Pre/Co-requisite: Graduate or Continuing Education student, or Instructor permission.

**EDSP 5890. Special Educ Practicum. 1-6 Credits.**

Students provide direct instruction for six learners with learning disabilities, cognitive disabilities, behavior disorders, and/or multidisabilities. Prerequisite: Instructor permission.

**EDSP 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDSP 5991. Intern: Systems Development. 1-18 Credits.**

Competency-based instruction in planning for system level development and change. Students apply systems theory in an educational setting. Prerequisite: EDSP 6140 or Instructor permission.

**EDSP 6130. Collaborative Consultation. 3 Credits.**

Adult development and group dynamics theory provide the knowledge base for collaborating with parents and teachers to meet the diverse needs of students with disabilities. Cross-listed with: EDLP 6200.

**EDSP 6140. Curr & Tech Spec Ed: Literacy. 3 Credits.**

Curricular and assessment areas essential to literacy development for students with disabilities. Development, adaptation of curricula and assessment in elementary and secondary education for students with mild, moderate, and severe disabilities. Prerequisite: Special Education Graduate student or Instructor permission.

**EDSP 6150. Curr & Tech Spec Ed: Math. 0 or 3 Credits.**

Curricular and assessment areas essential to math development for students with disabilities. Development, adaptation of curricula and assessment in elementary and secondary education for students with mild, moderate, and severe disabilities. Prerequisite: Special Education Graduate student or Instructor permission.

**EDSP 6180. Behavior Analysis in Spec Ed. 3 Credits.**

Instruction for learners with disabilities emphasizing learning principles, applied behavior analysis, and research-based interventions. Interventions focus on teaching new skills as well as analyzing and addressing maladaptive behaviors. Emphasizes applying these approaches in inclusive educational environments. Prerequisite: Special Education Graduate student or Instructor permission.

**EDSP 6200. Social & Emotional Interventio. 3 Credits.**

Explore evidence based practices and behavior based interventions to support struggling students to remain in the general education classroom environment. Students learn to understand the underlying function of students' behavior and ways to engage students in their classroom based instruction. The course is rooted within an MTSS framework, exploring personal, classroom, and systematic implications.

**EDSP 6300. The Trauma Lens. 3 Credits.**

Provides students with the theoretical foundation and conceptual frameworks that relate to building resilience for children, youth and families who have experienced trauma and adversity. For in-service and pre-service professionals in child welfare, health/mental health, and education.

**EDSP 6320. Fam,Schl&Intrprof Partnerships. 3 Credits.**

Takes a family, school and inter-professional collaborative approach to understanding and enhancing equity and well-being for children, youth, families, and the workforce. In-service and pre-service students from across professions (child welfare, health/mental, education) will build toolkit of strategies for healthy partnerships that build resilience and strong professional practices.

**EDSP 6330. Resilience-orient Systems Chng. 3 Credits.**

Focus on resilience-oriented and trauma informed system change in schools and human service organizations; designed to provide a conceptual framework addressing the strategic process of managing change that is trauma responsive and encourages collaborative learning climate for its employees. Prerequisites: EDSP 6300, EDSP 6320, or Instructor permission. Pre/co-requisites: EDSP 6300, EDSP 6320, or Instructor permission.

**EDSP 6340. Restorative&Trma Pract w/Child. 3 Credits.**

An introduction to evidence-informed, restorative and trauma-informed approaches that support the social-emotional health for school-aged children and youth who have experienced trauma and adversity. Students will gain a toolbox of knowledge, practice and skills they can apply to their direct practice with children and families. Prerequisite: EDSP 6300, EDSP 6320, or Instructor permission.

**EDSP 6350. The Community Schools Approach. 3 Credits.**

Examines the core structural elements that define the community schools strategy including community school coordinators, systematic needs assessments, community partner recruitment and coordination, and collaborative, data-driven decision-making. Explores the community schools pillars and commonly implemented programs and strategies typically found in community schools, including early childhood, expanded learning, health/mental health, adult education, and community and economic development.

**EDSP 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis. Thesis topic must be approved by a faculty committee.

**EDSP 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDSP 6991. Internship: Student Teaching. 1-18 Credits.**

Supervised graduate internship in school setting addressing special educator licensure standards. Prerequisites: At least 18 credits of EDSP graduate coursework; Special Education Graduate student; or Instructor permission.

**EDSP 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**EDSP 6994. Teaching Assistantship. 1-3 Credits.**

Student service as a teaching assistant, usually in an introductory level course in the discipline, for which credit is awarded. Offered at department discretion.

**EDSP 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.



**EDSP 7110. Prevention Science Theory. 3 Credits.**

Focus on multidisciplinary and multi-level prevention science theory. Prevention Science is a multi-disciplinary comprehensive approach to identify how best to promote the well-being of diverse families and communities by bridging research and practice. Nested ecological frameworks and structural determinants of youth development will serve as anchoring theoretical frameworks.

**EDSP 7150. Critical Issues in SEBH Policy. 3 Credits.**

Examines contemporary policy initiatives designed to promote youth SEBH. Utilizing an intersectional and interdisciplinary lens students will examine impact of current policy initiatives on the health and behavioral outcomes for youth with SEBH challenges. Teaches policy advocacy skills to advance equitable outcomes for youth with SEBH needs. Prerequisites: Social-Emotional-Behavioral Health & Inclusive Education student or Instructor permission.

**EDSP 7210. FSC Partnerships for SEBH. 3 Credits.**

Students will weave together content knowledge and critically consume multiple prevention-focused programs and practices in existing family, school, and community collaborations that are aimed at enhancing educational equity and SEBH for children and youth. Prerequisite: Social-Emotional-Behavioral Health & Inclusive Education student or Instructor permission. Co-requisite: EDSP 7220.

**EDSP 7220. Research Partnership in Action. 3 Credits.**

Building on existing research-practice partnerships, students will collaborate to respond to practice-research questions. Students will examine ways RPPs can enhance critically conscious collaborative research; learn research methods for conducting systematic scoping reviews of the literature for publication; and develop applied tools for translating findings to families and the practice community. Prerequisites: Instructor permission. Co-requisite: EDSP 7210 or Instructor permission.

**EDSP 7250. Psycho-Ed and Single Case. 3 Credits.**

Contextual factors and social determinants of health and education, including racism, poverty, trauma, and other adversities, place children and youth at risk for emotional and behavioral difficulties (EBD). Addresses the psycho-education of children and youth with EBD and introduces students to single-case design research methodology. Prerequisite: Social-Emotional-Behavioral Health & Inclusive Education student or Instructor permission.

**EDSP 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**EDSP 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**EDSP 7993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**STATISTICS (STAT)****Courses****STAT 5000. Biostatistics and Epidemiology. 3 Credits.**

Introductory design and analysis of medical studies. Epidemiological concepts, case-control and cohort studies. Clinical trials. Students evaluate statistical aspects of published health science studies. Understand the relevance of published public health research to clinical practice. Prerequisite: Graduate student or Instructor permission.

**STAT 5010. Gr Applied Data Analysis. 3 Credits.**

Fundamental data processing, code development, graphing and analysis using statistical software packages. Analysis of data and interpretation of results. Project-based. Prerequisites: Graduate student or Instructor permission; content knowledge of STAT 1410, STAT 2430, or STAT 3210 assumed.

**STAT 5210. Advanced Stat Methods & Theory. 3 Credits.**

Parametric and non-parametric two-sample tests. Multiple regression and correlation. Matrix representations. Basic experimental design. Analysis of variance (fixed, random, and mixed models). Statistical Software usage. Prerequisites: Graduate student or Instructor permission; content knowledge of STAT 2830 assumed.

**STAT 5230. Appld Multivariate Analysis. 3 Credits.**

Multivariate normal distribution. Inference for mean vectors and covariance matrices. Multivariate analysis of variance (MANOVA), discrimination and classification, principal components, factor and cluster analysis. Prerequisite: STAT 3210, matrix algebra recommended.

**STAT 5290. Survivl/Logistic Regression. 3 Credits.**

Models and inference for time-to-event and binary data. Censored data, life tables, Kaplan-Meier estimation, logrank tests, proportional hazards models. Logistic regression-interpretation, assessment, model building, special topics. Prerequisite: Graduate student or Instructor permission; content knowledge of STAT 3210 or STAT 5210 assumed.

**STAT 5310. Experimental Design. 3 Credits.**

Randomization, complete and incomplete blocks, cross-overs, Latin squares, covariance analysis, factorial experiments, confounding, fractional factorials, nesting, split plots, repeated measures, mixed models, response surface optimization. Prerequisites: Graduate student or Instructor permission; content knowledge of STAT 3210 or STAT 5210 assumed; content knowledge of STAT 5010 recommended.

**STAT 5350. Categorical Data Analysis. 3 Credits.**

Measures of association and inference for categorical and ordinal data in multiway contingency tables. Log linear and logistic regression models. Prerequisite: Graduate student or Instructor permission; content knowledge of STAT 3210 or STAT 5210 assumed.

**STAT 5510. Probability Theory. 3 Credits.**

Distributions of random variables and functions of random variables. Expectations, stochastic independence, sampling and limiting distributions (central limit theorems). Concepts of random number generation. Prerequisites: Graduate student or Instructor permission; content knowledge of MATH 2248, STAT 2510 assumed.

**STAT 5530. Appl Time Series&Forecastng. 3 Credits.**

Autoregressive moving average (Box-Jenkins) models, autocorrelation, partial correlation, differencing for nonstationarity, computer modeling. Forecasting, seasonal or cyclic variation, transfer function and intervention analysis, spectral analysis.

**STAT 5610. Statistical Theory. 3 Credits.**

Point and interval estimation, hypothesis testing, and decision theory. Application of general statistical principles to areas such as nonparametric tests, sequential analysis, and linear models. Prerequisite: STAT 5510.

**STAT 5870. Data Science I - Experience. 3 Credits.**

Data harvesting, cleaning, and summarizing; working with non-traditional, non-numeric data (social network, natural language textual data, etc.); scientific visualization; advanced data pipelines with a practical focus on real datasets and developing good habits for rigorous and reproducible computational science; Project-based. Prerequisites: Knowledge of CS 1210 and either STAT 1410 or STAT 2430 required; knowledge of CS 2100 and MATH 2522 or MATH 2544 recommended; Graduate student or Instructor permission. Cross-listed with: CSYS 5870, CS 5870.

**STAT 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**STAT 6300. Bayesian Statistics. 3 Credits.**

Introduction to Bayesian inference. Posterior inference, predictive distributions, prior distribution selection. MCMC algorithms. Hierarchical models. Model checking and selection. Use of computer software. Prerequisite: Content knowledge of STAT 5510 assumed.

**STAT 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**STAT 6810. Statistical Research. 1-3 Credits.**

Methodologic or data analytic research culminating in oral and written reports to the faculty. Prerequisite: Instructor permission.

**STAT 6850. Consulting Practicum. 1-3 Credits.**

Supervised field work in statistical consulting. Experiences may include advising UVM faculty and students or clients in applied settings such as industry and government agencies. Prerequisites: Second year Graduate student in Statistics or Biostatistics; permission of Statistics Program Director.

**STAT 6870. Data Science II. 3 Credits.**

Advanced data analysis, collection, and filtering; statistical modeling, monte carlo statistical methods, and in particular Bayesian data analysis, including necessary probabilistic background material; a practical focus on real datasets and developing good habits for rigorous and reproducible computational science. Prerequisites: STAT 5870, CS 5870, CSYS 5870, or Instructor permission. Cross-listed with: CS 6870, CSYS 6870.

**STAT 6990. Special Topics. 1-18 Credits.**

Lectures or directed readings on advanced and contemporary topics not presently included in other statistics courses. Prerequisites: As listed in schedule of courses.

**STAT 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**STAT 7980. Applied Geostatistics. 3 Credits.**

Introduction to the theory of regionalized variables, geostatistics (kriging techniques): special topics in multivariate analysis; Applications to real data subject to spatial variation are emphasized. Prerequisites: Programming skills (such as in Python or Matlab) and content knowledge of multivariate statistics (such as STAT 5230) are assumed. Cross-listed with: CEE 7980, CSYS 7980.

## SURGERY (SURG)

### Courses

**SURG 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**SURG 6993. Independent Study. 1-18 Credits.**

A course which is tailored to fit the interests of a specific student, which occurs outside the traditional classroom/laboratory setting under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

## SUSTAINABILITY, ECOLOGY AND POLICY (SEP)

### Courses

**SEP 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**SEP 6391. Master's Thesis Research. 1-18 Credits.**

Research for the Master's Thesis.

**SEP 6990. Special Topics. 1-18 Credits.**

Graduate topics and material that may eventually develop into a regular course offering.

**SEP 6991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**SEP 6995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**SEP 7491. Doctoral Dissertation Research. 1-18 Credits.**

Research for the Doctoral Dissertation.

**SEP 7990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**SEP 7991. Internship. 1-18 Credits.**

On-site supervised work experience combined with a structured academic learning plan directed by a faculty member or a faculty-staff team in which a faculty member is the instructor of record, for which academic credit is awarded. Offered at department discretion.

**SEP 7995. Graduate Independent Research. 1-18 Credits.**

Graduate student work on individual or small team research projects under the supervision of a faculty member, for which credit is awarded. Offered at department discretion.

**WILDLIFE & FISHERIES BIOLOGY (WFB)****Courses****WFB 5990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific title.

**WFB 6990. Special Topics. 1-18 Credits.**

See Schedule of Courses for specific titles.

**ACCOUNTANCY**

[http://www.uvm.edu/business/macc\\_master\\_accountancy](http://www.uvm.edu/business/macc_master_accountancy)

**OVERVIEW**

The Master of Accountancy (M.Acc.) degree is a STEM-designated program designed to equip students with 150 hours of university-level education required to sit for the Certified Public Accountant (CPA) exam and become certified as a CPA. The curriculum prepares students to become successful professionals as auditors, tax preparers and advisors, as well as corporate, not-for-profit and governmental accountants. Graduates may also complete various other professional certifications including the Certified Management Accountant (CMA), Certified Internal Auditor (CIA), Certified Information Systems Auditors (CISA) or the Certified Fraud Examiner (CFE).

**DEGREES**

Accountancy (M.Acc.) AMP (p. 78)

Accountancy M.Acc. (p. 79)

**FACULTY**

**Arel, Barbara M.;** Associate Professor, Grossman School of Business; PHD, Arizona State University

**Cats-Baril, William Lawrence;** Associate Professor, Grossman School of Business; PHD, University of Wisconsin-Madison

**Chiang, Kevin C.;** Professor, Grossman School of Business; PHD, Louisiana State University

**Dempsey, Stephen Jeffrey;** Associate Professor, Grossman School of Business; PHD, Virginia Polytechnic Institute and State University

**DeWitt, Rocki-Lee;** Professor, Grossman School of Business; PHD, Columbia University

**Do, Hung Tuan;** Associate Professor, Grossman School of Business; PHD, Purdue University

**Glavas, Ante;** Associate Professor, Grossman School of Business; PHD, Case Western Reserve University

**Gove, Steve;** Associate Professor, Grossman School of Business, PHD, Arizona State University

**Hughes, Susan;** Professor Emeritus, Grossman School of Business; PHD, University of Cincinnati

**Jones, David A.;** Professor, Grossman School of Business; PHD, University of Calgary

**Lowensohn, Suzanne;** Associate Professor, Grossman School of Business; PHD, University of Miami

**Lucas, Marilyn T.;** Associate Professor, Grossman School of Business; PHD, University of Illinois Urbana-Champaign

**Monsen, Erik;** Associate Professor, Grossman School of Business; PHD, University of Colorado at Boulder

**Noordewier, Thomas Gerald;** Professor, Grossman School of Business; PHD, University of Wisconsin-Madison

**Novak, David C.;** Professor, Grossman School of Business; PHD, Virginia Polytechnic Institute and State University

**Prevost, Andrew;** Professor, Grossman School of Business; PHD, Wayne State University

**Schnitzlein, Charles R.;** Professor, Grossman School of Business; PHD, Washington University

**Sharma, Pramodita;** Professor, Grossman School of Business; PHD, University of Calgary

**Sharma, Sanjay;** Dean and Professor, Grossman School of Business; PHD, University of Calgary

**Tomas, Amy M.;** Senior Lecturer, Grossman School of Business; PHD, University of Memphis

**Tomas III, Michael John;** Associate Professor, Grossman School of Business; PHD, Syracuse University

**Vanden Bergh, Richard G.;** Professor, Grossman School of Business; PHD, University of California Berkeley

**Venugopal, Srinivas;** Assistant Professor, Grossman School of Business; PHD, University of Illinois at Urbana-Champaign

**Walberg, Glenn C.;** Associate Professor, Grossman School of Business; JD, College of William and Mary

**Zhang, Chun;** Associate Professor, Grossman School of Business; PHD, Michigan State University

**ACCOUNTANCY (M.ACC.) AMP**

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

**OVERVIEW**

The STEM-designated Master of Accountancy provides a means of entry into the public accounting profession and for positions in corporate, government and not-for-profit organizations. Qualified undergraduate students who plan to earn the Master of Accountancy (M.Acc.) degree may enroll in the Accelerated Master's Pathway which enables UVM students to begin working on their master's degree requirements during their undergraduate study.

**SPECIFIC REQUIREMENTS****Requirements for Admission to Graduate Studies for the Degree of Master of Accountancy**

UVM students may apply for admission to the accelerated M.Acc. program after successfully completing BUS 3610. Admission to the accelerated program requires the following:

- A declared concentration in the Grossman School of Business;
- Successful completion of BUS 3610 Corporate Financial Reporting I;
- A minimum cumulative grade point average of 3.20;
- Completion of the Graduate College application form, that must include at least one positive letter of recommendation from a



faculty member who taught the applicant in a 2000- or 3000-level Grossman School of Business concentration course;

- A designation on the first page of the application indicating the applicant is applying for the accelerated program.
- Applicants should be clear that the courses taken for graduate credit must be in addition to the course work required for the B.S.B.A. including all general education, foundation, concentration and theme courses.

Consistent with the M.Acc. application guidelines, GMAT scores are not required.

### Minimum Degree Requirements

Students may take up to 9 credits of graduate course work prior to the conferral of the B.S.B.A. degree. These credits will be counted in the grade point averages for both the B.S.B.A. and M.Acc. degrees. All courses to be counted toward the M.Acc. degree must be completed after Graduate College acceptance of the student in the accelerated program, be 5000- or 6000-level business courses, be approved by the program director and exclude any courses that are required for the undergraduate degree.

The program requires 30 graduate credit hours made up of:

3 Required Courses:		
BUS 6601	Professional Communications	3
BUS 6602	CPA Law	3
BUS 6690	Accounting Rsch, Reg & Ethics	3
5 Accounting Electives (15 credits). Choose from the following:		
BUS 5615	Advanced Accounting	
BUS 5620	Adv Topics in Management Acctg	
BUS 5630	Auditing	
BUS 5635	Fraud Examination	
BUS 5641	Corporation Taxation	
BUS 5643	Taxation of Social Enterprises	
BUS 5650	Governmental Accounting	
BUS 5660	Gr Accounting Information Syst	
BUS 6612	Adv Topics in Corp Acct.&Rept	
BUS 6641	Tax & Entrepreneurial Ventures	
BUS 6670	Accounting & Reporting for ESG	
BUS 6990	Special Topics	
BUS 6991	Internship	
BUS 6993	Independent Study	

### Comprehensive Examination

M.Acc. students complete the comprehensive examination through successful completion of the capstone course, BUS 6690 Accounting Research, Regulation and Ethics.

### Requirements for Advancement to Candidacy for the Degree of Master of Accountancy

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 or better, including all core courses.

## ACCOUNTANCY M.ACC.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The STEM-designated Master of Accountancy program provides a means of entry into the public accounting profession and for positions in corporate, government and not-for-profit organizations.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Accountancy

To be considered by the Program Director and the Graduate Studies Committee, applicants to the Master of Accountancy must meet the following minimum requirements:

- 4-year Bachelor's degree
- 2.75 (4.00 scale) overall GPA

Students graduating from academic institutions in non-English speaking countries must demonstrate their abilities in English. A minimum TOEFL score of 90 or IELTS score of 7.0 is required for admission.

Although the GMAT (or the GRE equivalent) is not required, students with lower overall GPAs and/or students who graduated from foreign universities may submit their GMAT scores to enhance their academic credentials.

Students graduating from the University of Vermont or St. Michael's College with a major or concentration in accounting, finance, or economics should consult the M.Acc. Director for additional admissions opportunities.

Prerequisite Courses include:

- Microeconomics
- Principles of Financial Accounting
- Principles of Managerial Accounting
- Corporate Financial Reporting 1 (also titled Intermediate Accounting 1)
- Corporate Financial Reporting 2 (also titled Intermediate Accounting 2)

## Minimum Degree Requirements

The program requires 30 graduate credit hours made up of:

3 Required Courses:		
BUS 6601	Professional Communications	3
BUS 6602	CPA Law	3
BUS 6690	Accounting Rsch, Reg & Ethics	3
5 Accounting Electives (15 credits). Choose from the following:		
BUS 5615	Advanced Accounting	
BUS 5620	Adv Topics in Management Acctg	
BUS 5630	Auditing	
BUS 5635	Fraud Examination	
BUS 5641	Corporation Taxation	
BUS 5643	Taxation of Social Enterprises	
BUS 5650	Governmental Accounting	
BUS 5660	Gr Accounting Information Syst	
BUS 6612	Adv Topics in Corp Acct.&Rept	
BUS 6641	Tax & Entrepreneurial Ventures	
BUS 6670	Accounting & Reporting for ESG	
BUS 6990	Special Topics	
BUS 6991	Internship	
BUS 6993	Independent Study	
Other graduate courses may be approved by the program		
2 graduate-level business electives (Students can substitute additional accounting courses for business courses. 1 undergraduate 3000- or 4000-level course may be taken if preapproved for graduate credit by the Graduate College)		6

The states and commonwealths have different requirements to sit for the CPA exam and subsequently become certified as CPAs. We encourage M.Acc. students to check the specific state or commonwealth Board of Accountancy requirements for the state or commonwealth in which they plan to work so that they meet the minimum requirements to sit for the CPA exam and become certified as CPAs.

The program emphasizes appropriate research strategies and techniques, effective business writing, and professional presentation skills. Optional tracks in Financial Reporting & Auditing, Federal Taxation, and Sustainability Reporting & Assurance are available. Students work closely with their academic advisor to design a course of study that best suits their prior course work.

Students who meet the prerequisite requirements can complete the M.Acc. program in less than 1 year. Students who plan to take Corporate Financial Reporting 1 and 2 during the first year of the

program will likely require a minimum of 3 semesters and a maximum of 2 years to complete the program.

## Comprehensive Examination

M.Acc. students complete the comprehensive examination through successful completion of the capstone course, BUS 6690.

## Requirements for Advancement to Candidacy for the Degree of Master of Accountancy

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all required (3) courses.

## AGROECOLOGY

<http://www.uvm.edu/agroecology/learning/cgsa/>

### OVERVIEW

Agroecology is an approach that seeks to integrate ecological science with other academic disciplines and knowledge systems to guide research and action towards the sustainable transformation of our current agrifood system. The Certificate of Graduate Study in Agroecology (CGSA) is a 15-credit program that can be completed within 1 year, and the micro-Certificate of Graduate Study in Agroecology (mCGSA) is a 9-credit program that can also be completed within 1 year. The curriculum encourages students to integrate ecological, social, and economic perspectives in developing practical solutions to contemporary problems within our agrifood system. Students will join yearly cohorts to build community and expand the network among program participants. The certificate is designed so that you can live in your own food shed while learning lessons that you can apply anywhere.

More information on the Certificate is available from the ALC website.

### DEGREES

Agroecology CGS (p. 80)

Agroecology mCGS (p. 81)

### FACULTY

**Anderson, Collin;** Associate Research Professor, Department of Plant and Soil Science; PHD, University of Manitoba

**Izzo, Victor;** Senior Lecturer, Department of Plant and Soil Science; PHD, University of Vermont

**Mendez, Victor E.;** Professor, Department of Plant and Soil Science; PHD, University of California Santa Cruz

## AGROECOLOGY CGS

All students must meet the Requirements for the Certificates of Graduate Study (p. 269)

### OVERVIEW

Agroecology is an approach that seeks to integrate ecological science with other academic disciplines and knowledge systems to guide research and action towards the sustainable transformation of our

current agrifood system. The Certificate of Graduate Study in Agroecology (CGSA) is a 15-credit program that can be completed within 1 year. The curriculum encourages students to integrate ecological, social, and economic perspectives in developing practical solutions to contemporary problems within our agrifood system. The fully prescribed coursework consists of an introductory residential/online hybrid course, 3 foundational online classes, and a final synthesis seminar course. Students will join yearly cohorts to build community and expand the network among program participants. The certificate is designed so that you can live in your own food shed while learning lessons that you can apply anywhere.

The Certificate of Graduate Study in Agroecology is managed by the Agroecology and Livelihoods Collaborative (ALC), within the Department of Plant and Soil Science, and is conferred by the Graduate School.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Certificate of Graduate Study

**FOR CURRENT UVM STUDENTS:** Students currently enrolled in a UVM master's or doctoral program must complete the online UVM Graduate Application. Letters of recommendation and transcripts are not required, and an application fee waiver can be provided.

**FOR DUAL GRADUATE DEGREE/CERTIFICATE PROGRAM APPLICANTS:** Students applying at the same time for a graduate degree program and a Certificate of Graduate Study at UVM must first complete the online UVM Graduate Application for the degree program. Once accepted into the degree program applicants can then log back into the portal and choose the option to apply as a certificate student. A fee waiver will be provided by the Graduate Admissions office.

**FOR APPLICANTS TO CERTIFICATE PROGRAM:** Applicants seeking to enroll in only a Certificate of Graduate Study program must complete the online UVM Graduate Application and all associated requirements. This application will need to include official transcripts from an accredited university as well as 3 letters of recommendation. A bachelor's degree is required for admittance. Note: GRE is not required for applicants only intending to complete the CGSA.

### Minimum Degree Requirements

Students may earn the certificate either in conjunction with a UVM master's or doctoral degree, or independent of a degree.

The Certificate of Graduate Study in Agroecology requires 15 graduate credits, made up of 5 core courses. They are distributed as follows:

ALE 6110	Introduction to Agroecology	3
ALE 6120	Ecological Foundations of Agro	3
ALE 6130	PAR & Transdiscipl Agroecology	3

ALE 6140	Agroecol, Food Sov. & Soc Mov.	3
ALE 6150	Agroecology Grad Capstone	3

More information on the Certificate is available from the ALC website.

## ACROECOLOGY MCGS

All students must meet the Requirements for the Certificates of Graduate Study

### OVERVIEW

Agroecology is an approach that seeks to integrate ecological science with other academic disciplines and knowledge systems to guide research and action towards the sustainable transformation of our current agrifood system. The micro-Certificate of Graduate Study in Agroecology (mCGSA) is a 9-credit program that focuses on the three dimensions of agroecology: science, movement and practice.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the micro-Certificate of Graduate Study

**FOR CURRENT UVM STUDENTS:** Students currently enrolled in a UVM master's or doctoral program must complete the online UVM Graduate Application. Letters of recommendation and transcripts are not required, and an application fee waiver can be provided.

**FOR DUAL GRADUATE DEGREE/CERTIFICATE PROGRAM APPLICANTS:** Students applying at the same time for a graduate degree program and a micro-Certificate of Graduate Study at UVM must first complete the online UVM Graduate Application for the degree program. Once accepted into the degree program applicants can then log back into the portal and choose the option to apply as a micro-certificate student. A fee waiver will be provided by the Graduate Admissions office.

**FOR APPLICANTS TO MICRO-CERTIFICATE PROGRAM:** Applicants seeking to enroll in only a micro-Certificate of Graduate Study program must complete the online UVM Graduate Application and all associated requirements. This application will need to include official transcripts from an accredited university as well as 3 letters of recommendation. A bachelor's degree is required for admittance. Note: GRE is not required for applicants only intending to complete the mCGSA.

### Minimum Degree Requirements

Completion of the following courses:

ALE 6110	Introduction to Agroecology	3
ALE 6120	Ecological Foundations of Agro	3
ALE 6140	Agroecol, Food Sov. & Soc Mov.	3



## ANIMAL BIOSCIENCES

### OVERVIEW

The research program focuses on farm animal agriculture involving a combination of courses and graduate research. Areas of research interest include nutrition, metabolism, lactation, reproduction, genetics, and animal health.

An interdisciplinary program leading to the M.S. and Ph.D. degrees in Animal Biosciences is offered under the direction of a committee composed of program graduate faculty members. The goal of this interdisciplinary program is to provide advanced education and research training in mammalian physiology and endocrinology, mammary gland biology, basic and applied nutrition, animal genetics and genomics, or animal health. All graduate students will complete a common core of courses as well as specific courses to support their research programs. The program provides the flexibility necessary for students to gain competence in the area of their choice.

### DEGREES

Animal Biosciences AMP (p. 82)

Animal Biosciences M.S. (p. 83)

Animal Biosciences Ph.D. (p. 84)

### FACULTY

**Barlow, John;** Associate Professor, Department of Animal and Veterinary Sciences; DVM, University of Illinois Urbana-Champaign; PHD, University of Vermont

**Dann, Heather;** Adjunct Assistant Professor, Department of Animal and Veterinary Sciences; PHD, University of Illinois Urbana-Champaign

**Etter, Andrea J.;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, Purdue University

**Freeman, Kalev;** Assistant Professor, Department of Surgery; MD, PHD, University of Colorado Boulder

**Grant, Richard;** Adjunct Professor, Department of Animal and Veterinary Sciences; PHD, Purdue University

**Greenwood, Sabrina Louise;** Associate Professor, Department of Animal and Veterinary Sciences; PHD, University of Guelph

**Guo, Ming Ruo;** Professor, Department of Nutrition and Food Science; PHD, University College Cork

**Jetton, Thomas Lawrence;** Professor, Department of Medicine-Endocrinology; PHD, Vanderbilt University

**Kraft, Jana;** Associate Professor, Department of Animal and Veterinary Sciences; PHD, Friedrich-Schiller-University of Jena

**McKay, Stephanie Dawn;** Associate Professor, Department of Animal and Veterinary Sciences; PHD, University of Alberta

**Morrison, Sarah Y.;** Adjunct Assistant Professor, Department of Animal and Veterinary Science; PHD, University of Illinois, Urbana-Champaign

**Smith, Julia M.;** Research Associate Professor, Department of Animal and Veterinary Sciences; DVM, Cornell University

**Skinner, R. Chris;** Assistant Professor, Department of Nutrition and Food Science; PHD, West Virginia University

**Townson, David H.;** Professor, Department of Animal and Veterinary Sciences, PHD, Ohio State University

**Van Amburgh, Michael;** Adjunct Professor, Department of Animal Science and Veterinary Science; PHD, Cornell University

**Zhao, Feng-Qi;** Professor, Department of Animal and Veterinary Sciences; PHD, University of Alberta

## ANIMAL BIOSCIENCES AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

An option for the outstanding student with an interest in a graduate degree is the Accelerated Master's Entry Pathway in which students commence study for their M.S. in their senior year and have the potential to obtain a B.S./M.S. in a five-year period. Accepted AMP students begin work toward their M.S. during their senior year while completing the B.S. 9 graduate level coursework credits taken in the senior year can count toward both the B.S. and the M.S. Students MUST be admitted through the Graduate College to the M.S. as an AMP student before taking any courses that will be applied to the M.S. requirements. Students may start full-time M.S. coursework in the summer following their undergraduate graduation.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

An acceptable undergraduate major in animal science, biology, or a related field.

Further details about the Accelerated Master's Pathway, available for students majoring in Animal Science or Biological Science, can be obtained from the Department of Animal and Veterinary Sciences, 102 Terrill Bldg., (802) 656-0155.

#### Minimum Degree Requirements

OPTION A (THESIS)	
30 credits of study with a minimum of 15 credits in courses in animal science or related fields and a minimum of 9 credits of thesis research. At least 6 credits of graded coursework must be at the 6000-level. Students are required to attend and participate in ABIO 6010 and ABIO 6020 twice during their programs. Students must also prepare a research proposal.	30
Students are expected to meet with their Graduate Studies Committee during their second and third semester, and during the final semester for their thesis defense. Students are also expected to have 1 publication ready to submit or already submitted to an appropriate scientific journal at the time of their defense. Students are also required to participate in at least 1 semester of teaching.	
OPTION B (NON-THESIS)	

30 credits of study with 24 credits in courses in animal science or related fields, and a minimum of 6 credits of literature research. At least 6 credits of graded coursework must be at the 6000-level. Students are required to attend and participate in ABIO 6010 and ABIO 6020 twice during their program. Students prepare a literature review under the guidance of a mentor and studies committee. The format of the literature review is determined by the studies committee, which is composed of their research mentor and at least 2 members of UVM graduate faculty as described in the graduate college catalog requirements for the Master's Degree. A thesis and an oral thesis defense is not required. Students submit the written literature review for evaluation by their studies committee in their last semester of study.	30
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**Comprehensive Examination**

Animal Bioscience AMP students are required to pass a written comprehensive examination, an oral comprehensive examination, or both, in their field of specialization. The student's studies committee decides the format of this exam (time and page limits, open or closed book, etc.). The comprehensive examinations are taken on the University of Vermont campus in Burlington. 1 re-examination only is permitted for any failed comprehensive examination. The comprehensive examination is not the same as the oral thesis defense, and must be passed satisfactorily before defending the thesis. The studies committee members may differ from the thesis defense committee members, but often they are the same individuals. The comprehensive exam process is completed at least 2 months prior to the thesis defense, and preferably, prior to the start of the semester they intend to defend their thesis.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

When a student begins a graduate program, they are not yet a candidate for a graduate degree. To become a candidate for a graduate degree, the student must complete certain academic requirements to achieve the milestone of becoming a candidate for that degree. Advancement-to-candidacy signifies that the student has completed their required coursework, comprehensive exam(s) and other requirements and is ready to move forward to the thesis phase (thesis-based student) or literature research (non-thesis student).

**ANIMAL BIOSCIENCES M.S.**

All students must meet the Requirements for the Master's Degree

**OVERVIEW**

The research program focuses on farm animal agriculture involving a combination of courses and graduate research. Areas of research interest include nutrition, metabolism, lactation, reproduction, genetics, and/or animal health.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

An acceptable undergraduate major in animal science, chemistry, biology, or a related field.

**Minimum Degree Requirements**

<b>OPTION A (THESIS)</b>	
30 credits of study with a minimum of 15 credits in courses in animal science or related fields and a minimum of 9 credits of thesis research. At least 6 credits of graded coursework must be at the 6000-level. Students are required to attend and participate in ABIO 6010 and ABIO 6020 twice during their programs. Students must also prepare a research proposal.	30
Students are expected to meet with their Graduate Studies Committee during their second and third semester, and during the final semester for their thesis defense. Students are also expected to have 1 publication ready to submit or already submitted to an appropriate scientific journal at the time of their defense. Students are also required to participate in at least 1 semester of teaching.	
<b>OPTION B (NON-THESIS)</b>	
30 credits of study with 24 credits in courses in animal science or related fields, and a minimum of 6 credits of literature research. At least 6 credits of graded coursework must be at the 6000-level. Students are required to attend and participate in ABIO 6010 and ABIO 6020 twice during their program. Students prepare a literature review under the guidance of a mentor and Graduate Studies Committee. The format of the literature review is determined by the Graduate Studies Committee, which is composed of their research mentor and at least 2 members of UVM graduate faculty as described in the graduate college catalog requirements for the Master's Degree. A thesis and oral thesis defense are not required. Students submit the written literature review for evaluation by their studies committee in their last semester of study.	30

**Comprehensive Examination**

Animal Bioscience M.S. students are required to pass a written comprehensive examination, an oral comprehensive examination, or both, in their field of specialization. The student's Graduate Studies Committee decides the format of this exam (time and page limits, open or closed book, etc.). The comprehensive examinations are taken on the University of Vermont campus in Burlington. 1 re-examination only is permitted for any failed comprehensive examination. The comprehensive examination is not the same as the oral thesis defense, and must be passed satisfactorily before defending the thesis. The studies committee members may differ from the thesis defense committee members, but often they are the same individuals. Usually the comprehensive exam process is completed at least 2 months prior to the thesis defense, and preferably, prior to the start of the semester they intend to defend their thesis.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

When a student begins a graduate program, they are not yet a candidate for a graduate degree. To become a candidate for a graduate degree, a student must complete certain academic requirements to achieve the milestone of becoming a candidate for that degree. Advancement-to-candidacy signifies that the student has completed their required coursework, comprehensive exam(s) and other requirements and is ready to move forward to the thesis phase (thesis-based student) or literature research (non-thesis student). Department policy requires students to advance to candidacy at least 1 semester before they can earn the degree.

## ANIMAL BIOSCIENCES PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree

### OVERVIEW

An interdisciplinary program leading to the Ph.D. degree in Animal Biosciences is offered under the direction of a committee composed of program graduate faculty. The goal of this interdisciplinary program is to provide advanced education and research training in nutrition, metabolism, lactation, reproduction, genetics, and/or animal health. All Ph.D. students will complete a common core of courses as well as specific courses to support their research programs. The program provides the flexibility necessary for students to gain competence in the area of their choice.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

To be considered for admission, applicants must show promise of ability to pursue advanced study, have adequate preparation in the field, and be fluent in the English language.

Admission requires the following coursework to be completed:

- 2 semesters of chemistry to include general chemistry, organic and/or biochemistry, with labs;
- 2 semesters of biological sciences (e.g., anatomy, biology, physiology, animal sciences, botany, nutrition, food science, cellular and molecular biology, or microbiology); and
- 1 semester of math (precalculus or calculus) or statistics.

The following standards and coursework are recommended for Ph.D. applicants:

- GPA of at least 3.0 or equivalent
- 1 year of undergraduate general chemistry, with lab
- 1 year of undergraduate organic chemistry, with lab
- 1 course in biochemistry, with lab
- 1 course, with lab, in any biological science, with anatomy and/or physiology preferred
- 1 semester of math (precalculus or calculus) and statistics

#### Minimum Degree Requirements

- The candidate must meet all the requirements as prescribed by the Graduate College for the degree of Doctor of Philosophy.
- Candidates are required to attend and participate in ABIO 6010 and ABIO 6020 for at least 2 semesters. These candidates must also participate in 1 semester of ABIO 6030 or an equivalent alternative course in research proposal writing.
- At least 9 credits of graded coursework must be at the 6000- or 7000-level.
- In addition, all courses and seminars as established by the Graduate Studies Committee must be satisfactorily met. The student is expected to meet with their committee within the first 2

semesters and then at least annually until the doctoral research is completed and an acceptable dissertation written and defended.

- It is also expected that, at the time of their defense, a Ph.D. student will have at least 2 publications ready to submit, or already submitted, to an appropriate scientific journal. The specific publication expectations will be determined in consultation with the candidate's Graduate Studies Committee.
- All doctoral candidates must acquire appropriate teaching experience prior to the award of the degree. The nature and amount of teaching will be determined by the candidate's Graduate Studies Committee.
- Proficiency in a modern foreign language or computer language and programming is optional at the discretion of the graduate studies committee.

### Comprehensive Examination

The comprehensive examination will consist of both a written and oral component. The specific format of the written and oral exams will be determined in consultation with the candidate's Graduate Studies Committee. Both the written and oral exams are typically passed by the end of the third year of candidacy, but absolutely no later than 6 months before the dissertation is submitted. Should the candidate fail the examination, only 1 re-examination is permitted. Success in the comprehensive examination is prerequisite to standing for the Dissertation Defense Examination

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

When a student begins a graduate program, they are not yet a candidate for a graduate degree. To become a candidate for a graduate degree, the student must complete certain academic requirements to achieve the milestone of becoming a candidate for that degree. Advancement-to-candidacy signifies that the student has completed their required coursework, comprehensive exams and other requirements and is ready to move forward to the dissertation phase. University policy requires students to advance to candidacy 6 months before they can submit their dissertation.

## ATHLETIC TRAINING

### OVERVIEW

**This program is not currently accepting students.**

### ATHLETIC TRAINING M.S.

**This program is not currently accepting students.**

## BIOCHEMISTRY

<http://www.med.uvm.edu/biochemistry/grad>

### OVERVIEW

The goal of the Biochemistry Graduate Program at the University of Vermont is to prepare students for careers in science as both researchers and educators. This is accomplished by expanding knowledge of both chemistry and biochemistry, while cultivating the ability for critical analysis, creativity and independent study.



## DEGREES

Biochemistry AMP (p. 85)

Biochemistry M.S (p. 86).

## FACULTY

**Berger, Christopher;** Professor, Department of Molecular Physiology and Biophysics; PHD, University of Minnesota Twin Cities

**Chatterjee, Nimrat;** Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Baylor College of Medicine

**Doublié, Sylvie;** Professor, Department of Microbiology and Molecular Genetics; PHD, University of North Carolina Chapel Hill

**Everse, Stephen;** Associate Professor, Department of Biochemistry; PHD, University of California San Diego

**Francklyn, Christopher;** Professor, Department of Biochemistry; PHD, University of California Santa Barbara

**Frietze, Seth;** Assistant Professor, Department of Biomedical and Health Sciences; PHD, Harvard University

**Glass, Karen;** Associate Professor, Department of Pharmacology; PHD, University of Vermont

**Godsey, Michael;** Associate Professor, Department of Biochemistry; PHD, Oregon Health & Science University

**Gordon, Jonathan;** Assistant Professor, Department of Biochemistry; PHD, University of Western Ontario

**Heath, Jessica;** Assistant Professor, Department of Pediatrics; Department of Biochemistry; MD, SUNY Stony Brook

**Hondal, Robert;** Associate Professor, Department of Biochemistry; PHD, Ohio State University

**Kelm, Robert;** Associate Professor, Department of Medicine-Cardiovascular; PHD, University of Vermont

**Lian, Jane;** Professor, Department of Biochemistry; PHD, Boston University

**Quénet, Delphine;** Assistant Professor, Department of Biochemistry, PHD; University of Strasbourg, France

**Silveira, Jay.;** Assistant Professor, Department of Biochemistry; PHD, University of Vermont

**Stein, Gary;** Professor, Department of Biochemistry; PHD, University of Vermont

**Stein, Janet;** Professor, Department of Biochemistry; PHD, Princeton University

**Wargo, Matthew;** Associate Professor, Department of Microbiology and Molecular Genetics; PHD, Dartmouth College

## BIOCHEMISTRY AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

## OVERVIEW

Our accelerated master's degree entry pathway (AMP) in Biochemistry is a thesis-based program designed to offer select UVM undergraduate science majors the opportunity to obtain both a B.S. and a M.S. in biochemistry in a total of 5 years of study. The objective of this program is to provide students both a theoretical and practical knowledge of fundamental biochemical concepts while preparing

students for careers in research (academic or industrial) or increasing their competitiveness for additional graduate degrees.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

Students could apply for admission into the accelerated master's in biochemistry program in the beginning of the Fall semester of their Junior year and as late as the Fall semester of their Senior year. Admission into this program requires the following:

- A minimum cumulative grade point average of 3.00;
- Satisfactory completion of BIOC 3005 & BIOC 3006;
- Completion of the Graduate College Application form;
- Agreement of a UVM Biochemistry faculty member to serve as AMP advisor (this faculty member should also write 1 of the 3 recommendation letters in support of the student's application to the Graduate College).

GRE/GMAT scores are NOT an admission requirement for the accelerated master's in biochemistry program.

Note: Students MUST be admitted through the Graduate College before taking any courses that will be applied to the master's degree requirements. Students may start full-time master's degree coursework in the summer following their undergraduate graduation.

### Minimum Degree Requirements for the Degree of Master of Science

A minimum of 30 credits (at least 17 of which must be taken from graduate courses offered by the Department of Biochemistry and 6 of which must graded credits at the 6000-level) and successful completion of a comprehensive exam are required for completion of the accelerated master's degree in biochemistry. Students must meet all of the requirements stipulated by the UVM Graduate College for the Master's Degree.

Students may take up to 9 credit hours of graduate-level coursework before the conferral of the B.S. that can also count toward the M.S. Students would then be expected to complete remaining master's degree requirements during a 5<sup>th</sup> year of study.

Students must complete the following courses:

BIOC 6001	General Biochemistry I *	3
BIOC 6002	General Biochemistry II *	3
BIOC 6051	Proteins I: Structure&Function	3
BIOC 6072	Cancer Biology	3

\*Successful completion of BIOC 3005/BIOC 3006 can substitute for the BIOC 6001/BIOC 6002 requirement for AMP students. However, these will not count towards the 30 graduate credit requirement. Therefore, BIOC 3005 and BIOC 3006 cannot be used as courses that will double count towards bachelor's degree and the M.S.

Note: If a physical chemistry course has not been taken previously, a student must take Physical Chemistry (CHEM 2600) in their 1<sup>st</sup> year (for which they do not receive credit toward the MS degree).

Remaining credits in the degree program should be selected from the following approved list. Special topics or other graduate courses may be acceptable by prior approval from the Chair of the Departmental Graduate Studies Committee.

CLBI 6010	Cell Biology	3
MPBP 6010	Human Physiology & Pharm I	4
PHRM 6010	Applied Systems Pharmacology	3
PHRM 6080	Integrative Physiol. & Pharm.	3

#### Thesis Track:

At least 9 (and up to 13) credits of Master's Thesis Research (BIOC 6391) are required. In addition, a written thesis and defense of this thesis must occur according to the guidelines laid out by the Graduate College.

#### Non-Thesis Track:

At least 6 (and up to 9) credits of Independent Study (BIOC 6993) and 2 credits of independent research set up as a special topics course (BIOC 6995) with your mentor are required. In addition, a manuscript in the format of a review article must be submitted to the Departmental Graduate Studies Committee and a seminar on the manuscript must be presented to the Department.

### Comprehensive Examination

The comprehensive examination must be taken by the end of the 2<sup>nd</sup> semester as a matriculated graduate student for students admitted in the accelerated program. The examination will cover broad knowledge of the student's discipline. The details and format of the examination and its form (written or oral or both) are decided upon by the Departmental Graduate Studies Committee and will be discussed with the student well in advance of the exam. A single re-take is permitted for the comprehensive exam.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Advancement to candidacy requires satisfactory completion of the comprehensive exam.

## BIOCHEMISTRY M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The objective of this program is to provide students both a theoretical and practical knowledge of fundamental biochemical concepts while preparing students for careers in research (academic or industrial) or increasing their competitiveness for additional graduate degrees.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

An acceptable undergraduate major in biochemistry, biology, chemistry, or a related field. The general (aptitude) Graduate Record Examination (GRE) and the subject GREs are NOT required but may be helpful to your application. Completion of the following courses may also be helpful: year-long courses in organic chemistry (equivalent to CHEM 1500 / CHEM 1550 or CHEM 2580 / CHEM 2585); physical chemistry (equivalent to CHEM 2600), and physics (equivalent to PHYS 1600 / PHYS 1650); quantitative chemistry; mathematics (preferably through differential and integral calculus); a biological science. If a physical chemistry course has not been taken previously, a student must take Physical Chemistry (CHEM 2600) in their 1<sup>st</sup> year (for which they do not receive credit toward the M.S. degree).

### Minimum Degree Requirements

A minimum of 30 credits (at least 17 of which must be taken from graduate courses offered by the Department of Biochemistry and 6 of which must be at the 6000-level) and successful completion of a comprehensive exam are required for completion of the master's degree in biochemistry. Students must meet all of the requirements stipulated by the UVM Graduate College for the Master's Degree.

Students must complete the following courses:

BIOC 6001	General Biochemistry I *	3
BIOC 6002	General Biochemistry II *	3
BIOC 6051	Proteins I: Structure&Function	3
BIOC 6072	Cancer Biology	3

\*Successful completion of BIOC 3005/BIOC 3006 can substitute for the BIOC 6001/BIOC 6002 requirement for previous UVM students only. However, these will not count towards the 30 graduate credit requirement.

Remaining credits in the degree program should be selected from the following approved list. Special topics or other graduate courses may be acceptable by prior approval from the Chair of the Departmental Graduate Studies Committee.

CLBI 6010	Cell Biology	3
MPBP 6010	Human Physiology & Pharm I	4

#### Thesis Track:

At least 9 (and up to 13) credits of Master's Thesis Research (BIOC 6391) are required. In addition, a written thesis and defense of this thesis must occur according to the guidelines laid out by the Graduate College.

#### Non-Thesis Track:

At least 6 (and up to 9) credits of Independent Study (BIOC 6993) and 2 credits of independent research set up as a special topics

course (BIOC 6995) with your mentor are required. In addition, a manuscript in the format of a review article must be submitted to the Departmental Graduate Studies Committee and a seminar on the manuscript must be presented to the Department.

### Comprehensive Examination

The comprehensive examination must be taken by the end of the 2<sup>nd</sup> semester as a matriculated graduate student. The examination will cover broad knowledge of the student's discipline. The details and format of the examination and its form (written or oral or both) are decided upon by the Departmental Graduate Studies Committee and will be discussed with the student well in advance of the exam. A single re-take is permitted for the comprehensive exam.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

All requirements outlined in the Biochemistry Program handbook including:

- Maintain a 3.00 GPA
- Satisfactory completion of the comprehensive exam

## BIOMEDICAL ENGINEERING

### OVERVIEW

Department website: <https://www.uvm.edu/cems/ebe>

### OVERVIEW

The University of Vermont (UVM) offers interdisciplinary graduate programs in Biomedical Engineering that leverage core strengths in engineering and collaborations with researchers across campus, including those in UVM's Lerner College of Medicine.

The M.S. in Biomedical Engineering gives students the opportunity to develop advanced engineering skills and domain expertise so that they may apply engineering methods to address problems related to human health. Students enrolled in the M.S. in BME program pursue a 2-year, personalized plan of study that includes only coursework, a project, or a research-oriented thesis. Students who complete their undergraduate studies at UVM may complete the M.S. in BME coursework in 1 year through an Accelerated Master's Program (AMP).

The Ph.D. in Biomedical Engineering is a flexible, dynamic degree that trains aspiring researchers to apply engineering techniques to the study of biological systems. Research areas include bioinstrumentation, biomechanics, biomedical imaging, biomedical systems and signal analysis, clinical engineering, digital health, implant design, rehabilitation engineering, simulation and modeling, biomaterials, tissue engineering, and biomathematics.

### DEGREES

Biomedical Engineering AMP (p. 87)

Biomedical Engineering M.S. (p. 88)

Biomedical Engineering Ph.D. (p. 89)

## FACULTY

**Bates, Jason H. T.;** Professor, Department of Medicine-Pulmonary; DSC, Canterbury University; PHD, University of Otago

**Berger, Christopher Lewis;** Professor, Department of Molecular Physiology and Biophysics; PHD, University of Minnesota Twin Cities

**Bernstein, David;** Assistant Professor, Department of Electrical and Biomedical Engineering; PHD, Boston University

**Beynon, Bruce David;** Professor, Department of Orthopaedics and Rehabilitation; PHD, University of Vermont

**Caporizzo, Matthew;** Assistant Professor, Department of Molecular Physiology and Biophysics; PHD, University of Pennsylvania

**Cipolla, Marilyn Jo;** Professor, Department of Neurological Sciences; PHD, University of Vermont

**Doiron, Amber;** Assistant Professor, Department of Electrical and Biomedical Engineering; PHD, University of Texas at Austin

**Fiorentino, Niccolo M.;** Assistant Professor, Department of Mechanical Engineering; PHD, University of Virginia

**Floreani, Rachael Ann;** Associate Professor, Department of Mechanical Engineering; PHD, Colorado State University

**Jangraw, David;** Assistant Professor, Department of Electrical and Biomedical Engineering; PHD, Columbia University

**Majumdar, Dev;** Assistant Professor, Department of Surgery; PHD, University of California Los Angeles

**Spector, Peter Salem;** Professor, Department of Medicine-Cardiology; MD, Albert Einstein College of Medicine

**Warshaw, David;** Professor, Department of Molecular Physiology and Biophysics; PHD, University of Vermont

**Weiss, Daniel;** Professor, Department of Medicine-Pulmonary; MD, PHD, Mount Sinai School of Medicine

## BIOMEDICAL ENGINEERING AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269).

### OVERVIEW

Qualified undergraduate students who plan to earn a M.S. in biomedical engineering may enroll in the Accelerated Master's Entry Pathway, which enables students to begin working on the M.S. while still an undergraduate. Students typically apply to the program in the second semester of their junior year. Following acceptance by the Graduate College, students may take up to 6 graduate credits (defined as 5000-level or above) while still an undergraduate that can be counted toward both the B.S. and the M.S. degrees. Another 3 graduate credits can be counted towards the M.S. degree while an undergraduate but cannot count towards the B.S. degree. The graduate credits taken prior to completion of the bachelor's must be in graded coursework only; independent study, research credits, internships and practica will not count towards the M.S. In addition, the courses taken must be approved by the student's graduate advisor.



**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students**

To apply for the program, students must be enrolled in an engineering program at the University of Vermont with a cumulative grade point average of at least 3.20 at the time of application, and must complete the CEMS Accelerated Masters Permission Form and the Graduate College application. For thesis students, the application should name a graduate faculty member who has agreed to serve as their thesis advisor. No Graduate Record Examination (GRE) is required for AMP applicants.

**Minimum Degree Requirements for the Degree of Master of Science**

<b>Thesis-Based</b>	
24 credit hours of coursework, at least 6 of which must be at the 6000-level. At least 15 credit hours will come from CEE, EE, BME, ME, CS, EMGT, CEMS and/or ENGR graduate courses. At least 6 credits will have BME designation.	24
6 credit hours of research conducted with BME associated faculty.	6
Degree Capstone: A thesis must be completed, under the supervision of a BME graduate program faculty member. The written thesis must meet Graduate College requirements and be defended orally in a public forum.	
<b>Project-Based</b>	
27 credit hours, at least 6 of which must be at the 6000-level. At least 15 credit hours will come from CEE, EE, BME, ME, CS, EMGT, CEMS and/or ENGR graduate courses. At least 6 credits will have BME designation.	27
3 credit hours of project conducted with BME associated faculty.	3
Degree Capstone: A poster must be presented at Spring BME Student Symposium (or other public forum) on the project. Poster presentation must meet requirements as assessed by BME faculty.	
<b>Coursework Option</b>	
30 credit hours, at least 6 of which must be at the 6000-level. At least 15 credit hours will come from CEE, EE, BME, ME, CS, EMGT, CEMS, and/or ENGR graduate courses. At least 6 credits will have BME designation.	30

**Comprehensive Examination**

M.S. Thesis Option: The student must orally present a proposal for their thesis research at least 3 months prior to their final semester's last day of classes. The student's thesis committee will orally examine the student based on the student's coursework and research focus.

M.S. Project Option: The student must orally present a proposal for their project research approximately 3 months prior to their final semester's last day of classes. The student's project committee will orally examine the student based on the student's coursework and project focus.

M.S. Coursework Option: The student must complete a written and/or oral comprehensive exam during the final semester of residence at UVM that will be based on their completed coursework.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

Successful completion of the Comprehensive Examination.

**BIOMEDICAL ENGINEERING M.S.**

All students must meet the Requirements for the Master's Degree (p. 270).

**OVERVIEW**

Leveraging strong ties between the University of Vermont's College of Engineering and Mathematical Sciences and the Larner College of Medicine, the Master of Science (M.S.) in Biomedical Engineering gives students the opportunity to develop advanced engineering skills and domain expertise so that they may apply engineering methods to address problems related to human health. Students enrolled in the M.S. in BME program pursue a 2-year, personalized plan of study that includes only coursework, a project, or a research-oriented thesis.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

An accredited bachelor's degree in biomedical engineering or a similar technical field. Special arrangements may be made, on an individual basis, for students who hold a bachelor's degree in other areas. No Graduate Record Examination (GRE) is required.

**Minimum Degree Requirements**

<b>Thesis-Based</b>	
24 credit hours of coursework, at least 6 of which must be at the 6000-level. At least 15 credit hours will come from CEE, EE, BME, ME, CS, EMGT, CEMS and/or ENGR graduate courses. At least 6 credits will have BME designation.	24
6 credit hours of research conducted with BME associated faculty.	6
Degree Capstone: A thesis must be completed, under the supervision of a BME graduate program faculty member. The written thesis must meet Graduate College requirements and be defended orally in a public forum.	
<b>Project-Based</b>	
27 credit hours, at least 6 of which must be at the 6000-level. At least 15 credit hours will come from CEE, EE, BME, ME, CS, EMGT, CEMS and/or ENGR graduate courses. At least 6 credits will have BME designation.	27
3 credit hours of project conducted with BME associated faculty.	3
Degree Capstone: A poster must be presented at Spring BME Student Symposium (or other public forum) on the project. Poster presentation must meet requirements as assessed by BME faculty.	
<b>Coursework Option</b>	

30 credit hours, at least 6 of which must be at the 6000-level. At least 15 credit hours will come from CEE, EE, BME, ME, CS, EMGT, CEMS, and/or ENGR graduate courses. At least 6 credits will have BME designation.	30
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### Comprehensive Examination

M.S. Thesis Option: The student must orally present a proposal for their thesis research at least 3 months prior to their final semester's last day of classes. The student's thesis committee will orally examine the student based on the student's coursework and research focus.

M.S. Project Option: The student must orally present a proposal for their project approximately 3 months prior to their final semester's last day of classes. The student's project committee will orally examine the student based on the student's coursework and project focus.

M.S. Coursework Option: The student must complete a written and/or oral comprehensive exam during the final semester of residence at UVM that will be based on their completed coursework.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of the Comprehensive Examination.

## BIOMEDICAL ENGINEERING PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree.

### OVERVIEW

The program in Biomedical Engineering is interdisciplinary and offers the Doctor of Philosophy degree. Graduate students obtain the Ph.D. degree through a program administered by the Department of Electrical and Biomedical Engineering.

Participating faculty with strong commitments to biomedical engineering research and education are from the College of Engineering and Mathematical Sciences, the College of Medicine, and other departments and colleges across campus. The extensive research facilities of the participating faculty and departments are available to all graduate students enrolled in the program and the program provides the flexibility necessary for students to gain competence in the area of their choice. Research areas include: bioinstrumentation, biomechanics, biomedical imaging, biomedical systems and signal analysis, clinical engineering, digital health, implant design, rehabilitation engineering, neuroengineering, simulation and modeling, biomaterials, tissue engineering, and biomathematics.

Students in the program are generally supported by sponsored research projects, participating departments and training grants.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

Students applying for admission to the graduate program must meet the general requirements of admission of the University of Vermont

Graduate College. Admission is competitive and students are selected on the basis of their scholastic preparation and intellectual capacity.

The following minimum preparation is recommended:

- Biology, Chemistry: 2 semesters each, or 4 introductory courses in the following subjects - anatomy, biology, biophysics, chemistry, physiology
- Engineering: 2 introductory courses in 1 or more of the following subjects - biomechanics, materials, mechanics, thermodynamics, electrical engineering, control theory, or fluid mechanics
- Mathematics: Calculus through differential equations, and 1 additional math/stats course
- Physics: 2 semesters of physics
- Undergraduate grade point average above 3.0 (based on a 4.0 scale), strong BME course grades (B average or better), and positive letters of recommendation
- Satisfactory scores on the general Graduate Record Examination (GRE) may be presented, but are not required

Special arrangements may be made, on an individual basis, for students who are highly prepared in one area, but less well prepared in another.

### Minimum Degree Requirements

Candidates for the degree of Doctor of Philosophy must complete 14 graduate credits of core courses including 6 credits of "domain-specific courses" (chosen from the following: BME 5330, BME 5440, BME 5150, BME 6710, CSYS 6701/MATH 6701, and CSYS 6020/CS 6020), 4 credits of human physiology and pharmacology (MPBP 6010), an advanced mathematics or statistics course (any MATH or STAT course at the 5000-level or above), and 1 credit of a research ethics course (CEMS 6010, NSCI 6270, or NFS 6362). Additionally, candidates must complete at least 16 credits of technical electives (any BHSC, BIOC, BIOL, BME, CEE, CEMS, CHEM, CLBI, CS, CSYS, DPT, EE, EMGT, ENGR, ENSC, EXSC, HLTH, MATH, ME, MLS, MMG, MPBP, NSCI, OT, PATH, PH, PHRM, PHYS, RAD, or STAT course at the 5000-level or above), a teaching requirement, a comprehensive examination, at least 20 credits of dissertation research, and a final oral examination. A minimum of 9 credits of coursework must be at the 6000-level or above.

### Comprehensive Examination

The comprehensive exam for the Biomedical Engineering Ph.D. will normally be taken at the end of a candidate's fourth semester of study (typically around May of Year 2) and will consist of a written part and an oral part.

The Written Part: The written part of the comprehensive examination will be a report written in the form of a research grant proposal based around a research idea in the area of the candidate's dissertation work, and will comprise three Specific Aims. The first 2 aims will be focused in the area of the candidate's Ph.D. research, and will be expected to include some preliminary data and a research plan that is grounded in techniques that are well understood by the candidate. The third aim will be a "stretch aim" that extends

beyond the scope of the candidate's research. In this third aim, the candidate will be expected to exhibit evidence of an ability to generate imaginative and thoughtful hypotheses, and to think laterally about how their Ph.D. research area could be developed in a new direction.

The Oral Part: The oral part of the comprehensive examination will be a formal seminar by the student in front of their graduate studies committee. The student will be asked to defend the proposal and to answer any additional questions the committee members feel appropriate after the seminar. It is expected that there will be specific questions directly associated with broad engineering and biological sciences.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Successful completion of the Comprehensive Examination and fulfillment of the graduate course requirements.

## BIOLOGY

<http://www.uvm.edu/~biology/>

### OVERVIEW

The Biology Graduate Program has excellent students and world-class faculty members who advise them. Faculty members work with students to design a set of courses, a research project and other activities that will prepare them for their career choice of:

- academic research
- medical institution research
- private sector research
- government work
- teaching at the baccalaureate level

No matter what the choice is, this program will help students to develop as research scientists who know how to write, think critically, and express themselves effectively. Faculty will also help students to network and find the right position for their next step: postdoctoral training, industry, teaching position, etc. All Biology students learn to teach undergraduates, helping to develop teaching skills which will serve them well regardless of whether teaching is their ultimate career goal. Biology graduate students are very successful and are appreciated for their contribution to undergraduate research, to the research program of the faculty, and to the quality and liveliness of the Biology Department.

The research of Biology faculty is very diverse and ranges from cell and molecular biology, neuroscience, and developmental biology, through animal behavior, ecology, and evolution. Faculty and student research typically range across these disciplines and students are encouraged to seek out diverse faculty for their graduate committee to meet their particular needs.

Biology offers an Accelerated Masters Degree, a Masters Degree, a Doctor of Philosophy degree, and a Masters of Science in Teaching degree.

## DEGREES

Biology AMP (p. 90)  
 Biology M.S. (p. 91)  
 Biology M.S.T. (p. 92)  
 Biology Ph.D. (p. 92)

## FACULTY

**Ballif, Bryan A.;** Professor, Department of Biology; PHD, Harvard University

**Brody, Alison Kay;** Professor, Department of Biology; PHD, University of California Davis

**Dang, Bin;** Research Professor, Department of Biology; PHD, Tsinghua University

**Deming, Paula B.;** Associate Professor, Department of Biomedical and Health Sciences; PHD, University of North Carolina at Chapel Hill

**Ebert, Alicia;** Associate Professor, Department of Biology; PHD, Colorado State University

**Gotelli, Nicholas J.;** Professor, Department of Biology; PHD, Florida State University

**Kilpatrick, Charles William;** Professor Emeritus, Department of Biology; PHD, University of North Texas

**Lam, Ying Wai;** Research Associate Professor, Department of Biology; PHD, Chinese University of Hong Kong

**Lockwood, Brent;** Associate Professor, Department of Biology; PHD, Stanford University

**Marsden, J. Ellen;** Professor, Rubenstein School of Environmental and Natural Resources; PHD, Cornell University

**Martinsen, Ellen;** Adjunct Assistant Professor, Department of Biology; PHD, University of Vermont

**May-Collado, Laura J.;** Assistant Professor, Department of Biology; PHD, Florida International University

**Pespeni, Melissa H.;** Associate Professor, Department of Biology; PHD, Stanford University

**Schall, Joseph J.;** Professor Emeritus, Department of Biology; PHD, University of Texas at Austin

**Stanley, Molly;** Assistant Professor, Department of Biology; PHD, Washington University

**Stevens, Lori;** Professor, Department of Biology; PHD, University of Illinois-Chicago

**Stockwell, Jason Dana;** Associate Professor, Rubenstein School of Environmental and Natural Resources; PHD, University of Toronto

**Van Houten, Judith;** Professor Emerita, Department of Biology; PHD, University of California Santa Barbara

**Vigoreaux, Jim Osvaldo;** Professor, Department of Biology; Molecular Physiology and Biophysics; PHD, University of Oklahoma

## BIOLOGY AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

An accelerated master's degree in biology can be earned in a shortened time by applying and being accepted in the junior year of undergraduate work. Interested life science majors should discuss this



possibility with the department’s graduate program director as soon as they think they might be interested in the program. The M.S. is expected to be earned in 1 additional year following completion of the bachelor's degree for students entering the M.S. through the AMP.

Learning goals for M.S. students are:

- Be able to execute scientific experiments, analyze and communicate experimental results orally and in writing.
- Have a working knowledge of the fundamental literature, concepts and ideas of their field of study.
- Have a broad factual and conceptual knowledge and understanding of biology.

Following formal admission to the Accelerated Master's Entry Pathway, up to 9 credits of subsequent Biology course work at the graduate level (5000-level or higher) can be double counted toward the undergraduate and graduate degree requirements.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Master's Students

To be eligible for the Accelerated Master’s Entry Pathway, a student must be a declared life science major, and have identified a biology faculty sponsor. Other requirements include a GPA typically higher than 3.10 overall and 3.30 in biology courses. After graduation with a bachelor's degree, the M.S. degree becomes their primary curriculum. There is no GRE requirement for any Biology graduate program.

#### Minimum Degree Requirements

A total of 30 credits, 15 of which must be graded course credits. 9 of these credits can also be applied to the undergraduate degree. Following completion of the bachelor's degree, students may take up to 3 credits of 3000- or 4000-level course for graduate credit with approval of the course instructor, the Director of Graduate Studies, and the Graduate College. Courses at the 3000- or 4000- level taken before completion of the bachelor's will not count toward the master's degree. Thesis research (6 to 15 credits) and successful defense of a thesis is required.

Required Courses (10 credits)		
BIOL 6005	Graduate Seminar	1
BIOL 6000	Scientific Survival Skills	2
BIOL 6100	Computational Biology	4
BIOL 6015	Proposal Writing	2
BIOL 6020	Foundations in Eco & Evo	1
or BIOL 6025	Foundations in Cell & Dev	
Electives (Minimum of 5 credits)		

Research (6-15 credits)		
BIOL 6391	Master's Thesis Research	6-15

### Comprehensive Examination

Students take Proposal Writing the spring semester of their final undergraduate semester during which they prepare a written research proposal. The comprehensive exam evaluates the written proposal and has 2 oral parts. The first oral part is a defense of the written proposal. The second oral part evaluates the student’s understanding of the broad range of concepts in the student's discipline.

The comprehensive examination takes place before the end of May following the student’s undergraduate graduation.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of the comprehensive examination is required for advancement to candidacy.

## BIOLOGY M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

Students pursue coursework and conduct their thesis research with Biology Graduate Program faculty in one or several biological sub-disciplines.

Learning goals for the M.S. degree students:

- Be able to execute scientific experiments, analyze and communicate experimental results orally and in writing
- Have a working knowledge of the fundamental literature, concepts and ideas of their field of study
- Have a broad factual and conceptual knowledge and understanding of biology

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

An undergraduate major in the life sciences. Acceptability to the faculty member with whom the candidate wishes to do thesis research. There is no GRE requirement for any Biology graduate program.

#### Minimum Degree Requirements

A total of 30 credits, 15 of which must be graded course credits. Students may take up to 3 credits of 3000- or 4000-level course for graduate credit with approval of the course instructor, the Director of Graduate Studies, and the Graduate College. Thesis research (6 to 15 credits) and successful defense of thesis are required.

Required Courses (10 credits)		
BIOL 6005	Graduate Seminar	1
BIOL 6000	Scientific Survival Skills	2
BIOL 6100	Computational Biology	4
BIOL 6015	Proposal Writing	2
or BIOL 6025	Foundations in Cell & Dev	
BIOL 6020	Foundations in Eco & Evo	1
or BIOL 6025	Foundations in Cell & Dev	
Electives (Minimum of 5 credits)		
Research (6-15 credits)		
BIOL 6391	Master's Thesis Research	6-15

### Comprehensive Examination

Students take Proposal Writing the spring semester of their second semester during which they prepare a written research proposal. The comprehensive exam evaluates the written proposal and has two oral parts. The first oral part is a defense of the written proposal. The second oral part evaluates the student's understanding of the broad range of concepts in the student's discipline. The comprehensive examination takes place before the end of May of their second semester.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of the comprehensive examination is required for advancement to candidacy.

## BIOLOGY M.S.T.

**This program is not currently accepting applications.**

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

Learning goals for MST students are:

- Be able to execute scientific experiments, analyze and communicate experimental results orally and in writing.
- Have a working knowledge of the fundamental literature, concepts and ideas of field of study.
- Have a broad factual and conceptual knowledge of biology.
- Gather knowledge of new techniques and information from laboratory and other courses potentially to use in the classroom.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science in Teaching

A bachelor's degree from an accredited institution and certification as a teacher of biology or an associated field. At least three years of secondary school teaching. Taking the Graduate Record Examination is not required.

#### Minimum Degree Requirements

30 credits of graded course work to include a selection of courses in the Departments of Plant Biology and Biology which will broaden and balance the undergraduate work in biology. Courses in 4 of the 5 following areas: anatomy; neurobiology; morphology and systematics; evolution; genetics; developmental biology; and environmental biology. At least 6 credits must be at the 6000-level. Appropriate courses in related science departments chosen with the graduate studies committee may be used to complete the required 30 credits. No thesis is required; however, each degree recipient must complete a final written examination.

#### Comprehensive Examination

The comprehensive examination must be taken by the end of the second year. The examination will cover broad knowledge of the student's discipline. The details and format of the examination and its form (written or oral or both) are decided upon by the Studies Committee and will be discussed with the student well in advance of the exam.

#### Requirements for Advancement to Candidacy for the Degree of Master of Science in Teaching

All Biology M.S. students who are admitted to the Graduate College are admitted to candidacy for the degree.

## BIOLOGY PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

Students pursue coursework and conduct their dissertation research with Biology Graduate Program faculty in one or several biological sub-disciplines.

Learning goals for the Ph.D. degree students:

- Be able to design and execute an independent research project, and analyze and communicate experimental results orally and in writing
- Be proficient in analysis and visualization of experimental results
- Be able to articulate and defend the rationale and importance of research questions, study design, and analysis of results
- Be able to communicate general and specific knowledge and importance of findings to a broad audience as well as experts within sub-disciplines

- Have a broad factual and conceptual knowledge and understanding of biology

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

Satisfactory completion of a bachelor's degree, typically in the life sciences. There is no GRE requirement for any Biology graduate program.

### Minimum Degree Requirements

There are 75 required credits, of which at least 30 must be graded credits. Students may take up to 6 credits of 3000- or 4000-level courses for graduate credit with approval of the course instructor, the Director of Graduate Studies, and the Graduate College. The selection of courses will be designated for each student by the advisor and graduate studies committee. At least 20, but not more than 45, credits must be earned in dissertation research. Each candidate must participate in the teaching of at least 1 undergraduate course.

Required Courses (21 Credits)		
BIOL 6005	Graduate Seminar (5 credits required)	1
BIOL 6010	Biology Seminar (4 credits required)	1
BIOL 6000	Scientific Survival Skills	2
BIOL 6100	Computational Biology	4
BIOL 6015	Proposal Writing	2
BIOL 6020	Foundations in Eco & Evo (4 credits required)	1
or BIOL 6025	Foundations in Cell & Dev	
Electives (Minimum of 9 credits)		
Research (20-45 credits)		
BIOL 7491	Doctoral Dissertation Research	1-18

### Comprehensive Examination

Students take Proposal Writing the spring semester of their second semester during which they prepare a written research proposal. The comprehensive exam evaluates the written proposal and has two oral parts. The first oral part is a defense of the written proposal. The second oral part evaluates the student's understanding of the broad range of concepts in the student's discipline. The comprehensive examination takes place before the end of May of their second year.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Successful completion of the comprehensive examination is required for advancement to candidacy.

## BIOSTATISTICS

<http://www.uvm.edu/~cems/mathstat/>

## OVERVIEW

The program offers a concentration in biostatistics leading to the M.S. degree.

Emphasis is placed on learning how to design studies and perform data analysis as the statistician in a research team. The curriculum takes full advantage of courses taught in the Statistics Program and includes potential experience in a variety of health, biomedical, natural resource and other research projects in the College of Medicine or other departments of UVM. This experience is designed to provide candidates with opportunities to use their academic training and work experience in defining research problems, formulating rational methods of inquiry, and gathering, analyzing, and interpreting data.

The program has close ties with the College of Medicine's Department of Medical Biostatistics and Bioinformatics, whose research activities cover the full range of studies that take place within an academic medicine environment. These include population-based health surveys of various types and evaluations of health promotion programs and professional education activities, such as community intervention studies to prevent smoking and to promote breast cancer screening. They also include clinical studies of many different interventions, bioengineering experiment design and measurement studies, statistical genetics, as well as data from other preclinical, clinical, and epidemiological studies.

Opportunities are also available for biostatistical research related to problems in agriculture and the life sciences, as well as natural resources and the environment. Opportunities could include multivariate or spatial data analyses for ongoing wildlife and water quality studies, for example. Students can gain research and consulting experience through the research requirement: a research project (STAT 6810) or a thesis (STAT 6391). Other opportunities for experience may arise through involvement in the Statistical Consulting Clinic (STAT 6850). (See also Statistics Program and Statistical Consulting Clinic descriptions.)

## DEGREES

Biostatistics AMP (p. 94)

Biostatistics M.S. (p. 94)

## FACULTY

**Bagrow, James;** Assistant Professor, Department of Mathematics and Statistics; PHD, Clarkson University

**Buzas, Jeff Sandor;** Professor, Department of Mathematics and Statistics; PHD, North Carolina State University Raleigh

**Callas, Peter W.;** Director of Biostatistics Core, Department of Mathematics and Statistics; PHD, University of Massachusetts Amherst

**Cole, Bernard;** Professor, Department of Mathematics and Statistics; PHD, Boston University

**Crocker, Abigail;** Associate Professor, Department of Mathematics and Statistics; PhD, University of Vermont

**Edwards, Erika;** Research Associate Professor, Department of Mathematics and Statistics; PhD, Boston University School of Public Health



**Single, Richard M.;** Associate Professor, Department of Mathematics and Statistics; PHD, SUNY Stony Brook  
**Young, Jean-Gabriel;** Research Assistant Professor, Department of Computer Science, PHD, Université Laval

## BIostatistics AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

A master's degree in mathematics, statistics or biostatistics can be earned in a shortened time by careful planning during the junior and senior years at UVM. For example, the M.S. could be earned in just 1 additional year, because 6 credits of graduate level courses taken while an undergraduate can also be counted concurrently toward the M.S. degree requirements. Another 3 graduate credits can be counted towards the M.S. degree while an undergraduate but cannot count towards the B.S. degree.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

Students should discuss the possibility of an Accelerated Master's Entry Pathway in biostatistics with the respective program director as soon as they think they may be interested in this program. Students must declare their wish to enter the Accelerated Master's Entry Pathway in writing to the statistics program director (it is recommended that this happen before the end of their junior year). They would apply to the Graduate College for admission, noting their interest in the Accelerated Master's Pathway. They can receive concurrent undergraduate and graduate credit for 1 or 2 graduate level courses, once admitted. No graduate credit can be counted for statistics courses earned prior to admission to the graduate program.

#### Minimum Degree Requirements for the Degree of Master of Science

Option A (Thesis)		
A 30 credit program requiring 24 credits of course work, at least 6 of which must be graded and at the 6000-level. The program must include:		
STAT 5000	Biostatistics and Epidemiology	3
STAT 5210	Advanced Stat Methods & Theory	3
STAT 5230	Appld Multivariate Analysis	3
STAT 5310	Experimental Design	3
STAT 5510	Probability Theory	3
3 additional graded course credits at the 6000-level or above		3
6 credits of approved thesis research (STAT 6391)		6

Option B (Non-Thesis)		
A 30 credit program requiring 27 credits of course work, at least 6 of which need to be graded and at the 6000-level. The program must include:		
STAT 5000	Biostatistics and Epidemiology	3
STAT 5210	Advanced Stat Methods & Theory	3
STAT 5230	Appld Multivariate Analysis	3
STAT 5310	Experimental Design	3
STAT 5510	Probability Theory	3
The research project requirement is met by taking 3 credits of:		
STAT 6810	Statistical Research	3
or STAT 6850	Consulting Practicum	

Both Options		
Under both plans, students must attend the regular colloquium series and participate in the Statistics Student Associate Journal Club as part of their training. The comprehensive examination covers knowledge acquired in the core courses of the program. Under the non-thesis option, students will be expected to take major responsibility for a comprehensive data analysis or methodological research project, and are encouraged to present the results from the project.		

### Comprehensive Examination

The comprehensive exam is a 3-hour exam that includes a mixture of questions spanning theoretical and applied statistics, probability, study design, and interpretation of analytical results. The questions are formatted as either numerical computation, derivation, or essay. The student can take the exam a maximum of 2 times. The exam is based on the courses STAT 5210, STAT 5230, STAT 5310, and STAT 5510. The exam is given at the end of August.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of any pre-requisite courses, and at least 15 graded graduate credits earned in compilation of the graduate GPA, including all core courses. A GPA of 3.00 or greater is also required.

## BIostatistics M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The program offers a concentration in biostatistics leading to the M.S. degree.

Emphasis is placed on learning how to design studies and perform data analysis as the statistician in a research team. The curriculum takes full advantage of courses taught in the Statistics Program and includes potential experience in a variety of health, biomedical, natural resource and other research projects in the College of Medicine or other departments of UVM. This experience is designed to provide candidates with opportunities to use their academic

training and work experience in defining research problems, formulating rational methods of inquiry, and gathering, analyzing, and interpreting data.

The program has close ties with the College of Medicine's Department of Medical Biostatistics and Bioinformatics, whose research activities cover the full range of studies that take place within an academic medicine environment. These include population-based health surveys of various types and evaluations of health promotion programs and professional education activities, such as community intervention studies to prevent smoking and to promote breast cancer screening. They also include clinical studies of many different interventions, bioengineering experiment design and measurement studies, statistical genetics, as well as data from other preclinical, clinical, and epidemiological studies.

Opportunities are also available for biostatistical research related to problems in agriculture and the life sciences, as well as natural resources and the environment. Opportunities could include multivariate or spatial data analyses for ongoing wildlife and water quality studies, for example. All students gain research and consulting experience through the research requirement: a research project (STAT 6810) or a thesis (STAT 6391). Other opportunities for experience may arise through involvement in the Statistical Consulting Clinic (STAT 6850). (See also Statistics Program and Statistical Consulting Clinic descriptions.)

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

An undergraduate major which provides a foundation for the application of statistical methodology and concepts to health and biomedical or agriculture/natural resource problems. For example, premedicine majors who have delayed their application to medical school will be well suited for the program. It is expected that candidates will have completed three semesters of calculus and a course including matrix algebra methods. Also they will have a solid introductory course in statistics (like STAT 2830) and a course including undergraduate probability (like STAT 2510). However, provisional admission to the program can be given prior to the completion of these mathematics and statistics requirements. Computer programming experience is desirable. Satisfactory scores on the general (aptitude) portion of the Graduate Record Examination are required. Current undergraduate students at the University of Vermont should contact the program director for details on the Accelerated Master's Program.

#### Minimum Degree Requirements for the Degree of Master of Science

Option A (Thesis)		
A 30 credit program requiring 24 credits of course work, at least 6 of which must be graded and at the 6000-level. The program must include:		
STAT 5000	Biostatistics and Epidemiology	3
STAT 5210	Advanced Stat Methods & Theory	3

STAT 5230	Appld Multivariate Analysis	3
STAT 5310	Experimental Design	3
STAT 5510	Probability Theory	3
6 credits of approved thesis research (STAT 6391)		6

Option B (Non-Thesis)		
A 30 credit program requiring 27 credits of course work, at least 6 of which need to be graded and at the 6000-level or above. The program must include:		
STAT 5000	Biostatistics and Epidemiology	3
STAT 5210	Advanced Stat Methods & Theory	3
STAT 5230	Appld Multivariate Analysis	3
STAT 5310	Experimental Design	3
STAT 5510	Probability Theory	3
The research project requirement is met by taking 3 credits of:		
STAT 6810	Statistical Research	3
or STAT 6850	Consulting Practicum	

Both Options		
Under both plans, students must attend the regular colloquium series and participate in the Statistics Student Associate Journal Club as part of their training. The comprehensive examination covers knowledge acquired in the core courses of the program. Under the non-thesis option, students will be expected to take major responsibility for a comprehensive data analysis or methodological research project, and are encouraged to present the results from the project.		

#### Comprehensive Examination

The comprehensive exam is a 3-hour exam that includes a mixture of questions spanning theoretical and applied statistics, probability, study design, and interpretation of analytical results. The questions are formatted as either numerical computation, derivation, or essay. The student can take the exam a maximum of 2 times. The exam is based on the courses STAT 5210, STAT 5230, STAT 5310, and STAT 5510. The exam is given at the end of August.

#### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of any prerequisite courses, and at least 15 graded graduate credits earned in compilation of the graduate GPA, including all core courses. A GPA of 3.0 or greater is also required.

### BUSINESS ADMINISTRATION

<http://www.uvm.edu/business/>

#### OVERVIEW

The Grossman School of Business (GSB) believes business can — and must — become a force for good. GSB's graduate programs equip tomorrow's changemakers with the knowledge and skills

needed to create better ways of doing business. GSB offers the Sustainable Innovation Master of Business Administration (SI-M.B.A.) and Certificates of Graduate Study.

Situated at the heart of one of the most progressive business environments in the world, the fully integrated curriculums create impact because they were created from the ground up to incorporate environmental, social and governance challenges into business practices. Program graduates develop the holistic, interdisciplinary, systems skills needed to help businesses grow profitably and sustainably.

## DEGREES

Sustainable Innovation M.B.A (p. 96).

Sustainable Enterprise CGS (p. 97)

Sustainable Family Enterprise mCGS (p. 97)

## FACULTY

**Callery, Patrick;** Assistant Professor, Grossman School of Business; PhD, University of California, Santa Barbara

**Glavas, Ante;** Associate Professor, Grossman School of Business; PHD, Case Western Reserve University

**Jones, David A;** Professor, Grossman School of Business; PHD, University of Calgary

**Lowensohn, Suzanne;** Associate Professor, Grossman School of Business; PHD, University of Miami

**Monsen, Erik;** Associate Professor, Grossman School of Business; PHD, University of Colorado at Boulder

**Noordewier, Thomas Gerald;** Professor, Grossman School of Business; PHD, University of Wisconsin-Madison

**Novak, David C.;** Professor, Grossman School of Business; PHD, Virginia Polytechnic Institute and State University

**Prevost, Andrew;** Professor, Grossman School of Business; PHD, Wayne State University

**Schnitzlein, Charles;** Professor, Grossman School of Business; PHD, Washington University

**Sharma, Pramodita;** Professor, Grossman School of Business; PHD, University of Calgary

**Sharma, Sanjay;** Dean, Grossman School of Business; PHD, University of Calgary

**Vanden Bergh, Richard G.;** Professor, Grossman School of Business; PHD, University of California Berkeley

**Venugopal, Srinivas;** Associate Professor, Grossman School of Business; PHD, University of Illinois at Urbana-Champaign

## SUSTAINABLE INNOVATION M.B.A.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

The Sustainable Innovation MBA at the University of Vermont is the leading program for emerging changemakers who believe business can – and must – become a force for good.

The accelerated, 12-month program integrates sustainable business practices across disciplines, focusing on the tools needed to manage

business today and lead through change tomorrow. Sustainable Innovation MBA graduates jump back into work with the knowledge and skills they need to become change agents in fields as diverse as impact investing, sustainable development, mission-driven marketing, supply chain management, nonprofit management, and other socially responsible business functions.

The program requires the successful completion of 45 credit hours, which are structured across an online asynchronous course taught in August, 4 8-week modules that each comprise multiple courses, and a 3-month summer capstone practicum project. All courses cover topics and tools for the creation of a more inclusive, resilient, and sustainable economy. Courses and other co-curricular experiences are delivered by faculty and thought leaders drawn from the Grossman School of Business, other UVM units, and the local and global business communities.

All students take the same courses at the same time. Given the nature of this accelerated one-year M.B.A. program, students are expected to be engaged in their coursework on a full-time, in-person basis.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies the Degree of Master of Business Administration

Admissions preference will be given to applicants who have 3 or more years of work experience in for-profit, non-profit, and/or government positions. Applicants with international exposure, and entrepreneurial and/or managerial experience are especially encouraged.

Due to the interdisciplinary nature of the program, applicants are drawn from a broad range of backgrounds and there are no particular prerequisites in regards to prior coursework or degree programs. A bachelor's degree is required. Each applicant is evaluated holistically, focusing on the applicant's achievements and strengths as a person, which include but extend well beyond a collection of academic transcripts, test scores, and work experience.

GMAT or GRE scores are not required, but applicants are welcome to submit test scores if they feel it will strengthen their application. Applicants often submit test scores when they have a less strong academic record, or little to no quantitative coursework. Applicants for whom English is not their primary language are required to submit proof of English proficiency. The UVM Graduate College requires a minimum TOEFL score of 90, an IELTS score of 6.5, or a Duolingo score of 110. Application requirements also include 3 letters of reference and a statement of purpose.

### Minimum Degree Requirements

To support the success of a diverse student body with varying levels of prior exposure to basic but core skills in business statistics, microeconomics, accounting, finance and spreadsheets, the program covers the cost of a required MBA Math course ([www.mbamath.com](http://www.mbamath.com)). Admitted students who have paid their non-refundable deposit are invited to begin this self-paced, online course as early as June 1 of the year in which they enroll in the program. Before the start of Module 1 in late August, each student is required to achieve 80% or higher on each MBA Math quiz, and an average



quiz grade of 85% or higher. All tutorials and quizzes can be revisited and completed multiple times, and in any order. In exceptional circumstances, timeline extensions to meet these requirements can be granted at the discretion of a Program Director.

Required courses:

MBA 6990	Special Topics (Business Fundamentals (Online, Self-Paced))	1
MODULE 1		
MBA 6010	Foundations of Management	10
MODULE 2		
MBA 6020	Bldg a Sustainable Enterprise	9
MODULE 3		
MBA 6030	Growth of Sust Enterprise	9
MODULE 4		
MBA 6040	Focusing on Sustainability	9
MODULE 5		
MBA 6050	Sus Entrepreneurship in Action	6

**Comprehensive Examination**

Successful completion of the summer practicum in Module 5 will be considered as fulfilling the Graduate College requirement that all Master's degree students pass a comprehensive examination in their field of specialization.

**Requirements for Advancement to Candidacy for the Degree of Master of Business Administration**

Successful completion of all courses with a minimum GPA of 3.00.

**SUSTAINABLE ENTERPRISE CGS**

All Students must meet the Requirements for the Certificate of Graduate Study. (p. 269)

**OVERVIEW**

The Certificate of Graduate Study in Sustainable Enterprise provides a comprehensive framework for learning how enterprises can be both profitable and responsible, providing students with the business strategies, experience, professional network, and credentials to make an impact on their careers and the planet.

The Certificate of Graduate Study in Sustainable Enterprise is designed to:

- Develop students' business knowledge as they learn how sustainability issues impact business practices across organizational divisions
- Progress students' understanding of how enterprises stay competitive by incorporating triple bottom line concepts into their business strategy

- Deliver courses that fully integrate sustainability issues, similar to the Sustainable Innovation M.B.A. (SI-MBA), and draw on the knowledge and business acumen of our esteemed Grossman School of Business faculty and industry experts succeeding in their field

The fully online certificate will require 15 credits in the field of sustainable enterprise, including 4 required courses (12 credits) from 3 core enterprise content areas, including: accounting, marketing, operations, and supply chains, and 1 required course (3 credits) in a capstone course designed around leading sustainable innovation. Students can choose 1 elective course (3 credits) from a variety of topical electives, including: finance, new business models, and entrepreneurial family business. The program will offer 2 online courses each semester, with students expected to take 1 or both courses. Students may start the program in the fall, spring, or summer, so it will be possible to complete the program in 1 year.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the certificate of graduate study in sustainable enterprise**

Students are required to have earned a bachelor's degree from an accredited college or university.

**Minimum Degree Requirements**

REQUIRED COURSES		
BUS 6670	Accounting & Reporting for ESG	3
BUS 6550	Sustainable Marketing	3
BUS 6700	Green Oper. and Supply Chains	3
ADDITIONAL COURSE (3 CREDITS) CHOOSE ONE COURSE FROM THE FOLLOWING:		
BUS 6420	Int Sustain New Business Model	
BUS 6450	Sustainable Family Enter I	
BUS 6451	Sustainable Family Enter II	
Other graduate-level courses as approved by the program		

Additional questions may be directed to the Grossman School of Business.

**SUSTAINABLE FAMILY ENTERPRISE MCGS**

All students must meet the Requirements for the micro-Certificate of Graduate Study (mCGS) (p. 269)

**OVERVIEW**

The Micro-Certificate of Graduate Study in Sustainable Enterprise offers a means for graduate students from diverse backgrounds to learn how to practically embed sustainable development issues in the most prevalent form of business organizations – the family

business, thereby helping them to balance their performance on the 3P dimensions of People, Planet and Profits

The Micro-Certificate of Graduate Study in Sustainable Enterprise is designed to:

- Develop students' understanding of the best and next practices of innovative family firms in sustainable development
- Deliver courses that fully integrate sustainability issues, similar to the Sustainable Innovation M.B.A. (SI-MBA), and draw on the knowledge and business acumen of our esteemed Grossman School of Business faculty in the family enterprise field

The fully online certificate requires 9 credits in the field of sustainable family enterprise. 6 of the credits are required courses in sustainable family enterprise and students choose 1 elective course (3 credits) from a variety of topical electives, including sustainable marketing, ESG accounting and reporting, new business models and green supply chains. The program will offer 2 online courses each semester, with students expected to take 1 or both courses. Students may start the program in the fall, spring, or summer.

## SPECIFIC REQUIREMENTS

### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE micro-CERTIFICATE OF GRADUATE STUDY

Students are required to have earned a bachelor's degree from an accredited college or university.

### MINIMUM DEGREE REQUIREMENTS

Required Courses		
BUS 6450	Sustainable Family Enter I	3
BUS 6451	Sustainable Family Enter II	3
Additional Course (3 credits) Choose one from the following:		3
BUS 6550	Sustainable Marketing	
BUS 6420	Int Sustain New Business Model	
BUS 6700	Green Oper. and Supply Chains	
BUS 6670	Accounting & Reporting for ESG	
Other graduate-level courses as approved by program		

Additional questions may be directed to the Grossman School of Business.

## CELLULAR, MOLECULAR, AND BIOMEDICAL SCIENCES

<http://www.uvm.edu/cmb/>

### OVERVIEW

The Cellular, Molecular and Biomedical Sciences (CMB) program provides personalized training in a graduate-student focused, state-of-the-art research environment. Graduates are highly qualified

scientists ready to take on the rigors of scientific careers in academia, industry, and government.

This interdisciplinary program is comprised of highly dedicated research faculty in 16 departments across the UVM campus. This breadth, combined with a collegial atmosphere, provides an ideal environment for studying the molecular, cellular, genetic, biophysical, and biochemical mechanisms that control organismal development and disease.

### DEGREES

Cellular, Molecular and Biomedical Sciences M.S. (p. 100)

Cellular, Molecular and Biomedical Sciences Ph.D. (p. 100)

### FACULTY

**Ali, M. Yusuf;** Assistant Professor, Department of Molecular Biology and Biophysics, PHD, Toyohashi University of Technology

**Amiel, Eyal;** Assistant Professor, Department of Biomedical and Health Sciences; PHD, Dartmouth College

**Anathy, Vikas;** Associate Professor, Department of Pathology and Laboratory Medicine; PHD, Madurai Kamraj University

**Barlow, John;** Associate Professor, Department of Animal and Veterinary Sciences; DVM, University of Illinois Urbana-Champaign; PHD, University of Vermont

**Berger, Christopher Lewis;** Professor, Department of Molecular Physiology and Biophysics; PHD, University of Minnesota Twin Cities

**Bernstein, David;** Assistant Professor, Department of Electrical and Biomedical Engineering; PHD, Boston University

**Bonney, Elizabeth;** Professor, Department of Obstetrics and Gynecology; MD, Stanford University

**Botten, Jason W.;** Professor, Department of Medicine-Pulmonary; PHD, University of New Mexico

**Boyson, Jonathan;** Associate Professor, Department of Surgery; PHD, University of Wisconsin Madison

**Bruce, Emily;** Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Cambridge University

**Caporizzo, Matthew;** Assistant Professor, Department of Molecular Physiology and Biophysics; PHD, University of Pennsylvania

**Carr, Frances Eileen;** Professor, Department of Pharmacology; PHD, University of Illinois Chicago

**Celli, Jean;** Professor, Department of Microbiology and Molecular Genetics; PHD, Université Pierre & Marie Curie

**Chatterjee, Nimrat;** Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Baylor College of Medicine

**Cunniff, Brian;** Assistant Professor, Department of Pathology and Laboratory Medicine; PHD, University of Vermont

**Deming, Paula;** Associate Professor, Department of Biomedical and Health Sciences; PHD, University of North Carolina at Chapel Hill

**Diehl, Sean;** Associate Professor, Department of Microbiology and Molecular Genetics; PHD, University of Vermont

**Double, Sylvie;** Professor, Department of Microbiology and Molecular Genetics; PHD, University of North Carolina Chapel Hill

- Erdos, Benedek;** Assistant Professor, Department of Pharmacology; MD, PHD, Semmelweis University, School of Medicine, Budapest, Hungary
- Etter, Andrea;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, Purdue University
- Everse, Stephen;** Associate Professor, Department of Biochemistry; PHD, University of California San Diego
- Francklyn, Christopher;** Professor, Department of Biochemistry; PHD, University of California Santa Barbara
- Freeman, Kalev;** Assistant Professor, Department of Surgery; MD, PHD, University of Colorado Boulder
- Frietze, Seth;** Associate Professor, Department of Biomedical and Health Sciences; PHD, Harvard University
- Glass, Karen;** Associate Professor, Department of Pharmacology; PHD, University of Vermont
- Gordon, Jonathan;** Assistant Professor, Department of Biochemistry; PHD, University of Western Ontario
- Harraz, Osama F.;** Assistant Professor, Department of Pharmacology; PHD, University of Calgary
- Heath, Jessica;** Associate Professor, Department of Pediatrics; Department of Biochemistry; MD, SUNY Stony Brook
- Hondal, Robert;** Professor, Department of Biochemistry; PHD, Ohio State University
- Howe, Alan K.;** Professor, Department of Pharmacology; PHD, Northwestern University
- Huston, Christopher;** Professor, Department of Medicine-Infectious Disease; MD, Cornell University
- Janssen-Heininger, Yvonne M.W.;** Professor, Department of Pathology and Laboratory Medicine; PHD, Maastricht University, The Netherlands
- Jetton, Thomas Lawrence;** Professor, Department of Medicine-Endocrinology; PHD, Vanderbilt University
- Kelm, Robert;** Associate Professor, Department of Medicine-Cardiovascular; PHD, University of Vermont
- Kinsey, C. Matthew;** Assistant Professor, Department of Medicine-Pulmonary, MD, Albert Einstein College of Medicine, Bronx, NY; MPH Harvard School of Public Health
- Knodler, Leigh;** Associate Professor, Department of Microbiology and Molecular Genetics; PHD, University of New South Wales
- Krementsov, Dimitry N.;** Assistant Professor, Department of Biomedical and Health Sciences, PHD, University of Vermont
- Landry, Christopher C.;** Professor, Department of Chemistry; PHD, Harvard University
- Lee, Benjamin;** Associate Professor, Department of Pediatrics; MD, Case Western Reserve University
- Lian, Jane;** Professor, Department of Biochemistry; PHD, Boston University
- Lounsbury, Karen M.;** Professor, Department of Pharmacology; PHD, University of Pennsylvania
- Majumdar, Dev;** Assistant Professor, Department of Surgery; PHD, University of California Los Angeles
- Martorelli Di Genova, Bruno;** Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Federal University of Sao Paulo
- Morelli, Kathryn;** Assistant Professor, Department of Neurological Sciences; PhD, The Jackson Laboratory & University of Maine
- Morielli, Anthony D.;** Associate Professor, Department of Pharmacology; PHD, University of California Santa Cruz
- Mughal, Amreen;** Assistant Professor, Department of Pharmacology; PHD, North Dakota State University
- Nallasamy, Shanmugasundaram;** Assistant Professor, Department of Obstetrics, Gynecology, and Reproductive Sciences; DVM, Tamil Nadu Veterinary and Animal Sciences University, India; PHD, University of Illinois at Urbana-Champaign
- Nelson, Mark;** Professor, Department of Pharmacology; PHD, Washington University in St Louis
- Ou, Yangguang;** Assistant Professor, Department of Chemistry; PHD, University of Pittsburgh
- Poynter, Matthew;** Professor, Department of Medicine-Pulmonary; PHD, University of Utah
- Previs, Michael;** Assistant Professor, Department of Molecular Physiology and Biophysics; PHD, University of Vermont
- Quénet, Delphine;** Assistant Professor, Department of Biochemistry, PHD; University of Strasbourg, France
- Roberts, Stephen;** Associate Professor, Department of Microbiology and Molecular Genetics; PHD, University of North Carolina
- Salogiannis, John;** Assistant Professor, Department of Molecular Physiology and Biophysics; PHD, Harvard University
- Seward, David;** Assistant Professor, Department of Pathology and Laboratory Medicine; MD, PHD, University of Colorado Anschutz Medical Campus
- Silveira, Jay R.;** Assistant Professor, Department of Biochemistry; PHD, University of Vermont
- Skinner, R. Chris;** Assistant Professor, Department of Nutrition and Food Science; PHD, West Virginia University
- Spees, Jeffrey;** Professor, Department of Medicine-Cardiovascular; PHD, University of California Davis
- Stafford, James;** Assistant Professor, Department of Neurological Sciences; PHD, Oregon Health and Science University
- Stein, Gary;** Professor, Department of Biochemistry; PHD, University of Vermont
- Stein, Janet;** Professor, Department of Biochemistry; PHD, Princeton University
- Stumpff, Jason K.;** Associate Professor, Department of Molecular Physiology and Biophysics; PHD, University of Colorado
- Taatjes, Douglas Joseph;** Professor, Department of Pathology and Laboratory Medicine; PHD, University of Basel
- Teuscher, Cory;** Professor, Department of Medicine-Immunobiology; PHD, University of New Mexico
- Thali, Markus Josef;** Professor, Department of Microbiology and Molecular Genetics; PHD, University of Zurich
- Tierney, Mary Lauretta;** Associate Professor, Department of Plant Biology; PHD, Michigan State University
- Toth, Michael;** Professor, Department of Medicine-Cardiovascular; PHD, University of Maryland Baltimore
- Trybus, Kathleen;** Professor, Department of Molecular Physiology and Biophysics; PHD, University of Chicago
- van der Vliet, Albert;** Professor, Department of Pathology and Laboratory Medicine; PHD, University of Amsterdam
- Ward, Gary;** Professor, Department of Microbiology and Molecular Genetics; PHD, University of California San Diego



**Wargo, Matthew;** Associate Professor, Department of Microbiology and Molecular Genetics; PHD, Dartmouth College

**Warshaw, David;** Professor, Department of Molecular Physiology and Biophysics; PHD, University of Vermont

**Weiss, Daniel;** Professor, Department of Medicine-Pulmonary; MD, PHD, Mount Sinai School of Medicine

**Wellman, George;** Professor, Department of Pharmacology; PHD, University of Vermont

## CELLULAR, MOLECULAR AND BIOMEDICAL SCIENCES M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

The Cellular, Molecular and Biomedical Sciences Program only awards M.S. degrees to students who have matriculated into the Ph.D. program, and their studies committee has determined that their academic progress (research included) is not sufficient to complete a Ph.D. degree, or the student requests to leave the program prior to completion of the Ph.D. degree. These students are required to complete the minimum course and research requirements for the M.S. as defined by the Graduate College, and must defend a research-based master's thesis.

## CELLULAR, MOLECULAR AND BIOMEDICAL SCIENCES PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

The Cellular, Molecular and Biomedical Sciences (CMB) program trains students to:

- Become scholars in their field
- Conduct hypothesis-based research in an ethically responsible manner
- Think independently, creatively, and critically
- Effectively communicate as teachers, researchers, and scholars

The curriculum of the Cellular, Molecular and Biomedical Sciences program is designed to give students fundamental and applied skills to prepare them for future positions in scientific research and related fields. The core curriculum includes course work in biochemistry, cell biology, genetics, ethics, data analysis, and scientific communications. Students also enhance their writing skills through a grant-writing course and improve their presentation skills through participation in the CMB seminar series. Students are provided with at least 2 opportunities to serve as teaching assistants, typically in undergraduate laboratory-based courses.

During the 1st year, CMB students complete 3 research rotations with potential advisors, while taking the required core course work in Cell Biology and Biochemistry. Students generally fulfill their core course and comprehensive exam requirements in year 2.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

Competitive applicants typically have evidence of strong course preparation and an undergraduate GPA of 3.00 or better. Foreign applicants to the CMB Program are required to have a satisfactory score on either the TOEFL (100 or higher) or the IELTS (7.0 or better). Prior research experience and strong letters of recommendation are expected of all competitive applicants.

### Minimum Degree Requirements

Completion of course and research credits totaling 75 credits is required for the Ph.D. Maintaining a GPA of 3.00 or better in core courses and advanced electives is required.

Required core courses for all CMB students:

BIOC 6001	General Biochemistry I	3
BIOC 6002	General Biochemistry II	3
BIOC 7990	Special Topics (Critical Reading & Analysis)	2
CLBI 6010	Cell Biology	3
CLBI 7010	Critical Reading & Analysis	2
CLBI 6020	Science Communication	3
CLBI 7020	Biomedical Data Analysis	2
MPBP 6300	Biomedical Grantsmanship	2
Approved Genetics Course		3
Ethics Requirement (Choose 1 of the following):		1
NSCI 6270	Resp Conduct in Biomed Rsch	
MMG 6990	Special Topics (Ethics in Graduate Research)	
PBIO 6990	Special Topics (Ethics in Graduate Research)	

Students must complete a minimum of 20 research credits (CLBI 7491) and 30 course credits, and an additional 25 course or research credits. Once students have earned 75 credits, they register for continuous registration GRAD 9010, GRAD 9020 or GRAD 9030, as appropriate.

Additional program requirements include service as a graduate teaching assistant (GTA) twice during the 1<sup>st</sup> two years, weekly attendance at the CMB seminar series, annual presentation of research progress within the CMB seminar program starting in the second year, and annual meetings with the student's dissertation studies committee beginning in the 2<sup>nd</sup> year.

### Comprehensive Examination

The comprehensive examination is a tool to evaluate the progress of each student and ensure that they are prepared to proceed toward the doctorate degree. All parts of the qualifying examination will

be evaluated in a manner to avoid bias and maintain uniformity of assessment. The examination will determine whether the candidate:

1. Has acquired an adequate academic background through required course work and electives
2. Can analyze and interpret data and scientific ideas
3. Can apply logical thought to synthesize diverse facts and concepts
4. Understands and meets the intellectual demands of the degree program

The comprehensive examination is structured to provide assessment in oral and written formats. The 2 phases of the exam occur at distinct times during training, and both must be satisfactorily completed to advance to doctoral candidacy.

Phase I is an oral examination that tests students on their ability to synthesize and integrate scientific knowledge learned from first-year laboratory rotations, CMB seminar and core courses. The oral exam must be completed by July 15 of the 1<sup>st</sup> year. Phase II is a written grant proposal based on the student's thesis research project that must be completed by August 31 of the 2<sup>nd</sup> year. The Phase II exam will provide the student with a detailed plan for conducting their dissertation research. The comprehensive exam is organized and conducted by the CMB Education Committee.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Maintain a 3.00 GPA and successful completion of the comprehensive exam, as outlined in the CMB Program Handbook.

## CHEMISTRY

<http://www.uvm.edu/~chem/>

### OVERVIEW

The Chemistry Department currently offers graduate programs leading to either the M.S. or Ph.D. in analytical, biological, inorganic, organic, or physical chemistry. In recent years about eight students per year have received the Ph.D. In the Chemistry Department, courses are offered in inorganic chemistry, organometallic chemistry, physical inorganic chemistry, synthetic organic chemistry, physical organic chemistry, heterocyclic chemistry, advanced analytical chemistry, optical spectroscopy, mass spectrometry, electrochemistry, thermodynamics, quantum chemistry, and polymer chemistry.

Upon arrival, new graduate students in Chemistry take examinations in analytical, inorganic, organic, and physical chemistry in order to place students properly in the graduate curriculum. The exams are nationally standardized by the American Chemical Society, and national norms are used. Appropriate course work and didactic opportunities are in place to strengthen any student weakness that may appear from the exams.

Early in the fall semester faculty present a series of short talks that describe their research interests. New graduate students attend these talks and then discuss specific research interests with individual faculty members. After this process, students normally make a decision regarding their research direction and particular advisor

around the end of November of the first year. Detailed information about the degree requirements of the program can be found via the Graduate Program link of the Chemistry Department's website.

### DEGREES

Chemistry AMP (p. 101)

Chemistry M.S. (p. 102)

Chemistry Ph.D. (p. 103)

### FACULTY

**Brewer, Matthias;** Professor, Department of Chemistry; PHD, University of Wisconsin-Madison

**Hondal, Robert J.;** Associate Professor, Department of Biochemistry; PHD, Ohio State University

**Landry, Christopher C.;** Professor, Department of Chemistry; PHD, Harvard University

**Lee, Andrea J.;** Research Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, University of Wisconsin-Madison

**Li, Jianing;** Associate Professor, Department of Chemistry; PHD, Columbia University

**Liptak, Matthew D.;** Associate Professor, Department of Chemistry; PHD, University of Wisconsin-Madison

**Madalengoitia, Jose S.;** Associate Professor, Department of Chemistry; PHD, University of Virginia

**Matthews, Dwight E.;** Professor Emeritus, Department of Chemistry; PHD, Indiana University Bloomington

**Ou, Yangguang;** Assistant Professor, Department of Chemistry, PHD, University of Pittsburgh

**Petrucci, Giuseppe A.;** Professor, Department of Chemistry; PHD, University of Florida

**Punihaole, David;** Assistant Professor, Department of Chemistry, PHD, University of Pittsburgh

**Ruggiero, Michael T.;** Assistant Professor, Department of Chemistry; PHD, Syracuse University

**Schneebeli, Severin;** Associate Professor, Department of Chemistry; PHD, Columbia University

**Waterman, Rory;** Professor, Department of Chemistry; PHD, University of Chicago

### CHEMISTRY AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

Qualified undergraduate students who plan to earn a M.S. in Chemistry may enroll in the Accelerated Master's Entry Pathway (AMP), which enables students to begin working on the M.S. while still an undergraduate. Students apply to the program in the second semester of their junior year or the first semester of their senior year. Upon admission to the program by the Graduate College, students will choose 9 credits of graduate approved courses that can be taken while still an undergraduate.

## REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF MASTER OF SCIENCE FOR ACCELERATED STUDENTS

Students must apply for the Accelerated Master's Entry Pathway (AMP) during spring semester of their junior year. Students interested in the AMP can request information in writing from the Chemistry department. Recommendation for admission will be based upon the student's prior academic record with particular attention paid to performance in upper-division 3000- and 4000-level Chemistry courses. Following formal Graduate College admission to the Accelerated Master's Pathway, up to 9 credits of approved graduate course work may be taken that may be counted toward both the undergraduate and graduate degree requirements. Generally, AMP students begin research by or during the summer prior to their senior year; however, this research is not eligible for graduate credit.

## MINIMUM DEGREE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

The above prerequisites for admission must be supplemented in either of the following two ways:

OPTION A (THESIS)	
Completion of 12 credits of CHEM 6391 and submission of a satisfactory thesis; and completion of at least 30 credits of graduate work (courses and Master's Thesis Research).	
OPTION B (NON-THESIS)	
Completion of 6 credits of CHEM 6392; and completion of at least 30 credits of graduate work (courses and Literature Research Project).	

M.S. students should decide at the beginning of their program whether they will pursue Option A or Option B and inform the Department of Chemistry and the Graduate College of their decisions.

## COMPREHENSIVE EXAMINATION

In the Chemistry Department, the Comprehensive Examination for the Master's degree consists of completion of the following three parts:

- (1) Passing of the (entrance) qualifying-examinations requirement within the first year, and successful completion of the coursework requirement. The qualifying examinations establish a broad knowledge base in all major areas of chemistry, while the latter requirement is constructed to add breadth to the students' knowledge base in specific areas of chemistry not directly related to their research area.
- (2) Successful completion of the Advancement to Candidacy exam (CHEM 6015). This course consists of the preparation of a 5-page dossier of research accomplishments, and an oral examination on its contents, which serves as a comprehensive review of the student's fundamental understanding of chemistry.
- (3) Completion of a total of 2 credits of Current Topics (CHEM 6050). This course consists of a review of 1 major article

from the current literature (and supporting supplementary articles).

The oral presentation is followed by an examination of the student's understanding of the crucial information in that paper by faculty in the student's major area.

## REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF SCIENCE

Proficiency in 3 areas of chemistry evidenced by the qualifying examinations or completion of designated courses at this university		
1 semester of residence		
CHEM 6050	Topics in Current Chemistry (Must be Taken Twice)	1
CHEM 6010	Intro to Graduate Research	1
CHEM 6015	Chemical Investigations	1
CHEM 6020	Grad Seminar	1
At least 15 credits of formal graded course work (at least 6 of which must be at the 6000-level) including:		15
6 credits of graduate level courses in the chemical field of specialization		
9 credits of graduate-level chemistry courses not in the area of specialization		
Maintenance of an overall point-hour ratio of 3.00		

## CHEMISTRY M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

An M.S. degree in chemistry prepares students for careers in chemical sciences, biomedical sciences, catalysis, energy, environment, or materials science as well as other professional fields that apply strong research skills or basic chemical understanding. For a description of research by chemical subdivision, please refer to the Chemistry Ph.D. topic in this catalogue.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

An undergraduate major in an appropriate field, minimally with course work in the four classic subdisciplines of chemistry (analytical, inorganic, organic, and physical). This is most commonly satisfied with a B.A., B.S., or equivalent degree in chemistry. Applicants with prior research experience are preferred.

### Minimum Degree Requirements

The above prerequisites for admission to candidacy must be supplemented in either of the following 2 ways:



OPTION A (THESIS)	
Completion of 12 credits of CHEM 6391 and submission of a satisfactory thesis; and completion of at least 30 credits of graduate work (courses and Master's Thesis Research).	
OPTION B (NON-THESIS)	
Completion of 6 credits of CHEM 6392; and completion of at least 30 credits of graduate work (courses and Literature Research Project).	

M.S. students should decide at the beginning of their program whether they will pursue Option A or Option B and inform the Department of Chemistry and the Graduate College of their decisions.

### Comprehensive Examination

In the Chemistry Department, the Comprehensive Examination for the Master's degree consists of completion of the following 3 parts:

(1) Passing of the (entrance) qualifying-examinations requirement within the first year, and successful completion of the coursework requirement. The qualifying examinations establish a broad knowledge base in all major areas of chemistry, while the latter requirement is constructed to add breadth to the students' knowledge base in specific areas of chemistry not directly related to their research area.

(2) Successful completion of the Advancement to Candidacy exam (CHEM 6015). This course consists of the preparation of a 5-page dossier of research accomplishments, and an oral examination on its contents, which serves as a comprehensive review of the student's fundamental understanding of chemistry.

(3) Completion of a total of 2 credits of Current Topics (CHEM 6050). This course consists of a review of 1 major article from the current literature (and supporting supplementary articles). The oral presentation is followed by an examination of the student's understanding of the crucial information in that paper by faculty in the student's major area.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Proficiency in 3 areas of chemistry evidenced by the qualifying examinations or completion of designated courses at this university		
1 semester of residence		
CHEM 6050	Topics in Current Chemistry (Must be taken twice)	1
CHEM 6010	Intro to Graduate Research	1
CHEM 6015	Chemical Investigations	1
CHEM 6020	Grad Seminar	1
At least 15 credits of formal graded course work (at least 6 of which must be at the 6000-level) including:		15
6 credits of graduate-level courses in the chemical field of specialization		

9 credits of graduate-level chemistry courses not in the area of specialization	
Maintenance of an overall GPA of 3.00	

## CHEMISTRY PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

A Ph.D. degree in chemistry prepares students for careers in chemical sciences and related disciplines including biomedical sciences, biotechnology, catalysis, energy, environment, materials science, or nanotechnology. Individuals having earned a Ph.D. in chemistry at UVM have gone on to careers in academics, the chemical industry, and national research laboratories. Graduate study at UVM is research intensive, and a description of research by chemical subdivision follows.

Analytical chemistry involves developing and applying instrumentation and chemical methods to solve problems across a range of chemistries and scientific disciplines. The department currently has 3 research foci: 1) development of innovative methods and instruments to study the formation and chemistry of organic aerosols in the atmosphere. This work bridges the gap between analytical chemistry and atmospheric science, contributing to the understanding of the impact of aerosols on global climate through direct scattering of solar radiation and the formation of ice and water clouds; 2) developing new chemical imaging methods to study biological processes. This work will enable direct imaging of the structural dynamics and interactions of biomolecules and lead to new insights into protein folding dynamics in cells, understanding the molecular origins of neurodegenerative diseases, and aide in the rational design of new nanoparticle drug delivery vehicles; and, 3) development of a suite of electrochemical sensors and sampling/separation techniques to make quantitative measurements of various neurochemicals in the brain. This work will enable elucidate underlying mechanisms of various neuropsychiatric (i.e. PTSD, depression, etc.) and neurodevelopmental disorders (i.e. autism spectrum) to reveal more efficacious treatments.

Biological chemistry is an interdisciplinary area that incorporates organic, analytical, physical, and inorganic chemistry into biological research and has several focus areas. One focus area integrates physical chemistry with biochemistry and utilizes single molecule fluorescence microscopy to investigate how DNA repair enzymes recognize oxidatively damaged DNA bases. A second focus area is the study of antioxidant enzymes, peptides, nucleic acid, and vitamin-like small molecules that contain sulfur and selenium. Here the tools of organic, physical, and analytical chemistry are used for synthesis, characterization, and determination of the mechanism of action of both small molecules and macromolecules. Several other bioanalytical, bioinorganic, bioorganic, and biophysical research opportunities exist within the program as noted above and below.

Inorganic chemistry at UVM involves the study of main-group elements and transition metals in a variety of contexts, with

applications in catalysis, energy, environment, and medicine. One example is the synthesis and characterization of inorganic particles, which can be functionalized for broad applications in heterogeneous catalysis, targeted drug delivery, and biological imaging. A second focus area employs biochemical, spectroscopic, and computational tools to elucidate and manipulate the enzymatic mechanisms of metalloproteins. Finally, a third example is the design of metal-based catalysts for chemical bond formation, which can be applied to the preparation of useful small molecules and novel polymeric materials.

Current research in organic chemistry includes the development of novel synthetic methodologies to prepare oxygen- and nitrogen-containing heterocyclic compounds, new ring fragmentation reactions and their applications in synthesis, development of efficient and stereoselective tandem/cascade reaction sequences, natural products, mechanistic studies of organic chemical reactions, development of 1,3-diaza-Claisen rearrangements and applications toward the synthesis of guanidine-containing natural products, and studies in bioorganic chemistry. Additional projects involve the methodological development of syntheses for  $\pi$ -conjugated small molecules, molecular cages, non-planar aromatics, and polymeric systems as functional materials with applications ranging from mesoscale synthesis to renewable energy harvesting and storage.

Physical chemistry research areas include two major areas of focus. The first area is the development of multiscale modeling approaches to understand complex chemical systems, with the aims of elucidating the critical structure-mechanism-function relationships of chemical and biological compounds and providing rational guides to help drug discovery and materials design. The second area is the use of low-frequency vibrational spectroscopies, combined with quantum mechanical calculations, to understand how collective atomic motions are related to bulk material properties, with the aim of harnessing these vibrations to selectively drive processes related to mechanochemistry of energy storage materials, pharmaceutical stability, biomolecular function, and semiconducting potential.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

An undergraduate major in an appropriate field, minimally with course work in the 4 classic subdisciplines of chemistry (analytical, inorganic, organic, and physical). This is most commonly satisfied with a B.A., B.S., or equivalent degree in chemistry. Applicants with prior research experience are preferred.

### Minimum Degree Requirements

CHEM 6010	Intro to Graduate Research	1
CHEM 6020	Grad Seminar	1
CHEM 7010	Research Problem Conception	1
CHEM 7015	Research Problem Solution	1
Current Topics in Chemistry (CHEM 6050) must be taken at least 3 times		3-5

Between 20 and 45 credits hours of Doctoral Dissertation Research (CHEM 7491)	20-45
Demonstration of basic competence in four fields of chemistry (analytical, inorganic, organic, and physical) through the biannual qualifying examinations or completion of prescribed courses at the University of Vermont	
1 year of teaching	
1 year of residence	
At least 18 credits of formal course work including:	
9 credits of graduate level courses in the chemical field of specialization	
9-12 credits of graduate-level chemistry courses not in the area of specialization	
Maintenance of an overall grade point average of 3.00	

### Comprehensive Examination

In the Chemistry Department, the Comprehensive Examination for the Doctorate degree consists of completion of the following three parts:

- (1) Passing of the (entrance) qualifying-examinations requirement within the first year, and successful completion of the coursework requirement. The qualifying examinations establish a broad knowledge base in all major areas of chemistry, while the latter requirement is constructed to add breadth to the students' knowledge base in specific areas of chemistry not directly related to their research area.
- (2) Successful completion of the Advancement to Candidacy exam.
- (3) Completion of a total of 3 credits of Current Topics (CHEM 6050). This course consists of a review of one major article from the current literature (and supporting supplementary articles). The oral presentation is followed by an examination of the student's understanding of the crucial information in that paper by faculty in the student's major area.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

It is expected that a student will ordinarily complete the following requirements for admission to candidacy by the end of the second year of residence:

CHEM 6010	Intro to Graduate Research	1
CHEM 6015	Chemical Investigations	1
CHEM 6020	Grad Seminar	1
Current Topics in Chemistry (CHEM 6050) must be taken 3 times		3
Demonstration of basic competence in 4 fields of chemistry (analytical, inorganic, organic, and physical) through the biannual qualifying examinations or completion of prescribed courses at the University of Vermont		
1 year of teaching		

1 year of residence	
At least 18 credits of formal course work (at least 9 of which must be at the 6000-level) including:	18
9 credits of graduate-level courses in the chemical field of specialization	
9 credits of graduate-level chemistry courses not in the area of specialization	
Maintenance of an overall GPA of 3.00	

## CIVIL AND ENVIRONMENTAL ENGINEERING

<https://www.uvm.edu/cems/cee/>

### OVERVIEW

Graduate programs in Civil and Environmental Engineering (CEE) that lead to the master of science and doctor of philosophy degrees are offered. The curricular and research programs emphasize engineering related to environmental and hydrological processes, sustainable transportation systems, materials, and geotechnical, geoenvironmental and structural engineering.

Research in the department addresses critical issues facing the world related to sustainability and energy; infrastructure systems; climate change, hazard mitigation and adaptation; and environmental and public health. A wide range of research methods are employed from state-of-the-art laboratory and field testing to sensing to computational modeling to data analytics to artificial intelligence. Example projects include groundwater contamination modeling and remediation, environmental restoration and ecological engineering, hydrological processes, resource recovery from wastes, air pollution related health effects, sustainable materials, soil and structural dynamics, earthquake engineering, geo-energy, climate change impacts on natural and built infrastructure, structural health monitoring, and sustainable transportation systems.

CEE graduate students can concurrently pursue certificates of graduate study in Complex Systems, Ecological Economics, and Community Resilience & Planning, among others.

### DEGREES

Civil and Environmental Engineering AMP (p. 105)

Civil and Environmental Engineering M.S. (p. 106)

Civil and Environmental Engineering Ph.D. (p. 107)

### FACULTY

**Badireddy, Appala Raju**; Assistant Professor, Department of Civil and Environmental Engineering; PHD, University of Houston

**Bombliès, Arne**; Associate Professor, Department of Civil and Environmental Engineering; PHD, Massachusetts Institute of Technology

**Dewoolkar, Mandar M**; Professor, Department of Civil and Environmental Engineering; PHD, University of Colorado Boulder

**Doran, Elizabeth**; Research Assistant Professor, Department of Civil and Environmental Engineering; PHD, Duke University

**Garcia, Luis**; Professor, Department of Civil and Environmental Engineering; PHD, University of Colorado Boulder

**Ghazanfari, Ehsan**; Associate Professor, Department of Civil and Environmental Engineering; PHD, Lehigh University

**Hernandez, Eric M.**; Associate Professor, Department of Civil and Environmental Engineering; PHD, Northeastern University

**Holmén, Britt A.**; Professor Emerita, Department of Civil and Environmental Engineering; PHD, Massachusetts Institute of Technology

**Lens, John**; Senior Lecturer, Department of Civil and Environmental Engineering; PHD, University of Vermont

**Pinder, George Francis**; Professor, Department of Civil and Environmental Engineering; PHD, University of Illinois Urbana-Champaign

**Rizzo, Donna Marie**; Professor, Department of Civil and Environmental Engineering; PHD, University of Vermont

**Rowangould, Dana**; Assistant Professor, Department of Civil and Environmental Engineering; PHD, University of California, Davis

**Rowangould, Greg**; Associate Professor, Department of Civil and Environmental Engineering; PHD, University of California, Davis

**Scarborough, Matthew**; Assistant Professor, Department of Civil and Environmental Engineering; PHD, University of Wisconsin-Madison

**Svolos, Lampros**; Assistant Professor, Department of Civil and Environmental Engineering; PhD, Columbia University

**Underwood, Kristen L.**; Research Assistant Professor, Department of Civil and Environmental Engineering; PHD, University of Vermont

## CIVIL AND ENVIRONMENTAL ENGINEERING AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students

Qualified undergraduate students who plan to earn a M.S. in civil and environmental engineering may enroll in the Accelerated Master's Entry Pathway, which enables students to begin working on the M.S. while still an undergraduate. Applications are typically completed in the second semester of the junior year, but must be completed at least 1 month prior to the semester in which the student wishes to take courses that will double-count for both B.S. and M.S. degrees so that there is enough time to be admitted to the Graduate College before coursework that will double count is taken. Upon entering the pathway, students may take up to 6 graduate credits while completing the undergraduate degree that can be counted toward both the B.S. and the M.S. degrees. Another 3 graduate credits can be counted towards the M.S. degree while an undergraduate but cannot count towards the B.S. degree. These credits must be earned after the student has been accepted into the Graduate College, and are subject



to approval of the student's graduate advisor. Students pursuing an M.S. degree in civil and environmental engineering may choose either a thesis, project, or non-thesis-based program.

To apply to the program, students should have a cumulative grade point average of at least 3.20 at the time of application (some exceptions may be made, if warranted), must submit a letter of application to the graduate program coordinator naming a faculty member who has agreed to serve as their graduate advisor and list the courses proposed for graduate credit. Applicants must also complete the Graduate College application. GRE scores are not required for AMP students.

### Minimum Degree Requirements

The requirements for advancement to candidacy are as follows:

THESIS OPTION	
Total Minimum Credits (including 6-9 credits of CEE 6391)	30
Oral Comprehensive Examination	
Completion and Defense of a Thesis	
NON-THESIS OPTION #1	
Total Minimum Credits (including 3-6 credits of CEE 6392)	30
Oral Comprehensive Examination	
Completion of a Research Report	
NON-THESIS OPTION #2	
Total Minimum Credits	30
Written Comprehensive Examination	

Students must declare which option they intend to pursue at the beginning of their program, any changes must be done in coordination with the academic advisor and Graduate Program Director.

All M.S. students must complete a minimum of 6 credits in advanced statistics, mathematics or numerical/computational methods, and a minimum of 9 credits in Civil and Environmental Engineering (CEE) coursework. At least 6 graded coursework credits must be at the 6000-level or above.

### Comprehensive Examination

A comprehensive examination is required of all M.S. students. For thesis option students this generally takes the form of an oral examination with the Studies Committee and often focuses around the basic principles behind the thesis research. This should generally take place in the semester preceding the thesis defense.

For non-thesis option students, the required format is either a written report or a written examination consisting of 3 topics related to the student's course of study. This usually takes place in the last semester of the program.

The examination may be retaken once if the student does not pass it on the first attempt.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Specific course work may be required of those who lack a sufficiently strong engineering background.

## CIVIL AND ENVIRONMENTAL ENGINEERING M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

A graduate program in Civil and Environmental Engineering (CEE) that leads to the master of science degree is offered. The curricular and research programs emphasize engineering related to environmental and hydrological processes, sustainable transportation systems, materials, and geotechnical, geoenvironmental and structural engineering.

Research in the department addresses critical issues facing the world related to sustainability and energy; infrastructure systems; climate change, hazard mitigation and adaptation; and environmental and public health. A wide range of research methods are employed from state-of-the-art laboratory and field testing to sensing to computational modeling to artificial intelligence. Example projects include groundwater contamination modeling and remediation, environmental restoration and ecological engineering, hydrological processes, air pollution related health effects, sustainable materials, soil and structural dynamics, geo-energy, and sustainable transportation systems.

CEE graduate students can concurrently pursue certificates of graduate study in Complex Systems, Ecological Economics, and Community Resilience & Planning, among others.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

All applicants must have an undergraduate degree from a recognized university. A B.S. in engineering is preferred, but applicants with a B.S. in 1 of the sciences are often accepted. The latter, however, should have a minimum of the following mathematics and science course work prior to admission: calculus through differential equations (UVM's MATH 3201 equivalent), calculus-based physics (UVM's PHYS 1500 equivalent), and chemistry (UVM's CHEM 1400 equivalent). Applicants without a B.S. degree in civil or environmental engineering may be asked to complete additional undergraduate coursework of up to 9 credits. Specific course work may be required of those who lack a sufficiently strong engineering background. Satisfactory scores on the Graduate Record Examination (GRE) general are also required. GRE is waived for graduates of the University of Vermont. International students whose native language is not English or who have not received their education in English are

required to submit satisfactory results from the TOEFL, IELTS or DuoLingo examination.

### Minimum Degree Requirements

The requirements for advancement to candidacy are as follows:

THESIS OPTION	
Total Minimum Credits (including 6-9 credits of CEE 6391)	30
Oral Comprehensive Examination	
Completion and Defense of a Thesis	
NON-THESIS OPTION #1	
Total Minimum Credits (including 3-6 credits of CEE 6392)	30
Oral Comprehensive Examination	
Completion of a Research Report	
NON-THESIS OPTION #2	
Total Minimum Credits (Restricted to Course Credits Only)	30
Written Comprehensive Examination	

Students must declare which option they intend to pursue at the beginning of their program, any changes must be done in coordination with the academic advisor and Graduate Program Director.

All MS students must complete a minimum of 6 credits in advanced statistics, mathematics or numerical/computational methods, and a minimum of 9 credits in Civil and Environmental Engineering (CEE) coursework. At least 6 graded coursework credits must be at the 6000-level or above.

### Comprehensive Examination

A comprehensive examination is required of all M.S. students. For thesis option students this generally takes the form of an oral examination with the Studies Committee and often focuses around the basic principles behind the thesis research. This should generally take place in the semester preceding the thesis defense.

For non-thesis option students, the required format is either a written report or a written examination consisting of 3 topics related to the student's course of study. This usually takes place in the last semester of the program.

The examination may be retaken once if the student does not pass it on the first attempt.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Specific course work may be required of those who lack a sufficiently strong engineering background.

## CIVIL AND ENVIRONMENTAL ENGINEERING PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

A graduate program in Civil and Environmental Engineering (CEE) that leads to the Doctor of Philosophy degree is offered. The curricular and research programs emphasize engineering related to environmental and hydrological processes, sustainable transportation systems, materials, and geotechnical, geoenvironmental and structural engineering.

Research in the department addresses critical issues facing the world related to sustainability and energy; infrastructure systems; climate change, hazard mitigation and adaptation; and environmental and public health. A wide range of research methods are employed from state-of-the-art laboratory and field testing to sensing to computational modeling to artificial intelligence. Example projects include groundwater contamination modeling and remediation, environmental restoration and ecological engineering, hydrological processes, air pollution related health effects, sustainable materials, soil and structural dynamics, geo-energy, and sustainable transportation systems.

CEE graduate students can concurrently pursue certificates of graduate study in Complex Systems, Ecological Economics, and Community Resilience & Planning, among others.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A M.S. or B.S. degree in engineering is preferred, but applicants with a M.S. or B.S. in 1 of the sciences are often accepted. The latter, however, should have a minimum of the following mathematics and science course work prior to admission: calculus through differential equations (UVM's MATH 3201 equivalent), calculus-based physics (UVM's PHYS 1500 equivalent), and chemistry (UVM's CHEM 1400 equivalent). Specific course work may be required of those who lack a sufficiently strong engineering background. Satisfactory academic performance as measured by grades and scores on the Graduate Record Exam are required. GRE is waived for graduates of the University of Vermont. Applicants whose native language is not English or who have not received their education in English must present satisfactory results from the TOEFL, IELTS or Duolingo examination.

#### Minimum Requirements for the Degree of Doctor of Philosophy

In addition to advancement to candidacy, the student must:

- Present at least 75 credits in approved course work and research (including those required for advancement to candidacy), of which at least 35 credits are in research, at least 30 credits are in coursework, 15 of which must be graded at UVM and at least 9 of which must be at the 6000-level or above. A minimum of

15 credits of coursework (taken at UVM or transferred or a combination) must be in Civil and Environmental Engineering (CEE).

- Write and successfully defend an acceptable dissertation
- Gain significant teaching experience

### Comprehensive Examination

A comprehensive examination is required of all Ph.D. students and should be completed by the end of their second year in the doctoral program when they have taken at least 24 credits of graduate coursework in different topical areas. Some or all of the 24 credits required may be transferred in from their Masters degree if desired.

The comprehensive examination, successful proposal presentation, and 1 year of residency at UVM are needed for advancement to candidacy.

The comprehensive examination covers 5 courses, from 2 topical areas are described below.

Area One. 3 topics from the following:

1. Advanced Mathematical Methods
2. Advanced Statistical Methods
3. Probabilistic Methods
4. Numerical Methods
5. Computational Modeling
6. Optional Area subject to approval by Studies Committee

Area Two. 2 topics from Civil and Environmental Engineering

5 members of the Comprehensive Examination Committee will test the student in 5 appropriate topics selected from the previous list. Each faculty member will be responsible for 1 of the 5 topics. The students and their Advisor select and recommend to the Graduate Program Director the Comprehensive Examination Committee.

The examination takes place in 2 days and covers a written part (day 1) and an oral part (day 2). The written part typically consists of questions prepared by each member of the Comprehensive Examination Committee on their respective topic. The oral examination is usually given 2 days after the written examination and it tests the candidate's ability to present a cogent defense of the written examination. The examination may be retaken once if the student does not pass it on the first attempt.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

It is ordinarily expected that a student will complete the following requirements for advancement to candidacy prior to the end of the second year in the program:

- 1 year of residency at UVM
- At least 12 credits of research
- At least 15 credits of course work at the graduate level acceptable to the student's graduate studies committee

- Satisfactory performance on a comprehensive examination that includes a written part and an oral part
- Satisfactory record of performance in courses and in teaching and research assignments

## CLINICAL AND TRANSLATIONAL SCIENCE

[http://med.uvm.edu/clinical\\_translational\\_sciences/](http://med.uvm.edu/clinical_translational_sciences/)

### OVERVIEW

Clinical and Translational Science (CTS) is a field that focuses on the development of new approaches to improving human health by linking basic science, clinical medicine and community health. CTS students learn to design, execute and report research, including the biologic and non-biologic aspects of health care, which interact to influence the health of individuals and populations. The programs are intended to facilitate the training and career development of a robust CTS workforce and to give individuals with diverse backgrounds, working with faculty from many disciplines, an educational pathway to prepare them for their roles as important and productive contributors to CTS.

### DEGREES

Clinical and Translational Science CGS (p. 108)

Clinical and Translational Science M.S. (p. 109)

Clinical and Translational Science Ph.D. (p. 110)

### FACULTY

**Callas, Peter W.;** Research Associate Professor, Department of Medicine- Medical Biostatistics; PHD, University of Massachusetts Amherst

**Fung, Mark K.;** Professor, Department of Pathology and Laboratory Medicine; MD, PHD, University of Alabama School of Medicine

**Kennedy, Amanda G.;** Professor, Department of Medicine-Hospital Medicine; PHARM.D, Northeastern University

**MacLean, Charles Duncan;** Professor, Department of Medicine-General Internal Medicine; MD, McGill University

**Nowak, Sarah;** Assistant Professor, Department of Pathology and Laboratory Medicine; PHD University of California Los Angeles

**Pinckney, Richard G.;** Associate Professor, Department of Medicine-General Internal Medicine; MD, SUNY Buffalo

**Rose, Gail Lynne;** Assistant Professor, Department of Psychiatry; PHD, University of Iowa

**van Eeghen, Constance O.;** Associate Professor, Department of Medicine-General Internal Medicine; DRPH, University of North Carolina Chapel Hill

## CLINICAL AND TRANSLATIONAL SCIENCE CGS

All students must meet the Requirements for the Certificates of Graduate Study (p. 269)



## OVERVIEW

The Certificate in Clinical and Translational Science (CTS) is designed for scientists, health care professionals, and scholars in other fields (e.g., ethics, business, engineering, law) who are seeking to broaden their horizons in CTS.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Certificate of Graduate Study

4 semesters of college-level science highly recommended

2 semesters of college-level mathematics or statistics highly recommended

Applicants must also follow the instructions and application requirements of the Graduate College.

### Minimum Degree Requirements

Students are expected to complete 18 credits of core coursework and participate in the Seminar in CTS.

Required Courses:		
CTS 6010	Design Clin&Translational Res	3
CTS 6070	Cell to Society	3
CTS 6100	Conduct Clin&Translational Res	3
CTS 6150	Report Clin&Translational Res	3
CTS 6200	Analyze Clin&Translational Res	3
CTS 6250	Multi Analysis Clin&Trans Res	3

## CLINICAL AND TRANSLATIONAL SCIENCE M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

### Concentration in Investigation

This program is designed to effectively and efficiently transform students and healthcare professionals drawn from the large array of disciplines contributing to health into successful independent Clinical and Translational Science (CTS) investigators.

### Concentration in Research Management

This program is designed for individuals who have an interest in contributing to CTS by becoming research coordinators, research administrators, and other science professionals.

### Non-Concentration, Course-Based

This program is designed to maximize flexibility in exploring coursework across the Clinical and Translational Science spectrum.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

#### CONCENTRATION IN INVESTIGATION

4 semesters of college-level science highly recommended

2 semesters of college-level mathematics or statistics highly recommended

Applicants must also follow the instructions and application requirements of the Graduate College.

#### CONCENTRATION IN RESEARCH MANAGEMENT

4 semesters of college-level science highly recommended

2 semesters of college-level mathematics or statistics highly recommended

Applicants must also follow the instructions and application requirements of the Graduate College.

#### NON-CONCENTRATION, COURSE-BASED

4 semesters of college-level science highly recommended

2 semester of college-level mathematics or statistics highly recommended

Applicants must also follow the instructions and application requirements of the Graduate College.

### Minimum Degree Requirements

#### CONCENTRATION IN INVESTIGATION

The Master's in CTS (Investigation) is a 30 credit degree that includes 18 credits of core course work, 6 credits of electives, and 6 credits of supervised research. Individuals must also participate in the Seminar in CTS, successfully pass a comprehensive exam, and successfully complete and publicly defend a thesis.

Required Courses (Investigation Track):		
CTS 6010	Design Clin&Translational Res	3
CTS 6070	Cell to Society	3
CTS 6100	Conduct Clin&Translational Res	3
CTS 6150	Report Clin&Translational Res	3
CTS 6200	Analyze Clin&Translational Res	3
CTS 6250	Multi Analysis Clin&Trans Res	3

#### CONCENTRATION IN RESEARCH MANAGEMENT

The Master's in CTS (Research Management) is a 30-credit degree that includes 18 credits of core course work, 6 credits of electives, and 6 credits of a supervised research internship. Individuals must also participate in the Seminar in CTS and successfully pass a comprehensive exam.

Required Courses (Research Management Track):		
CTS 6010	Design Clin&Translational Res	3
CTS 6070	Cell to Society	3
CTS 6100	Conduct Clin&Translational Res	3
CTS 6150	Report Clin&Translational Res	3
CTS 6200	Analyze Clin&Translational Res	3
CTS 6250	Multi Analysis Clin&Trans Res	3

**NON-CONCENTRATION, COURSE-BASED**

The Master’s in CTS (Non-Concentration, Course-based) is a 30-credit degree that includes 18 credits of core course work, 9 credits of electives, and a 3-credit capstone course. Individuals must also participate in the Seminar in CTS and successfully pass a comprehensive exam.

Required Courses:		
CTS 6010	Design Clin&Translational Res	3
CTS 6070	Cell to Society	3
CTS 6100	Conduct Clin&Translational Res	3
CTS 6150	Report Clin&Translational Res	3
CTS 6200	Analyze Clin&Translational Res	3
CTS 6250	Multi Analysis Clin&Trans Res	3

**Comprehensive Examination**

The comprehensive exam is a required component for all concentrations of the M.S. program. The goal of the comprehensive exam is to determine whether the student’s depth and breadth of knowledge and ability to integrate information is within a scope expected as part of a master’s program in CTS.

The written exam has 2 parts. The first part is writing a 1-2 page project summary of a grant protocol in the style of a National Institute of Health Small Research Grant (R03) using the concepts learned in the CTS core courses. The second part requires an analysis of an existing dataset using the concepts learned in the CTS core courses.

The oral exam requires students to meet with a Comprehensive Exam Committee to answer questions related to the written exam and concepts taught as part of the CTS core courses.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

Students must have completed all required courses including 15 graded credits and maintain an overall minimum grade point average of 3.00. Successful completion of oral and written comprehensive exam required.

**CLINICAL AND TRANSLATIONAL SCIENCE PH.D.**

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

**OVERVIEW**

The Ph.D. in Clinical and Translational Science (CTS) is designed for individuals who wish to become independent investigators.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy**

U.S. Baccalaureate degree or an equivalent international degree

4 semesters of college-level science highly recommended

2 semesters of college-level mathematics or statistics highly recommended

Interviews with appointed faculty are required

Students applying to the Ph.D. program must have a source of funding, a UVM Research Advisor<sup>1</sup>, and an environment in which to conduct research as part of the application

Applicants must also follow the instructions and application requirements of the Graduate College.

<sup>1</sup> Co-mentoring with faculty from other programs is allowed and often desirable but must involve CTS Faculty in all aspects of student research. This requirement is also applicable to CTS students in the M.S. program wishing to transfer to the Ph.D.

**Minimum Degree Requirements**

The Ph.D. in CTS is a 75-credit degree, which includes 18 credit hours of core coursework (CTS 6010, 6070, 6100, 6150, 6200, 6250), at least 12 credit hours of elective courses, and a minimum of 20 credit hours of supervised research. Students must also participate in the CTS Seminar, complete a teaching requirement, pass a comprehensive exam, and successfully complete and publicly defend a dissertation.

Required Courses:		
CTS 6010	Design Clin&Translational Res	3
CTS 6070	Cell to Society	3
CTS 6100	Conduct Clin&Translational Res	3
CTS 6150	Report Clin&Translational Res	3
CTS 6200	Analyze Clin&Translational Res	3
CTS 6250	Multi Analysis Clin&Trans Res	3

**Comprehensive Examination**

The overall goal of the comprehensive exam is to determine whether the student’s depth and breadth of knowledge and ability to integrate

information is such that they should be advanced to candidacy for the Ph.D. The written exam involves writing a grant proposal in the style of a National Institutes of Health Small Research Grant (R03) using the concepts learned in the CTS core courses. The oral exam requires students to meet with a Comprehensive Exam Committee to answer questions related to the written exam and concepts taught as part of the CTS core courses.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Students must have completed all required courses including 15 graded credits and maintain an overall minimum grade point average of 3.00. Successful completion of oral and written comprehensive exam required.

## COMMUNICATION SCIENCES AND DISORDERS

<http://www.uvm.edu/~cnhs/csd/>

### OVERVIEW

The Master of Science degree program in Communication Sciences and Disorders is designed to provide in-depth knowledge and skills in the areas required for a career in speech-language pathology. The course of study provides students with the academic background and clinical opportunities required in preparation for their Clinical Fellowship and ultimately the Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP), allowing them to pursue a satisfying and rewarding career in health care, medicine, education, or research.

The Master of Science program in speech-language pathology (residential) at the University of Vermont is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2200 Research Boulevard, #310, Rockville, MD 20850, 800-498-2071 or 301-296-5700

The Department of Communication Sciences and Disorders includes the Eleanor M. Luse Center for Communication: Speech, Language, and Hearing. This is an active clinic providing speech-language and audiology services to the community. It also serves as a key practicum site for students throughout their graduate studies. All students are supervised by clinically certified members of the faculty of the Eleanor M. Luse Center and affiliated practicum sites.

The CSD faculty conduct research in areas such as speech and language development, speech sound disorders and apraxia of speech, fluency and stuttering, autism and theory of mind, brain injury and cognitive-communication disorders. Many opportunities are available for graduate students who wish to become involved in faculty research projects.

### DEGREES

Communication Sciences and Disorders M.S. (p. 111)

## FACULTY

**Adams, Elizabeth;** Clinical Associate Professor, Department of Communication Sciences and Disorders; Au.D., CCC-A, A.T. Still University

**Bauerly, Kim R.;** Assistant Professor, Department of Communication Sciences and Disorders; PHD, University of Toronto

**Cannizzaro, Michael S.;** Associate Professor, Department of Communication Sciences and Disorders; Ph.D., University of Connecticut

**Coderre, Emily;** Assistant Professor, Department of Communication Sciences and Disorders; Ph.D.; University of Nottingham

**Cote, Sharon;** Clinical Assistant Professor, Department of Communication Science and Disorders; M.S., CCC-SLP, Boston University

**Hutchins, Tiffany L.;** Assistant Professor, Department of Communication Sciences and Disorders; Ph.D., University of South Florida

**Kazenski, Danra;** Clinical Assistant Professor, Department of Communication Sciences and Disorders; Ph.D., University of Vermont

**Prelock, Patricia A.;** Provost and Senior Vice President; Professor, Department of Communication Sciences and Disorders; Ph.D., University of Pittsburgh

**Velleman, Shelley L.;** Professor & Chair, Department of Communication Sciences and Disorders; Ph.D., University of Texas Austin

**Walberg, Julia;** Clinical Educator, Department of Communication Sciences and Disorders; M.S., CCC-SLP, The University of District of Columbia

## COMMUNICATION SCIENCES AND DISORDERS M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Master of Science degree program in Communication Sciences and Disorders is designed to provide in-depth knowledge and skills in the areas required for a career in speech-language pathology. The course of study provides students with the academic background and clinical opportunities required in preparation for their Clinical Fellowship and ultimately the Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP), allowing them to pursue a satisfying and rewarding career in health care, medicine, education, or research.

The Master of Science (M.S.) education program in speech-language pathology (residential) at the University of Vermont is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology of the American Speech-Language-Hearing Association, 2200 Research Boulevard, #310, Rockville, MD 20850, 800-498-2071 or 301-296-5700.



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The CSD faculty conduct research in areas such as speech and language development, speech sound disorders and apraxia of speech, fluency and stuttering, autism and theory of mind, brain injury and cognitive-communication disorders. Many opportunities are available for graduate students who wish to become involved in faculty research projects.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

Baccalaureate degree from an accredited institution. Completion of courses equivalent to:

CSD 3710	Introduction to Audiology	3
CSD 1230	Linguistics for Clinicians	3
or LING 1500	Introduction to Linguistics	
CSD 1940	Dev of Spoken Language	3
CSD 2010	Speech & Hearing Science	0 or 4
CSD 1220	Introduction to Phonetics	3
or LING 2510	Phonetics	
CSD 3810	Intro Cognitive Neuroscience (or an equivalent Human Neuroanatomy course)	3
College Level Statistics		3

Applicants must complete all of the above prerequisite courses before entering the program. Students are also required to complete 25 observation hours obtained according to guidelines provided by the American Speech-Language-Hearing Association. Students must complete these 25 observation hours before they begin their graduate program. Additionally, the American Speech-Language-Hearing Association Standard IV-A for certification requires evidence of previous course work in the biological sciences, physical sciences (i.e. physics or chemistry), statistics, and the social/behavioral sciences.

**Minimum Degree Requirements**

All students are required to complete mandatory course work in pursuit of the M.S. in Communication Sciences and Disorders. This course work includes content areas met by the following CSD courses:

CSD 6430	Augmentative Communication	3
CSD 6200	Clinic Preparation&Management	3
CSD 6210	Clinic Practicum Study 1	1

CSD 6220	Clinic Practicum Study 2	2
CSD 6230	Clinic Practicum Study 3	3
CSD 6240	Clinic Practicum Study 4	2
CSD 6250	Clinic Practicum Study 5	3
CSD 6260	Clinic Practicum Supplemental (optional)	1
CSD 6290	School Based Issues for SLPs	1
CSD 6330	Assmt & Treatmt of Stuttering	3
CSD 6300	Spch Snd Disorders in Children	3
CSD 6310	Language Disorders	3
CSD 6320	Seminar Lang/Lrng Disabilities	3
CSD 6340	Swallowing Disorders	3
CSD 6350	Neurogenic Comm. Disorders 1	3
CSD 6460	Voice Disorders	3
CSD 6450	Neurogenic Comm. Disorders 2	3
CSD 6720	Hearing Rehab for SLPs	3
NH 6899	Fundamentals Critical Inquiry	3
Masters thesis (CSD 6391), research project (CSD 6385), or non-thesis sequence of courses focusing on clinical systematic reviews (CSD 6381 and CSD 6385)		3-6
Total Credits		51-54

In total, 48-51 credits of graduate course work are required for the non-thesis track and 51-54 credits of graduate course work for students who write a thesis. Equivalent graduate-level course work, up to nine credits, may be waived if approved by the graduate program coordinator, reducing the total number of in-residence credits needed for completion of the program.

OPTION A (THESIS)	
The student will complete 45-48 credits of graduate-level courses and 6 additional credits (CSD 6391) for conducting the research leading to an M.S. thesis	
OPTION B (NON-THESIS)	
Students choosing the non-thesis option will complete 45-48 credits required for the degree, and at least 3 credits of non-thesis research (CSD 6381 and/or CSD 6385 – research project or Systematic Reviews course)	

**Comprehensive Examination**

The portfolio is used by this department as an alternative form of Comprehensive Examination; it provides a rich demonstration of the students’ achievements in their course of study. Each student’s portfolio includes a set of four reflective essays as well as academic and clinical artifacts selected by the student to reflect growth in specific areas of academic and clinical knowledge and skills required by the American Speech-Language-Hearing Association and the Vermont Department of Education. Other aspects of growth to

be demonstrated include increasing rigor in critical thinking and methods of inquiry for research and its application.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Students will be admitted to candidacy when the following criteria have been met:

- A minimum of 375 hours of supervised clinical practicum.
- 25 hours of guided clinical observation.
- 36 graduate credits and completion of a written comprehensive examination in the form of a portfolio.

## COMMUNITY DEVELOPMENT AND APPLIED ECONOMICS

<https://www.uvm.edu/cals/cdae>

### OVERVIEW

The Department of Community Development and Applied Economics (CDAE) supports sustainable local and international community development through interdisciplinary research, education, and outreach that serves the public interest. CDAE offers a Master of Science degree in Community Development and Applied Economics. Expertise among the CDAE faculty advisors includes economics (both ecological and neoclassical), rural sociology, food systems, applied econometrics, agricultural economics, policy and governance, consumer affairs, renewable energy, and community entrepreneurship. CDAE's research and outreach is both global (e.g. Agroecology, Farmer Livelihoods and Ecosystem Services in Brazil's Atlantic Forest) and local (e.g., dairy farming and farmers' markets in Vermont) and graduate students benefit from close affiliation with other research institutions at the University of Vermont and beyond.

### DEGREES

Community Development and Applied Economics AMP (p. 113)  
Community Development and Applied Economics M.S (p. 114).  
Community Resilience and Planning CGS (p. 115)

### FACULTY

**Aiyar, Anaka;** Assistant Professor, Department of Community Development and Applied Economics; PhD, University of California-Riverside

**Ament, Joseph;** Assistant Professor, Department of Community Development and Applied Economics; PhD, University of Vermont

**Baker, Daniel H.;** Associate Professor Emeritus, Department of Community Development and Applied Economics; PHD, University of Vermont

**Conner, David S.;** Professor, Department of Community Development and Applied Economics; PHD, Cornell University

**Farley, Joshua C.;** Professor, Department of Community Development and Applied Economics; PHD, Cornell University

**Heiss, Sarah Noel;** Associate Professor, Department of Community Development and Applied Economics; PHD, Ohio University

**Koliba, Christopher J.;** Professor Emeritus, Department of Community Development and Applied Economics; PHD, Syracuse University

**Kolodinsky, Jane Marie;** Professor Emeritus, Department of Community Development and Applied Economics; PHD, Cornell University

**Mays, Kate;** Assistant Professor, Department of Community Development and Applied Economics; PhD, Boston University

**McMahon, Edward;** Adjunct Associate Professor, Department of Community Development and Applied Economics; EDD, University of Vermont

**McRae, Glenn;** Adjunct Lecturer, Department of Community Development and Applied Economics; PHD, Union Institute and University

**Reynolds, Travis;** Associate Professor, Department of Community Development and Applied Economics, PHD, University of Washington

**Shrum, Trisha R.;** Assistant Professor; Department of Community Development and Applied Economics; PHD, Harvard University – John F. Kennedy School of Government

**Tobin, Daniel;** Associate Professor, Department of Community Development and Applied Economics; PHD, Pennsylvania State University

**Wang, Qingbin;** Professor, Department of Community Development and Applied Economics; PHD, Iowa State University

**Zia, Asim;** Professor, Department of Community Development and Applied Economics; PHD, Georgia Institute of Technology

## COMMUNITY DEVELOPMENT AND APPLIED ECONOMICS AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269).

### OVERVIEW

The Accelerated Master's Entry Pathway in Community Development and Applied Economics (AMP-CDAE) offers University of Vermont students the opportunity to secure a sound undergraduate and graduate program of study in 5 rather than a minimum of 6 years. The program closely integrates both programs of study, and enhances competitiveness in a marketplace stressing broad undergraduate and focused graduate education. The AMP-CDAE welcomes students majoring in one of CDAE's undergraduate majors, as well as related majors such as environmental studies, food systems, and other social science disciplines. Application to the program is typically made during a student's junior year.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF MASTER OF SCIENCE

The Accelerated Master's Entry Pathway requires that students fulfill the same entrance requirements as for all candidates for the Master of Science in Community Development and Applied Economics and be accepted in order to matriculate and advance to candidacy. The following criteria must be met to gain admission to the AMP-CDAE:

- A cumulative grade point average of 3.0 at the beginning of the second semester the candidate's junior year
- 3 letters of recommendation attesting to the candidate's academic performance
- A strong motivation and academic potential for graduate work articulated in a statement of purpose

Required academic prerequisites include course work in microeconomics and calculus, equivalent to UVM courses ECON 1450 Principles of Microeconomics and MATH 1212 Fundamentals of Calculus I. Other courses, including non-UVM courses or a CLEP exam, may be considered. Students must complete at least one of the prerequisites prior to enrolling in the AMP-CDAE. The remaining prerequisite must be completed within the first year of enrollment.

Completed applications will be reviewed in the month of May and a formal decision on admission will be rendered by the CDAE faculty by no later than May 15 of each year to afford potential new AMP-CDAE students the opportunity to enroll in Summer Session.

Following formal Graduate College admission to the Accelerated Master's Pathway, up to 9 credits of approved graduate course work may be taken that may be counted toward both the undergraduate and graduate degree requirements.

**MINIMUM DEGREE REQUIREMENTS**

The degree requires a total of 36 credits, of which 27 to thirty are from advanced courses in CDAE and other related fields, plus a minimum of 6 credits of thesis research. A written comprehensive examination and an oral defense of a thesis are also required. A student's thesis research is often an integral part of faculty-led, ongoing research projects in CDAE.

Students in the graduate program must have a 3.00 grade point average to remain a degree candidate. A student may be dismissed from the Graduate College if two or more grades below a "B" are received.

Five courses and graduate research seminars are required:

CDAE 6510	Research & Evaluation Methods	3
CDAE 6540	Advanced Microeconomics	3
CDAE 6920	Graduate Seminars	1
Approved statistics/research course (options include CDAE 6350, PA 6080, PA 6110, EDRM 6310, and NR 6430)		3
CDAE 6260	Community Economic Development	3
CDAE 6590	Applied Econometrics	3
CDAE 6391	Master's Thesis Research	6+

**COMPREHENSIVE EXAMINATION**

A written examination must be completed by the student's third semester of full-time enrollment. Each thesis committee member will provide one question to the candidate and the committee will specify

the amount of time that the candidate has to submit their responses. The intent of the comprehensive exam is to guide the student toward successful completion of the oral and written thesis defense.

**REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF SCIENCE**

Successful completion of any prerequisite courses, and at least 15 graded graduate credits earned in compilation of the graduate GPA, including all core courses. A GPA of 3.00 or greater is also required.

**COMMUNITY DEVELOPMENT AND APPLIED ECONOMICS M.S.**

All students must meet the Requirements for the Master's Degree (p. 270).

**OVERVIEW**

The Department of Community Development and Applied Economics (CDAE) supports sustainable local and international community development through interdisciplinary research, education, and outreach that serves the public interest. CDAE offers a Master of Science degree in Community Development and Applied Economics. Expertise among the CDAE faculty advisors includes economics (both ecological and neoclassical), rural sociology, food systems, applied econometrics, agricultural economics, policy and governance, consumer affairs, renewable energy, and community entrepreneurship. CDAE's research and outreach is both global (e.g. Agroecology, Farmer Livelihoods and Ecosystem Services in Brazil's Atlantic Forest) and local (e.g., dairy farming and farmers' markets in Vermont) and graduate students benefit from close affiliation with other research institutions at the University of Vermont and beyond.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

Required academic prerequisites include course work in microeconomics and calculus, equivalent to UVM courses ECON 1450 Principles of Microeconomics and MATH 1212 Fundamentals of Calculus I. Other courses, including non-UVM courses or a CLEP exam, may be considered. Students must complete at least 1 of the prerequisites prior to enrolling. The remaining prerequisite must be completed within the first semester of enrollment.

- GPA = 3.00 or equivalent from bachelor's degree.
- Completion of an acceptable Calculus and Microeconomics course by the end of the first semester of enrollment.
- Graduate Record Examination (GRE) scores are optional.
- Three letters of recommendation attesting to the candidate's academic potential for graduate work and motivation for pursuing the M.S. in CDAE.
- Resume or Curriculum Vitae
- To be considered for funding, applicants are invited to submit (i) a writing sample, (ii) evidence of research experience (e.g., term papers, class projects, research reports and/or other descriptions



of past research experience from academic or professional lives) and/or GRE scores.

- For international students whose native language is not English or who have not completed undergraduate degrees in English, scores from the Test of English as a Foreign Language (TOEFL), the English Language Testing System (IELTS), or Duolingo must be submitted.

**Minimum Degree Requirements**

The degree requires a total of 36 credits, of which 27 to 30 are from advanced courses in CDAE and other related fields, plus a minimum of 6 credits of thesis research. A written comprehensive examination and an oral defense of a thesis are also required. A student's thesis research is often an integral part of faculty-led, ongoing research projects in CDAE.

Students in the graduate program must have a 3.00 grade point average to remain a degree candidate. A student may be dismissed from the Graduate College if 2 or more grades below a "B" are received.

Five courses and graduate research seminars are required:

CDAE 6510	Research & Evaluation Methods	3
CDAE 6540	Advanced Microeconomics	3
CDAE 6920	Graduate Seminars (1 credit per semester, taken 3 semesters)	1
Approved statistics/research course (options include CDAE 6350, PA 6080, PA 6110, EDRM 6310, and NR 6430)		3
CDAE 6260	Community Economic Development	3
CDAE 6590	Applied Econometrics	3
CDAE 6391	Master's Thesis Research	6+

**Comprehensive Examination**

A written examination must be completed by the student's third semester of full-time enrollment. Each thesis committee member will provide one question to the candidate and the committee will specify the amount of time that the candidate has to submit their responses. The intent of the comprehensive exam is to guide the student toward successful completion of the oral and written thesis defense.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

Successful completion of any prerequisite courses, and at least 15 graded graduate credits earned in compilation of the graduate GPA, including all core courses. A GPA of 3.00 or greater is also required.

**COMMUNITY RESILIENCE AND PLANNING CGS**

All students must meet the Requirements for the Certificates of Graduate Study (p. 269).

**OVERVIEW**

The 18-credit Certificate of Graduate Studies in Community Resilience and Planning (CRP) provides masters, doctoral and certificate of graduate study-only students with the skills and knowledge needed to lead and guide communities through periods of change brought on by natural, economic, social and political shocks and disruptions. Students completing this certificate will develop a deep understanding of the current threats and opportunities facing communities within Vermont, the United States, and across the globe. With a core set of courses designed to provide students with a survey of the community resilience and sustainability field, a foundation in community economic development and research methods, and a capstone experience focusing on system dynamics and strategic management and planning, the CRP prepares students with the tools needed to lead and assist communities through times of crisis and transition.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Certificate of Graduate Study**

- Undergraduate transcripts showing completion of bachelor's degree.
- Resume or Curriculum Vitae.
- Evidence of at least 1 college-level course in statistics.
- Matriculated students in existing masters or doctoral programs will be required to have their program advisor sign off.
- There are no GRE requirements for acceptance into this certificate program.
- International students must meet UVM's minimum English proficiency requirements.

**Minimum Degree Requirements**

18 Credits including the following:

Core Courses:		
PA 6170	Systems Anly & Strategic Mgmt	3
CDAE 6260	Community Economic Development	3
CDAE 6510	Research & Evaluation Methods	3
In consultation with their advisor, students will select 3 electives from a list of Domains of Application courses and Methods courses		9

**COMPLEX SYSTEMS AND DATA SCIENCE**

<https://www.uvm.edu/cems>

**OVERVIEW**

The College of Engineering and Mathematical Sciences provides an educational program in Complex Systems and Data Science (CSDS) that includes education offerings at three levels:

1. A 5-course Graduate Certificate in Complex Systems that may be taken by any graduate student at UVM to augment their degree.

2. An M.S. in CSDS which is a 2-year degree with optional disciplinary tracks, and which UVM undergraduates may initiate through an Accelerated Master's Program.
3. A Ph.D. in CSDS which will allow students to fully develop a deep portfolio of published research, thereby opening the door to high level research positions in, for example, government, industry, or academia.

The educational program naturally complements UVM's undergraduate degree in Data Science but also thematically connects with many fields across the university.

The program's overall goal is to help students become protean data scientists with eminently transferable skills. Students are provided with a broad training in computational and theoretical techniques for (1) describing and understanding complex natural and sociotechnical systems, enabling them to then, as possible, (2) predict, control, manage, and create such systems. Students will be trained in: Industry standard methods of data acquisition, storage, manipulation, and curation; visualization techniques, with a focus on building high quality web-based applications; finding complex patterns and correlations through, for example, machine learning and data mining; powerful ways of hypothesizing, searching for, and extracting explanatory, mechanistic stories underlying complex systems—not just how to use black box techniques; combining the formulation of mechanistic models (e.g., toy physics models) with genetic programming.

## DEGREES

Complex Systems and Data Science AMP (p. 116)

Complex Systems and Data Science CGS (p. 117)

Complex Systems and Data Science M.S. (p. 118)

Complex Systems and Data Science Ph.D. (p. 119)

## FACULTY

**Allgaier, Nicholas;** Assistant Professor, Department of Psychiatry; Ph.D., University of Vermont

**Bagrow, James;** Associate Professor, Department of Mathematics and Statistics; PHD, Clarkson University

**Bongard, Joshua C.;** Professor, Department of Computer Science; PHD, University of Zurich

**Cheney, Nicholas A.;** Assistant Professor, Department of Computer Science; PHD, Cornell University

**Danforth, Chris;** Professor, Department of Mathematics and Statistics; PHD, University of Maryland College Park

**Dodds, Peter Sheridan;** Professor, Department of Computer Science; PHD, Massachusetts Institute of Technology

**Galford, Gillian Laura;** Research Associate Professor, Rubenstein School of Environment and Natural Resources; PHD, Brown University

**Garavan, Hugh P.;** Professor, Department of Psychiatry; PHD, Bowling Green State University

**Harp, Randall;** Associate Professor, Department of Philosophy; PHD, Stanford University

**Hébert-Dufresne, Laurent;** Associate Professor, Department of Computer Science; PHD, Université Laval, Québec, Canada

**Lovato, Juniper;** Research Assistant Professor, Department of Computer Science; PhD, University of Vermont

**Niles, Meredith;** Associate Professor, Department of Nutrition and Food Sciences; PHD, University of California-Davis

**Patania, Alice;** Assistant Professor, Department of Mathematics and Statistics; PHD, Politecnico di Torino

**Pespeni, Melissa H.;** Assistant Professor, Department of Biology; PHD, Stanford University

**Price, Matthew;** Associate Professor, Department of Psychological Science; PHD, Georgia State University

**Ricketts, Taylor H.;** Professor, Rubenstein School of Environment and Natural Resources; PHD, Stanford University

**Rizzo, Donna Marie;** Professor, Department of Civil and Environmental Engineering; PHD, University of Vermont

**Wshah, Safwan;** Associate Professor, Department of Computer Science; PHD, State University of New York at Buffalo

**Young, Jean-Gabriel;** Assistant Professor, Department of Computer Science, PHD, Université Laval

## COMPLEX SYSTEMS AND DATA SCIENCE AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

The accelerated M.S. in Complex Systems and Data Science (CSDS) is a 5-year degree coupled with a relevant bachelor's degree with optional disciplinary tracks. Our central goal is to help students become protean data scientists with eminently transferable skills. We provide students with a broad training in computational and theoretical techniques for (1) describing and understanding complex natural and sociotechnical systems, enabling them to then, as possible, (2) predict, control, manage, and create such systems. Students will be trained in: Industry standard methods of data acquisition, storage, manipulation, and curation; Visualization techniques, with a focus on building high quality web-based applications; Finding complex patterns and correlations through, for example, machine learning and data mining; Powerful ways of hypothesizing, searching for, and extracting explanatory, mechanistic stories underlying complex systems—not just how to use black box techniques; Combining the formulation of mechanistic models (e.g., toy physics models) with genetic programming.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF MASTER OF SCIENCE FOR ACCELERATED STUDENTS

To be eligible for the Accelerated Master's Entry Pathway, a student must be a declared computer science, mathematics, or statistics B.S. major, and have identified a Complex Systems faculty sponsor. Students need to apply early (before the second semester of their junior year) to have time to plan two graduate level courses that can be used toward both their bachelor's and graduate (M.S.) degree.

These credits must be taken after formal admission to the graduate program. Other requirements include a GPA typically higher than 3.0 overall. All students must meet the Graduate college requirements for the Accelerated Master’s Degree Pathway. There is no GRE requirement.

**MINIMUM DEGREE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE**

A total of 30 credits, distributed as shown below:

Common Core (3 Credits Each)		12
CSYS 6701	Principles of Complex Systems 1 (Include individual and/or team projects)	3
or MATH 6701	Principles of Complex Systems 1	
CSYS 6020	Modeling Complex Systems (Include individual and/or team projects)	3
or CS 6020	Modeling Complex Systems	
CSYS 5870	Data Science I - Experience	3
or STAT 5870	Data Science I - Experience	
or CS 5870	Data Science I - Experience	
1 of the following 3 courses:		3
CSYS/MATH 6713	Principles of Complex Systems 2	
CSYS/CS 6990	Special Topics (Modeling Complex Systems II)	
STAT 6870	Data Science II	
Electives		9
6 credits of Complex Systems and/or Data Science Electives		6
3 credits of an advisor approved course		3
Path Specific		9
Coursework only: 9 credits of either additional Complex Systems and Data Science courses or an elective path (Biomedical Systems, Distributed Systems, Energy Systems, Environmental Systems, Evolutionary Robotics, Policy Systems, or Self-designed named disciplinary path (requires approval of the CSDS advisor))		
Coursework and project: 3 to 6 credits of project (CSYS 6392) plus additional 3 to 6 credits of course work		
Coursework and thesis: 6 to 9 credits of thesis research (CSYS 6391) plus additional 3 credits of course work if needed.		

Threaded throughout their courses, a desired central outcome of each Master’s student’s training will be their development of a data-intensive, high design portfolio of interactive online visualizations. Students will have many opportunities to work with faculty, researchers, institutions, and corporations, on meaningful, important real-world data sets, drawn from engineering systems, neuroscience, society through the lens of social media, and more. Beyond being a key training mechanism, we envisage these portfolios—in the manner of, for example, a traditional engineering design or artist’s set of works

—will be instrumental in students achieving outstanding positions in their chosen fields.

**comprehensive exam**

Students must demonstrate mastery of the material by one of four possible routes: an oral exam, a written exam, a paper, or a portfolio. The exact format will be decided upon by the Curriculum Committee in consultation with the student. The Curriculum Committee will also designate three relevant faculty who will create the exam and or specify the format and content area of the paper and assess the student’s performance.

**REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF SCIENCE**

Successful completion of the comprehensive exam and all required coursework.

**COMPLEX SYSTEMS AND DATA SCIENCE CGS**

All students must meet the Requirements for the Certificates of Graduate Study (p. 269)

**OVERVIEW**

In complex physical, biological, social and engineered systems, the self-organizing dynamics of interacting entities (be they molecules, cells, genes, bacteria, plants, birds, humans, nanobots, electrical substations, etc.) give rise to emergent system properties (such as consciousness, cancer, global warming, societies, etc.). Fortunately, many essential properties of such systems may be studied, modeled and understood using similar approaches, regardless of the application domain. Learning these cutting-edge complex systems approaches can help students move to the forefront of their field and stand out when competing in a tough job market.

The Certificate in Complex Systems may be earned either in conjunction with or independent of a UVM graduate degree program. In the latter case, credits earned with a grade of B or better may transfer into a graduate degree program following completion of the certificate. All policies regarding transfer credit apply.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of certificate of graduate study**

A Bachelor’s degree and prior coursework in calculus, statistics, and computer programming (in any language, but prior Matlab and Python is helpful) are the minimum prerequisites. Linear algebra is recommended but not required. Specific electives may have additional prerequisites.

**Minimum Degree Requirements**

The Certificate of Graduate Study in Complex Systems requires a total of 15 credits, distributed as shown below:

CSYS/MATH 6701	Principles of Complex Systems 1	3
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CSYS/CS 6020	Modeling Complex Systems	3
CSYS 5870	Data Science I - Experience	3
or STAT 5870	Data Science I - Experience	
or CS 5870	Data Science I - Experience	
Complex Systems and Data Science Electives		6
6 credits of approved Complex Systems and/or Data Science Electives taken at the graduate level. These include all courses at the 5000- or 6000-level with a CSYS prefix, many courses with a CS, Math, or Stat prefix, and miscellaneous relevant domain-specific courses in areas such as engineering, public administration, biology, plant biology, physics, etc. All electives must be approved by the graduate coordinator.		

## COMPLEX SYSTEMS AND DATA SCIENCE M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The M.S. in Complex Systems and Data Science is a 2-year degree with optional disciplinary tracks. UVM undergraduates may incorporate the degree as part of an Accelerated Master's Program. Our central goal is to help students become protean data scientists with eminently transferable skills (read: super powers). We provide students with a broad training in computational and theoretical techniques for (1) describing and understanding complex natural and sociotechnical systems, enabling them to then, as possible, (2) predict, control, manage, and create such systems. Students will be trained in: industry standard methods of data acquisition, storage, manipulation, and curation; visualization techniques, with a focus on building high quality web-based applications; finding complex patterns and correlations through, for example, machine learning and data mining; powerful ways of hypothesizing, searching for, and extracting explanatory, mechanistic stories underlying complex systems—not just how to use black box techniques; and combining the formulation of mechanistic models (e.g., toy physics models) with genetic programming.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF MASTER OF SCIENCE

The program serves students from a wide variety of backgrounds and therefore deliberately keep the prerequisites to a minimum. Students must have a Bachelor's degree in a relevant field and prior coursework or be able to establish competency in calculus, computer programming, data structures, linear algebra, and probability and statistics. Please note that some electives have additional prerequisites. General GRE scores are not required.

We offer 3 courses for students who may be lacking in these prerequisites:

1. CS 2240 Data Structures
2. MATH 2522 Applied Linear Algebra, and
3. STAT 1410 Statistical Methods I

These courses cannot be taken for graduate credit.

#### MINIMUM DEGREE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE

A total of 30 credits, distributed as shown below:

Common Core (3 Credits Each)		9
CSYS 6701	Principles of Complex Systms 1	3
or MATH 6701	Principles of Complex Systms 1	
CSYS 6020	Modeling Complex Systems	3
or CS 6020	Modeling Complex Systems	
CSYS 5870	Data Science I - Experience	3
or STAT 5870	Data Science I - Experience	
or CS 5870	Data Science I - Experience	
1 of the following 3 courses:		3
CSYS 6713	Principles of Complex Systms 2	3
or MATH 6713	Principles of Complex Systms 2	
CSYS 6990	Special Topics (Modeling Complex Systems II)	3
or CS 6990	Special Topics	
STAT 6870	Data Science II	3
Electives		9
6 credits of Complex Systems and/or Data Science Electives		6
3 credits of an advisor approved course		3
Path Specific		9
The degree program can be completed with one of three options:		
Coursework only: 9 credits of either additional Complex Systems and Data Science courses or an elective path (Biomedical Systems, Distributed Systems, Energy Systems, Environmental Systems, Evolutionary Robotics, Policy Systems, or Self-designed named disciplinary path (requires approval of the CSDS advisor))		
Coursework and project: 3 to 6 credits of project (CSYS 6392) plus additional 3 to 6 credits of course work		
Coursework and thesis: 6 to 9 credits of thesis research (CSYS 6391) plus additional 3 credits of course work if needed.		

Threaded throughout the coursework, a desired central outcome of each Master's student's training will be their development of a data-intensive, high design portfolio of course projects, research, and /or data visualizations. Students will have many opportunities to work with faculty, researchers, institutions, and corporations, on meaningful, important real-world data sets, drawn from engineering systems, neuroscience, society through the lens of social media, and

more. Beyond being a key training mechanism, we envisage these portfolios—in the manner of, for example, a traditional engineering design or artist's set of works —will be instrumental in students achieving outstanding positions in their chosen fields."

### Comprehensive Exam

Students must demonstrate mastery of the material by one of four possible routes: an oral exam, a written exam, a paper, or a portfolio. The exact format will be decided upon by the Curriculum Committee in consultation with the student. The Curriculum Committee will also designate three relevant faculty who will create the exam and or specify the format and content area of the paper and assess the student's performance.

### REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF SCIENCE

Successful completion of the comprehensive exam and all required coursework.

## COMPLEX SYSTEMS AND DATA SCIENCE PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

The Ph.D. in Complex Systems and Data Science provides a pan-disciplinary academic training for graduate students working on complex systems problems across all quantitative sciences. While the Ph.D. resides in the College of Engineering and Mathematical Sciences (CEMS), thereby providing a strong computational and theoretical training, the program's scope is science-wide, encompassing natural, artificial, and sociotechnical systems. Depending on their chosen area of focus, students will work within and across research groups (potentially outside of CEMS) and be strongly connected with other students through co-location and regular student-led meetings and events. Students will be expected to generate and defend a scientifically important and socially meaningful body of work generally resulting in a minimum of three peer-reviewed journal papers and a dissertation. All students will receive a core training in empirical, computational, and theoretical methods for (1) describing and understanding complex systems thereby enabling them to, where possible, (2) predict, control, manage, and create such systems. Coursework will share a common core with the allied program Masters in Complex Systems and Data Science which include: (a) data acquisition, storage, manipulation, and curation; visualization techniques including state- of-the-art approaches to building high quality web-based applications; (b) finding complex patterns and correlations through, for example, machine learning; and (c) powerful ways of hypothesizing, searching for, and extracting explanatory, mechanistic stories underlying complex systems—not just how to use black box techniques.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A Bachelor's degree and preferably a Master's degree in a relevant field and prior coursework in computer programming, calculus, linear algebra, probability, and statistics. Training in relevant aspects of physics (e.g., statistical mechanics) will be beneficial but not required. Applicants lacking one or more of these prerequisite areas may be accepted provisionally and will be required to complete an approved program of supplementary work within their first year of study. GRE scores are not required. Applicants will be evaluated based on their potential for excellence in research, as judged from their academic background, test scores, relevant experience and letters of recommendation. Students who are most likely to succeed and thrive in the program will be admitted.

Applicants whose native language is not English or whose formal education has been conducted in a language other than English must have a Test of English as a Second Language (TOEFL) score of 90 (Internet-based test) or above or an International English Language Testing System (IELTS) score of 6.5 or above or a Duolingo score of 110 or above. To be considered for financial assistantship from the university, applicants must have an iBT TOEFL score of 100, an IELTS score of 7.0 or a Duolingo score of 120 above.

The student's Studies Committee (see below) may recommend to the Dean of the Graduate College that a student be dismissed from the program if they receive two or more grades below a B (3.00), a designation of U in Dissertation Research, or if the Studies Committee deems that they are not making satisfactory progress towards their degree requirements (for which they must be able to provide sufficient documentation).

## MINIMUM DEGREE REQUIREMENTS

### Minimum Degree Requirements

The P.hD. has 5 milestones:

1. Completion of coursework
2. The comprehensive exams
3. The dissertation proposal
4. At least 2 published or accepted peer-reviewed publications prior to defending their dissertation, with a third at least in peer-review. These publications must be deemed of sufficient breadth, depth, and quality by their Graduate Studies Committee
5. The written dissertation and oral defense of the dissertation

### COURSEWORK:

A minimum of 75 credits of graduate study must be approved by the students graduate studies committee and successfully completed. All students must take a minimum of 30 credits of research and 30 credits of graduate coursework, of which at least 15 must be graded and may not count towards a Master's degree (only courses with grades of B- or above are counted towards this minimum requirement and students with two grades below B are eligible for dismissal). Students may transfer credits for other universities or within UVM following

standard UVM policies. Students will need to earn a minimum 3.0 GPA to graduate.

**CORE COURSES (3 CREDITS EACH):**

CSYS 6701	Principles of Complex Systems 1	3
or MATH 6701	Principles of Complex Systems 1	
CSYS 6020	Modeling Complex Systems	3
or CS 6020	Modeling Complex Systems	
CSYS 5870	Data Science I - Experience	3
or STAT 5870	Data Science I - Experience	
or CS 5870	Data Science I - Experience	
2 of the following 3 courses:		
CSYS 6713	Principles of Complex Systems 2	3
or MATH 6713	Principles of Complex Systems 2	
CSYS 6990	Special Topics (Modeling Complex Systems II)	3
or CS 6990	Special Topics	
STAT 6870	Data Science II	3
All students are required to complete the 5 core courses, then may select their remaining coursework credits from the Complex Systems and Data Science Electives and the Concentration Track Electives in consultation with their advisor.		

Students will meet their course requirements by selecting appropriate coursework under the guidance of their studies committees. It is anticipated that most students would choose a subset of courses from a variety of complex systems and data science electives, including but not limited to:

**COMPLEX SYSTEMS AND DATA SCIENCE ELECTIVES (3 CREDITS EACH):**

Dissertation Research Credits		3 to 9 credits per semester
CSYS 5766	Gr Chaos,Fractals&Dynamcal Syst	3
CSYS 6713	Principles of Complex Systems 2	3
or MATH 6713	Principles of Complex Systems 2	
CSYS 6520	Evolutionary Computation	3
or CS 6520	Evolutionary Computation	
CEE 7920	Appld Artificial Neural Ntwrks	1-3
CSYS 7980	Applied Geostatistics	3
or STAT 7980	Applied Geostatistics	
or CEE 7980	Applied Geostatistics	
STAT 5230	Appld Multivariate Analysis	3

STAT 5290	Survivl/Logistic Regression	3
STAT 5310	Experimental Design	3
STAT 5350	Categorical Data Analysis	3
STAT 5510	Probability Theory	3
STAT 5610	Statistical Theory	3
STAT 6300	Bayesian Statistics	3
Any graduate-level course crosslisted in Complex Systems and Data Science, or other courses approved by the Complex Systems and Data Science Curriculum Committee		

Students who do not make satisfactory progress toward their Ph.D. dissertation will be offered the opportunity to switch to the M.S. program, provided they meet the standards for the M.S.

Elective Tracks for the Ph.D. in CSDS match those provided for the M.S. in CSDS:

- CSDS: Energy Systems
- CSDS: Policy Systems
- CSDS: Biomedical Systems
- CSDS: Evolutionary Robotics
- CSDS: Environmental Systems
- CSDS: Transportation Systems
- CSDS: Distributed Systems Track
- CSDS: Self-designed named disciplinary track (requires approval of the CSDS curriculum committee)

**CONCENTRATION TRACK ELECTIVES:**

Track Electives are considered relatively flexible and may be updated on a semester-by-semester basis, based on current course offerings and content and availability and may include special topics. See the Center’s website for current offerings.

**Comprehensive Examination**

Students will be tested via an extensive oral and/or written examination involving three faculty, one of whom should be their advisor. Material will cover the three core courses and/or curriculum committee approved content.

**Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy**

Successful completion of the comprehensive exam and all required coursework.

**COMPUTER SCIENCE**

<http://www.uvm.edu/~cems/cs/>

**OVERVIEW**

The Department of Computer Science offers 3 graduate programs through the Graduate College: an Accelerated Master's Program (AMP) that enables strong undergraduate students to complete computer science Bachelor's and Master's degrees in 5 years; a Master's Program (M.S.) in computer science with course work-only, project, and thesis options; and an interdisciplinary Ph.D.



program that offers study in both traditional and cross-disciplinary areas of computing. The Department also participates in the Transdisciplinary Certificate of Graduate Study in Complex Systems, and the Master's and Ph.D. degrees in Complex Systems & Data Science.

## DEGREES

Computer Science AMP (p. 121)

Computer Science M.S. (p. 122)

Computer Science Ph.D. (p. 123)

## FACULTY

**Bagrow, James;** Assistant Professor, Department of Mathematics and Statistics; PHD, Clarkson University

**Beckage, Brian;** Professor, Department of Plant Biology; PHD, Duke University

**Bongard, Joshua C.;** Professor, Department of Computer Science; PHD, University of Zurich

**Cheney, Nicholas A.;** Research Assistant Professor, Department of Computer Science; PHD, Cornell University

**Clemins, Patrick J.;** Adjunct Assistant Professor, Department of Computer Science; PHD, Marquette University

**Cockrell, R. Chase;** Assistant Professor, Department of Surgery; PHD, Iowa State University

**Danforth, Chris;** Associate Professor, Department of Mathematics and Statistics; PHD, University of Maryland College Park

**Darais, David;** Assistant Professor, Department of Computer Science; PHD, University of Maryland

**Dodds, Peter Sheridan;** Professor, Department of Mathematics and Statistics; PHD, Massachusetts Institute of Technology

**Eppstein, Margaret Jean;** Professor Emerita, Department of Computer Science; PHD, University of Vermont

**Hébert-Dufresne, Laurent;** Assistant Professor, Department of Computer Science; PHD, Université Laval, Québec, Canada

**Hibbeler, Jason;** Professor of the Practice, Department of Computer Science; PHD, University of Illinois at Urbana-Champaign

**Hines, Paul D.;** Associate Professor, Department of Electrical and Biomedical Engineering; PHD, Carnegie Mellon University

**Lee, Byung S.;** Professor, Department of Computer Science; PHD, Stanford University

**Li, Dawei ;** Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Shanghai Jiao Tong University

**Ling, Alan Chi;** Associate Professor, Department of Computer Science; PHD, University of Waterloo

**Near, Joseph P.;** Assistant Professor, Department of Computer Science; PHD, Massachusetts Institute of Technology

**Pinder, George Francis;** Professor, Department of Civil and Environmental Engineering; PHD, University of Illinois Urbana-Champaign

**Rizzo, Donna Marie;** Professor, Department of Civil and Environmental Engineering; PHD, University of Vermont

**Skalka, Christian Edward;** Associate Professor, Department of Computer Science; PHD, Johns Hopkins University

**Young, Jean-Gabriel;** Assistant Professor, Department of Computer Science, PHD, Université Laval

**Yu, Jun;** Professor, Department of Mathematics and Statistics; PHD, University of Washington Seattle

**Zia, Asim;** Professor, Department of Community Development and Applied Economics; PHD, Georgia Institute of Technology

## COMPUTER SCIENCE AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

## OVERVIEW

The Accelerated Master's Entry Pathway (AMP) in computer science allows students with strong ability and motivation to complete a bachelor's degree at UVM and a master's degree at UVM in computer science within 5 years.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Master's Students

Students enrolled in any undergraduate bachelor's degree program at UVM are eligible to apply for the computer science AMP. Following formal admission by the Graduate College to the Accelerated Master's Pathway, students may count up to 6 graduate level course work credits toward both the bachelor's and master's degrees. Another 3 graduate credits can be counted towards the master's degree while an undergraduate but cannot count towards the bachelor's degree.

Although the bachelor's degree need not be in computer science, applicants must have at least a 3.2 GPA and demonstrate that they have taken the following prerequisite courses, or have equivalent knowledge:

2 courses that treat systematic program development in a high-level language, for example:		
CS 1210	Computer Programming I	3
CS 2100	Intermediate Programming	4
1 course in computer system organization, for example:		
CS 2210	Computer Organization	3
1 course in data structures, for example:		
CS 2240	Data Struc & Algorithms	3
1 course in computability and complexity, for example:		
CS 2250	Computability & Complexity	3
2 courses in differential and integral calculus, for example:		
MATH 1234	Calculus I	4
MATH 1248	Calculus II	4
1 course in linear algebra:		

MATH 2522	Applied Linear Algebra	3
Coursework in probability and statistics, for example:		
STAT 2430	Statistics for Engineering	3
STAT 2510	Applied Probability	3

Undergraduates interested in the AMP should discuss this option with the College of Engineering & Mathematical Sciences Graduate Coordinator prior to any semester in which they wish to take courses that will apply to the master’s degree.

There is no GRE requirement for AMP students.

**Minimum Degree Requirements**

Option A (Thesis)	
30 credits, including a minimum of 21 credits of approved course work, at least 6 of which must be at the 6000-level, and a minimum of 6 credits of thesis research (CS 6391)	30
Option B (Project)	
30 credits, including a minimum of 24 credits of approved course work, at least 6 of which must be at the 6000-level, and a minimum of 3 credits of project research (CS 6392)	30
Option C (Non-Thesis)	
30 credits of approved course work, at least 6 of which must be at the 6000-level	30
All Options	
Students in all options must take 4 core Computer Science Courses, to be determined in consultation with and approval of the student’s graduate advisor and the CS graduate coordinator, depending on a student’s background and interests.	
Pass comprehensive exams covering material from the 4 approved core courses.	
Fulfill the credit requirement with approved graduate-level course work in computer science or related areas. (Only courses with grades of B- or above are counted towards course work requirements and students with 2 grades below B are eligible for dismissal.)	

**Comprehensive Examination**

Students must demonstrate mastery of the material by one of four possible routes: an oral exam, a written exam, a paper, or a portfolio. The exact format will be decided upon by the Curriculum Committee in consultation with the student. The Curriculum Committee will also designate three relevant faculty who will create the exam and or specify the format and content area of the paper and assess the student’s performance.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

Passing of the comprehensive exam.

**COMPUTER SCIENCE M.S.**

All students must meet the Requirements for the Master's Degree (p. 270)

**OVERVIEW**

The M.S. program in Computer Science offers thesis, project, and course work only options. Acceptance into thesis or project options is conditional upon the student finding an eligible advisor who agrees to supervise the thesis or project. Please see the Department of Computer Science website for current research interests of the department’s faculty.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

A bachelor's degree in computer science or a related discipline is required for admission. Students should also demonstrate that they have taken the following courses or have equivalent knowledge:

2 courses that treat systematic program development in a high-level language, for example:		
CS 1210	Computer Programming I	3
CS 2100	Intermediate Programming	4
1 course in computer system organization, for example:		
CS 2210	Computer Organization	3
1 course in data structures, for example:		
CS 2240	Data Struc & Algorithms	3
1 course in computability and complexity, for example:		
CS 2250	Computability& Complexity	3
2 courses in differential and integral calculus, for example:		
MATH 1234	Calculus I	4
MATH 1248	Calculus II	4
1 course in linear algebra:		
MATH 2522	Applied Linear Algebra	3
Coursework in probability and statistics, for example:		
STAT 2430	Statistics for Engineering	3
STAT 2510	Applied Probability	3

Applicants who have strong academic records but lack 1 or more of these prerequisites may be accepted provisionally. Provisionally accepted students will be required to complete an approved program of remedial work within their first year of study.

Applicants whose native language is not English or whose formal education has been conducted in a language other than English must have a Test of English as a Second Language (TOEFL) score of 90 (Internet-based test) or above or an International English

Language Testing System (IELTS) score of 6.5 or above. To be considered for financial assistantship from the university, applicants must have an iBT TOEFL score of 100 or an IELTS score of 7.0 or above.

### Minimum Degree Requirements

Option A (Thesis)	
30 credits, including a minimum of 21 credits of approved course work, at least 6 of which must be at the 6000-level, and a minimum of 6 credits of thesis research (CS 6391)	30
Option B (Project)	
30 credits, including a minimum of 24 credits of approved course work, at least 6 of which must be at the 6000-level, and a minimum of 3 credits of project research (CS 6392)	30
Option C (Non-Thesis)	
30 credits of approved course work, at least 6 of which must be at the 6000-level	30
All Options	
Students in all options must take 4 other core Computer Science Courses, to be determined in consultation with and approval of the student's graduate advisor and the CS graduate coordinator, depending on a student's background and interests	
Pass comprehensive exams covering material from the 4 approved core courses	
Fulfill the credit requirement with approved graduate-level course work in computer science or related areas. (Only courses with grades of B- or above are counted towards course work requirements and students with 2 grades below B are eligible for dismissal.)	

### Comprehensive Examination

Students must demonstrate mastery of the material by one of four possible routes: an oral exam, a written exam, a paper, or a portfolio. The exact format will be decided upon by the Curriculum Committee in consultation with the student. The Curriculum Committee will also designate three relevant faculty who will create the exam and or specify the format and content area of the paper and assess the student's performance.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Passing of the comprehensive examination.

## COMPUTER SCIENCE PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

The interdisciplinary Ph.D. program in computer science offers study in both traditional and cross-disciplinary areas in computing. Please see the departmental website for current research interests of the department's faculty.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A Bachelor's degree is required of all applicants. Applicants will be evaluated based on their potential for excellence in research, as judged from their academic background, relevant experience and letters of recommendation. We admit students who we believe are most likely to succeed and thrive in the program.

No students are admitted unless a computer science graduate advisor has agreed to supervise them; thus, all applicants are strongly encouraged to contact potential advisors as soon as they have applied. All eligible graduate advisors are listed on the departmental website, along with their research areas and links to their websites.

Applicants who have strong academic records in a discipline other than computer science and lack an acceptable computer science background (normally including courses in Data Structures (e.g. CS 2240), Computer Organization (e.g., CS 2210), and Intro to Computability and Complexity (e.g., CS 2250)) may be accepted provisionally. Provisionally accepted students will be required to complete an approved program of remedial work within their first year of study.

Applicants whose native language is not English or whose formal education has been conducted in a language other than English must have a Test of English as a Second Language (TOEFL) score of 90 (Internet-based test) or above or an International English Language Testing System (IELTS) score of 6.5 or above. To be considered for financial assistantship from the university, applicants must have an iBT TOEFL score of 100 or an IELTS score of 7.0 or above.

### Minimum Requirements for the Degree of Doctor of Philosophy

75 credits of graduate study at the 5000-level or above	75
A minimum of 30 credits of course work in CS, CSYS, or other areas approved by the student's advisor, at least 9 of which must be at the 6000- or 7000-level, and 15 of which must be graded and may not count towards a master's degree	30
A minimum of 30 credits of Doctoral Dissertation Research	30
Pass the oral Comprehensive Exam in three topical areas	

A student's doctoral program consists of:

- gaining a sound breadth of knowledge in computer science, primarily through course work
- gaining appropriate depth in a specific research area and posing an appropriate original research problem
- completing the research and documenting that research in a dissertation

The completion of these stages is marked by:

- the comprehensive exam demonstrates breadth of knowledge in computer science

- the dissertation proposal describes the current state-of-the-art in a particular research area and the particular research problem the student proposes to tackle
- the written dissertation and oral defense document the original research

Beyond research and course work, the student must gain appropriate experience in teaching, programming, and communicating technical ideas, both orally and in writing. The student must have at least 2 peer-reviewed publications accepted prior to defending their dissertation.

### Comprehensive Examination

All students enrolled in the UVM CS Ph.D. program must pass the Ph.D. comprehensive exams, regardless of whether they received their M.S. degree at UVM. The examiners are Computer Science graduate faculty members appointed by the student's advisor. The oral exam is a single-session exam, and aims to examine a student's breadth of knowledge in selected topical areas. The topical areas and examiners on this oral exam committee will be determined by the student and their advisor, with approval by the Graduate Coordinator. The specific policy on the oral examination procedure is administered by the Graduate Coordinator.

On the first try, the examination committee will award students one of the following 3 outcomes to the exam:

1. Pass at the Ph.D. level
2. Pass at the M.S. level with opportunity for at most 1 retake (to try for a Ph.D. level pass)
3. Fail with opportunity for at most 1 retake

If a student retakes the comprehensive exam, the examination committee will award students one of the following 3 outcomes to the retake:

1. Pass at the Ph.D. level
2. Pass at the M.S. level without further opportunity to retake at the Ph.D. level
3. Fail without opportunity for retake at the Ph.D. level

Ph.D. students who pass their Ph.D. comprehensive exams at the M.S. level but not at the Ph.D. level may, if desired, complete any remaining requirements to complete an M.S., but are not allowed to advance to candidacy for the Ph.D.

Each student's advisor will approve an appropriate timeframe of oral exams for a given student based on their individual circumstances. It is then up to the student to schedule their exams within the agreed-upon timeframe. While individual circumstances may vary, normal expectations are as follows:

- Ph.D. students are normally expected to take oral exams by the end of their second year of full-time Ph.D. graduate study (part-time students may take longer).
- A student who needs to retake their oral exams is expected to do so within 6 months of their first attempt.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Before advancing to candidacy, the student must:

- Demonstrate satisfactory performance in a schedule of courses of at least 15 credits of graduate course work at UVM, as approved by the student's advisor
- Pass a comprehensive exam in areas approved by the student's advisor
- Successfully propose a dissertation topic in a public presentation
- Pass an oral exam before the student's dissertation committee in a closed session following the dissertation proposal

## COUNSELING

<https://www.uvm.edu/cess/chdf/counseling>

### OVERVIEW

The mission of the Counseling Program at the University of Vermont is to prepare students to work as counseling professionals in culturally and socially diverse school, mental health, and community settings and to act as facilitators of personal and social change.

In the Counseling Program, students have the option to enroll in a 60-credit-hour School Counseling Program, a 60-credit-hour Clinical Mental Health Counseling program or a Dual Program option consisting of 76 credits. Program requirements include 700 hours of practicum and internship in a field setting for the clinical mental health and school counseling programs. Dual students need to complete both the clinical mental health and school counseling internship requirements.

The Clinical Mental Health and School Counseling programs of the UVM Counseling Program are accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP), the national accrediting body for counselor education programs.

The specific composition of a student's program, designed with the assistance of a faculty advisor, is based on university, college, and program requirements in accordance with licensure and accreditation standards. Learning experiences consist of a balance between theory and supervised practice.

In addition to the general application procedures, a resume and a group interview are required of each qualified applicant. For a more detailed description of the program visit the Graduate Counseling website, or contact:

University of Vermont  
Graduate Counseling Program  
101A Mann Hall  
208 Colchester Avenue  
Burlington, VT 05405-1757  
(802) 656-3888  
email: [cslgprog@uvm.edu](mailto:cslgprog@uvm.edu)



**DEGREES**

Counseling AMP (p. 125)

Counseling M.S. (p. 126)

Counselor Education and Supervision Ph.D. (p. 128)

**FACULTY**

**Hausheer, Robin;** Associate Professor, Department of Counseling, Human Development and Family Science; EDD, Boise State University

**Joshi, Aishwarya P.;** Assistant Professor, Department of Counseling, Human Development and Family Science; PHD, Idaho State University

**Okech, Jane E.;** Professor; Department of Counseling, Human Development and Family Science; PHD, Idaho State University

**Smith, Lance C.;** Associate Professor; Department of Counseling, Human Development and Family Science; PHD, Syracuse University

**Thacker Darrow, Nancy E.;** Assistant Professor, Department of Counseling, Human Development and Family Science; PHD, University of Tennessee

**Welkowitz, Julie A.;** Senior Lecturer; Department of Counseling, Human Development and Family Science; PHD, University of Vermont

**COUNSELING AMP**

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

**OVERVIEW**

The Counseling AMP is offered for the School Counseling Program only. This accelerated master’s degree entry pathway (AMP) is designed to offer select UVM undergraduates from multiple disciplines the opportunity to obtain their bachelor’s degree while beginning their M.S. in Counseling, School Counseling program, during their senior year. The mission of the Counseling Program at the University of Vermont is to prepare students to work as counseling professionals in culturally and socially diverse school, settings and to act as facilitators of personal and social change. The Counseling degree, School Counseling track, is a 60 credit hour program, including 700-hours of practicum and internship in a school setting. Following admission to the Graduate College, students enrolled in the AMP can take up to 9 credits of graduate-level courses completed during their senior undergraduate year that will count towards both a bachelor’s degree and the M.S. Students in the AMP would then be expected to complete remaining M.S. requirements during a fifth and sixth year of study. Full-time graduate student status will start the fall after their undergraduate graduation and will be expected to be maintained until completion of their M.S.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

Students must apply for admission into the accelerated Master’s in counseling program in the beginning of Spring semester their

Junior year. Admission into AMP will be determined, based upon the following:

- A minimum cumulative grade point average of 3.25
- Completion of the Graduate College Application form that must include at least two letters of recommendation from UVM faculty members.

Students MUST be admitted through the Graduate College before taking any courses that will be applied to the master’s degree requirements. Students will start AMP degree coursework during Fall of their Senior year. While not required for admission, applicants are strongly encouraged to take CNSL 2010 The Helping Relationship during the spring of their Junior year or previously.

**Minimum Degree Requirements for the Degree of Master of Science**

A minimum of 60 credit hours for the School Counseling program is required. Students must also meet the UVM Graduate College requirements for the Master's Degree (p. 270).

**ACCELERATED MASTERS PATHWAY COURSES**

The 9 credits of course work for the AMP that will be taken during the student’s undergraduate Senior year should be selected from the following list:

FALL COURSES		
CNSL 6740	Counseling Theory & Practice	3
CNSL 6200	Dev. Perspectives in CNSLNG	3
SPRING COURSES		
CNSL 6400	Development Guidance in Schls	3

Additional Courses to be taken post-bachelor's:

SCHOOL COUNSELING		
CNSL 6500	Prof Issues in Counseling	3
CNSL 6750	Lab Experience in Counseling	3
CNSL 6630	Counseling Practicum	3
CNSL 6770	Diversity & Intersectionality	3
CNSL 6810	Counsel/Career&Lifestyle Dev	3
CNSL 6410	Diagnosis in School Counseling	1
CNSL 6920	Group Counseling Experience	1
CNSL 6000	Research Methods in Counseling	3
CNSL 6440	Modalities: Counsel Child & Ad	3
CNSL 6991	Counseling Internship ((School Counseling))	6
CNSL 6930	Adv Group:Theory and Practice	3
CNSL 6880	Family and Couples Counseling	3

CNSL 6420	Assessment in School CNSLNG	1
CNSL 6760	Addictions Counseling	3
CNSL 6990	Special Topics (3 credits must be Leadership for Transformational SC)	12

**Comprehensive Examination**

All students are required to successfully complete a comprehensive evaluation at the end of their studies in the UVM Counseling Program. The Level I Licensure Portfolio serves as the comprehensive evaluative tool for students in the School Counseling Program.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

At least 15 graded graduate credits with a 3.00 GPA or better, including all core courses.

**COUNSELING M.S.**

All students must meet the Requirements for the Master's Degree (p. 270)

**OVERVIEW**

There are 2 tracks of study in the Graduate Counseling Program: the school counseling program (60 credits) and the clinical mental health program (60 credits). Students may elect to enroll in both programs - the Dual Option, which is 76 credits. The Graduate Counseling Program (including all specialty programs) is accredited by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP). The school counseling program meets the requirements set by the State of Vermont Department of Education for preparing school counselors (K-12) for licensure in Vermont, and the clinical mental health counseling program meets the academic requirements set by the Vermont Board of Allied Mental Health Practitioners for preparing clinical mental health counselors for licensure in Vermont.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

Submit the following (below) to the University of Vermont Graduate Admissions Office. Please be advised that the UVM Graduate College uses an online admissions process. Applications received by January 15 will be considered for the following Fall matriculation.

- Graduate Application Form: Available on-line from the Graduate College
- Statement of Purpose: The Statement of Purpose will be reviewed for clarity of expression, grammatical construction, and insight regarding the applicant's reasons for pursuing study in the Counseling Program. The statement of purpose must also include information as to how the applicant's experience and/or reasons for study will advance the Counseling Program's mission regarding diversity, equity and inclusion.

- 3 Letters of Recommendation: Letters written by individuals who have a professional relationship with the applicant and who are well acquainted with the applicant's accomplishments and potential for becoming an effective counselor are considered valid letters of recommendation. At least one of these letters should be from an academic advisor or instructor. Please do not include letters written by personal friends or acquaintances.
- Official College Transcripts: An official college transcript of course work (undergraduate and graduate) should be submitted from every college and/or university attended.
- Professional Resume: An up-to-date resume that attests to the applicant's education, work, and volunteer experience should be included in the application packet. Work experience in counseling or in a related field is highly desired.
- Test of English as a Foreign Language (TOEFL): Applicants whose native or first language is not English must submit TOEFL (or IELTS) test scores for admission. Minimum acceptable scores for admission may be found on the Graduate College Admissions website.

After an initial review of applications, qualified applicants will be invited to participate in a group interview. The applicant will be interviewed with a small group of others who are also applying to the Counseling Program. The group interview is critical in the application process. Faculty will be looking for evidence of candidates' self-awareness, awareness of social and cultural issues, ability to communicate with others, and interest and commitment to the profession of counseling. The interview will also offer candidates an opportunity to receive information about the Counseling Program at UVM and meet other students applying to the program.

**MINIMUM DEGREE REQUIREMENTS**

The Graduate Counseling Program offers 2 specialty programs: school counseling and clinical mental health counseling. Students may also select the Dual Option which includes preparation in both specialty programs. 60 credits are required for completion of the school counseling program, 60 credits are required for the clinical mental health counseling program, and 76 credits are required for the Dual Option. Successful completion of the program is based on the demonstration of appropriate knowledge, relevant skills, and professional disposition, as well as the accumulation of credits.

School Counseling Program Course Requirements		
CNSL 6750	Lab Experience in Counseling	3
CNSL 6200	Dev. Perspectives in CNSLNG	3
CNSL 6500	Prof Issues in Counseling	3
CNSL 6740	Counseling Theory & Practice	3
CNSL 6630	Counseling Practicum	3
CNSL 6400	Development Guidance in Schls	3
CNSL 6770	Diversity & Intersectionality	3
CNSL 6920	Group Counseling Experience	1

CNSL 6000	Research Methods in Counseling	3
CNSL 6410	Diagnosis in School Counseling	1
CNSL 6420	Assessment in School CNSLNG	1
CNSL 6991	Counseling Internship (Taken twice for 6 credits total)	6
CNSL 6930	Adv Group:Theory and Practice	3
CNSL 6440	Modalities: Counsel Child & Ad	3
CNSL 6880	Family and Couples Counseling	3
CNSL 6810	Counsel/Career&Lifestyle Dev	3
CNSL 6760	Addictions Counseling	3
CNSL 6990	Special Topics (3 credits must be Leadership for Transformational SC)	12
<b>Total Credits</b>		<b>60</b>

Clinical Mental Health Program Course Requirements		
CNSL 6750	Lab Experience in Counseling	3
CNSL 6200	Dev. Perspectives in CNSLNG	3
CNSL 6500	Prof Issues in Counseling	3
CNSL 6740	Counseling Theory & Practice	3
CNSL 6630	Counseling Practicum	3
CNSL 6610	Practice of Mental Hlth Cnslng	3
CNSL 6450	Diagnosis in CMH Counseling	3
CNSL 6770	Diversity & Intersectionality	3
CNSL 6920	Group Counseling Experience	1
CNSL 6000	Research Methods in Counseling	3
CNSL 6870	Therapeutic Psychopharmacology	3
CNSL 6991	Counseling Internship (Taken more than once; 6 credits required)	6
CNSL 6930	Adv Group:Theory and Practice	3
CNSL 6440	Modalities: Counsel Child & Ad	3
CNSL 6880	Family and Couples Counseling	3
CNSL 6520	Assessment in CMH Counseling	3
CNSL 6760	Addictions Counseling	3
CNSL 6810	Counsel/Career&Lifestyle Dev	3
Counseling Elective		5
<b>Total Credits</b>		<b>60</b>

Dual Option Program Course Requirements		
CNSL 6750	Lab Experience in Counseling	3

CNSL 6200	Dev. Perspectives in CNSLNG	3
CNSL 6500	Prof Issues in Counseling	3
CNSL 6740	Counseling Theory & Practice	3
CNSL 6630	Counseling Practicum	3
CNSL 6610	Practice of Mental Hlth Cnslng	3
CNSL 6450	Diagnosis in CMH Counseling	3
CNSL 6770	Diversity & Intersectionality	3
CNSL 6920	Group Counseling Experience	1
CNSL 6000	Research Methods in Counseling	3
CNSL 6870	Therapeutic Psychopharmacology	3
CNSL 6991	Counseling Internship (4 semesters; 12 credits required)	12
CNSL 6930	Adv Group:Theory and Practice	3
CNSL 6440	Modalities: Counsel Child & Ad	3
CNSL 6880	Family and Couples Counseling	3
CNSL 6520	Assessment in CMH Counseling	3
CNSL 6760	Addictions Counseling	3
CNSL 6400	Development Guidance in Schls	3
CNSL 6810	Counsel/Career&Lifestyle Dev	3
CNSL 6990	Special Topics (3 credits must be Leadership for Transformational SC)	12
<b>Total Credits</b>		<b>76</b>

**Comprehensive Examination**

The comprehensive exam for the Graduate Counseling program consists of the oral defense examination for the clinical mental health program and the Vermont Level I Licensure Portfolio for the school counseling program. They must be completed in full by the end of the student's last semester in the program.

The oral examination is designed to be an assessment of a student's knowledge of fundamental elements of clinical mental health practice.

The exam process requires a written submission as well as a digital video recording of a clinical session at 3 points in time during the program. A standard format for the oral exam is adhered to by the orals committee and communicated in advance to the students in oral and written format.

The Vermont Level I Licensure Portfolio required by the Vermont Agency of Education is designed to be a comprehensive assessment of a student's knowledge and engagement in School Counseling practice. A standard format for the portfolio is adhered to by the portfolio reviewers and communicated in advance to the student in oral and written format.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all core courses.

**COUNSELOR EDUCATION AND SUPERVISION PH.D.**

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

**OVERVIEW**

The Ph.D. in Counselor Education and Supervision prepares counseling professionals to enhance their careers in leadership, advocacy, research and scholarship, and the education and supervision of counselors. The program is distinguished by a commitment to develop critically conscious scholar-activists in the counseling profession. Graduates are prepared for careers as: instructors of counseling in higher education settings, leadership positions and supervisors in community agencies or schools, counselors in student support programs, counseling centers in higher education settings, community settings, and/or practitioners in private counseling practice and consultation.

Graduates of this program will demonstrate an understanding of the intersectionality of diverse social, economic, and cultural factors impacting the mental health and wellbeing of global communities and the subsequent implications these factors have for the training and practice of professional counselors, counselor educators, and clinical supervisors.

The 75-credit hour program is designed for students who have completed a master’s degree in counseling or counseling-related fields. The program is designed to be completed full-time in 4 years or part-time in 6 years through face-to-face coursework and internship experiences. The program utilizes a cohort model to curate a community where students support and learn from each other. This program is designed to provide licensed or license eligible counselors with doctoral training culminating in a degree in Counselor Education and Supervision. This degree program will not lead to licensure as a psychologist. Students interested in a career as a licensed psychologist should pursue that goal via the Doctoral program in Clinical Psychology through the College of Arts and Sciences.

**SPECIFIC REQUIREMENTS**

**REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY**

To be admitted, applicants must have (a) a Master’s degree in counseling or a related field (e.g., clinical social work, clinical or school psychology); (b) 3 letters of recommendation indicating academic aptitude, clinical counseling aptitude and experience, and potential for leadership and research; (c) a personal statement with

a clear articulation of career goals related to counselor education and supervision and commitment to social justice, equity, and inclusion.

Qualified applicants will be invited to participate in an interview. The interview is critical in the application process. Faculty will be looking for evidence of candidates’ self-awareness, awareness of social and cultural issues, ability to communicate with others, and interest and commitment to the counselor education and supervision profession.

Preference will be given to applicants with certification from the National Board of Certified Counselors (NBCC), state-licensed professional counselors (LCMHC, LPC), and/or licensed/certified school counselors.

**MINIMUM DEGREE REQUIREMENTS**

75 Credit Hour Curriculum, including:

Counselor Education & Supervision Core (15 credits)		
CNSL 7040	Diversity Equity in Cou Ed	3
CNSL 7050	Leadership in Counselor Ed	3
CNSL 7060	Counseling Theory & Research	3
CNSL 7200	Advanced Group and Supervision	3
CNSL 7210	Clinical Sup Theory & Practice	3
Teacher Preparation Core (6 credits)		
EDHI 6850	Seminar in Higher Education	3
EDHI 6990	Special Topics	3
Research Core (6 credits)		
EDRM 6110	Qualitative Research I	3
EDRM 6210	Quantitative Research I	3
Additional Research Courses (6 credits)		
Students select 2 6000-level EDRM courses in consultation with advisor		
Doctoral Internship Core (6 credits)		
CNSL 7991	Doctoral Internship	6
Professional Preparation (7 credits)		
CNSL 7010	Doctoral Sem Current Topics	1
CNSL 7020	Professional Writing	1
CNSL 7100	Professional Identity CourseEd	1
CNSL 7110	Pathway to the Professoriate	1
EDLP 7090	Dissertation Writing Seminar	3
Electives (8 credits)		
Dissertation Research (21 credits)		
CNSL 7491	Doctoral Dissertation Research	



## COMPREHENSIVE EXAMINATION

Full-time students will complete the comprehensive examination by the end of their 3<sup>rd</sup> year. Part-time students will complete the comprehensive examination by the end of their 5<sup>th</sup> year. The comprehensive exam format is both written and oral.

## REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Completion of core areas of program of study, successful passing of the comprehensive examination, and successful dissertation proposal

## CURRICULUM AND INSTRUCTION

<https://www.uvm.edu/cess/dae>

### OVERVIEW

There are 3 different types of Graduate Programs for Curriculum and Instruction:

Curriculum and Instruction, M.A.T.:

The Master of Arts in Teaching program for middle level and secondary teachers is designed for those students who aspire to earn both a Master's Degree and a license to teach in public middle or secondary schools. Students will prepare for licensure to teach in grades 5 through 9 or 7 through 12 in 1 summer and academic year.

Curriculum and Instruction, Accelerated Master's Pathway (M.A.T. AMP):

UVM students who are in their third year of study for a Bachelor's Degree may apply to the Accelerated Master of Arts in Teaching program. These students, when accepted, may complete 3-9 credits of graduate level coursework which may be counted toward both the minimum requirements for the Master of Arts in Teaching degree, as well as toward the undergraduate degree. Qualified candidates will need a major or its equivalent in an approved licensing endorsement

The Accelerated Master's Pathway leading to the Master of Arts in Teaching for middle level and secondary is designed for those students who aspire to earn both a Master's Degree and a license to teach in public middle or secondary schools. Students will prepare for licensure to teach in grades 5 through 9 or 7 through 12 in 1 summer and academic year.

Curriculum and Instruction, M.Ed.:

The Master's in Education Degree in Curriculum and Instruction is designed to advance curriculum design for innovative educators with attention to research methods to advance practice. Additional emphasis is placed on advancing understanding of curriculum theory and practice, collaboration across school and community contexts, and responsive design to ensure optimal development of the whole child.

## DEGREES

- Curriculum and Instruction M.A.T. AMP (p. 129)
- Curriculum and Instruction M.A.T. (p. 130)
- Curriculum and Instruction M.Ed. (p. 132)

## FACULTY

**Brinegar, Kathleen;** Senior Lecturer, Department of Education; Educational Leadership & Policy; EDD, University of Vermont

**Carter, Chalais "Cee";** Assistant Professor, Department of Education; PhD, University of Massachusetts Amherst

**Carthew, Jessica;** Assistant Professor, Department of Education; PHD, University of Maryland

**Castro, Eliana;** Assistant Professor, Department of Education; PHD, Michigan State University

**Garnett, Bernice Raveche;** Associate Professor, Department of Education; SCD, Harvard University

**Haines, Shana;** Associate Professor, Department of Education; PHD, University of Kansas

**Jorgenson, Simon;** Assistant Professor, Department of Education; PHD, University of Cincinnati

**Kervick, Colby T.;** Assistant Professor, Department of Education; EDD, University of Vermont

**Mayo, Cris;** Professor, Department of Education; PHD, University of Illinois at Urbana-Champaign

**Neumann, Maureen Doyle;** Professor, Department of Education; PHD, University of Washington

**Reyes, Cynthia;** Associate Professor, Department of Education; PHD, University of Illinois at Chicago

**Shepherd, Katharine;** Professor, Department of Education; EDD, University of Vermont

**Smith, Carmen Petrick;** Associate Professor, Department of Education; PHD, University of Texas-Austin

**Strolin-Goltzman, Jessica S.;** Professor, Department of Education; PHD, University of Albany

**Toolin, Regina;** Associate Professor, Department of Education; PHD, University of Wisconsin-Madison

## CURRICULUM AND INSTRUCTION M.A.T. AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

### OVERVIEW

The Accelerated Master's Entry Pathway leading to an M.A. in Teaching for middle level or secondary is designed for those students who aspire to earn both a master's degree and a license to teach in public middle or secondary schools. Students will prepare for licensure to teach in grades 5 through 9 (middle level) or 7 through 12 (secondary) in 1 summer and academic year.

UVM students who are in their third year of study for a Bachelor's degree may apply to the Accelerated Master of Arts in Teaching Pathway. Following acceptance by the Graduate College, these students may complete up to 9 credits of graduate-level course work, that may be counted toward both the minimum requirements for

the M.A.T. as well as toward the undergraduate degree. Qualified candidates will need a major or its equivalent in an approved licensing area.

Requests for further information and application instructions may be obtained by contacting the Director of CESS Graduate Enrollments in Waterman 529B or via email at teachuvm@uvm.edu.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Arts in Teaching**

All applicants to the Accelerated Master’s Pathway in Curriculum and Instruction must meet the following entrance criteria:

For Middle Level Education, a minor or its equivalent in at least 1 of the following areas:

- English, Science, Social Studies or Mathematics.

For Secondary Education, a major or its equivalent in a state-approved licensing area:

- Sciences: Earth Science, Biology, Chemistry, Physics
- Social Studies: Geography, History, Political Science, Economics
- English, Mathematics, French, German, Latin, Spanish, or Computer Science

For both Middle Level and Secondary Education:

- A minimum overall grade point average of 3.00 in a State-approved licensing area (see above)
- A demonstrated commitment to working with young people

**Minimum Degree Requirements**

AMP students may use up to 9 credits of graduate level courses taken at UVM toward both the bachelor’s and M.A.T. Some programs specify the courses that must be taken; for other programs it is determined individually. In all cases, students must be admitted by the Graduate College before taking any courses that will apply to the master’s degree, i.e., all courses used for the master’s degree must be taken after formal admission to the AMP.

The M.A.T. program has two tracks: Middle Level Education and Secondary Level Education.

Degree requirements for a Master of Arts in Teaching in Secondary Education are as follows:

Students enrolled in the M.A.T. in Secondary Education are required to complete a 31-credit program in education course work that will prepare them to teach in grades 7-12. In addition, some students may be required to complete additional content related course work to fulfill content requirements for licensure. Secondary students pursuing an endorsement at the secondary level in World Languages must also complete the Oral Proficiency Interview (OPI) and score at the Advanced Low level.

EDSC 5207	Development:Theory & Applctn	3
EDSC 5209	Practicum in Teaching	4
EDSC 5215	Disciplinary Literacy Sec Schl	3
EDSC 5216	Curr,Instr&Assmt Sec Schl Tchr	3
EDSC 6991	Internship	9
EDSC 5230	Teaching for Results	3
EDSP 5100	Foundations of Special Ed	3
1 methods course from the student's discipline		3
Total Program Credit Requirements		31

Degree requirements for a M.A.T. in Middle Level Education are as follows:

Students enrolled in the M.A.T. in Middle Level Teacher Education are required to complete a 33-36 credit program in education course work that will prepare them to teach math, English language arts, social studies or science in grades 5-9. Some students may be required to complete additional course work to fulfill content endorsement requirements for licensure.

EDML 6070	Adoles Lrng&Beh&Cog Perspect	3
EDML 6220	Social Justice Teaching & Adv	3
EDSP 5100	Foundations of Special Ed	3
EDML 5600	Middle Grades Integ Curr & Ped	3
EDML 5890	Equitable MG Learning Environ	3
EDML 5700	Middle Grades Organization	3
EDML 6991	Internship: Student Teaching	9
EDML 5860	ML Internship Seminar	3
Content Methods Course		3

**Comprehensive Examination**

For both tracks, the comprehensive examination is the satisfactory completion of the Vermont Licensure Portfolio (or its equivalent) submitted near the end of course work.

**Requirements for Advancement to Candidacy for the Degree of Master of Arts in Teaching**

Successful completion of any prerequisite courses, and at least 12 graded graduate credits with a 3.00 or better, including all core courses.

**CURRICULUM AND INSTRUCTION  
M.A.T.**

All students must meet the Requirements for the Master's Degree (p. 270)

**OVERVIEW**

The Master of Arts in Teaching program for middle level and secondary teachers is designed for those students who aspire to earn both a master's degree and a license to teach in public middle or secondary schools. The program welcomes students from all colleges and universities who have completed at least an undergraduate degree (B.S. and B.A.) in arts and sciences, agriculture or natural resources, who have completed majors in topics such as English, social sciences (history, political science, economics or geography), science, mathematics, computer science and/or foreign languages (French, Spanish, Latin and Greek). Students will prepare for licensure to teach in grades 5-9 for the middle level program or 7-12 for the secondary program in 1 or 2 summers and 1 academic year.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Arts in Teaching**

Applications to both Master of Arts in Teaching pathways (Middle Level and Secondary Level) are reviewed on a rolling basis.

All applicants to the Secondary Education Licensure Masters Preparation Program must meet the following entrance criteria:

- A demonstrated commitment to working with young people.
- A major or its equivalent in a State-approved licensing area (see below).
- A minimum overall grade point average of 3.00 in undergraduate coursework as well as a 3.00 in the State-approved licensing area (major).

State-Approved Licensing Areas:

- Sciences: Biological Science, Chemistry, Earth Science, Physics
- Social Studies: Geography, History, Political Science, Economics
- English
- Mathematics
- French
- German
- Latin
- Spanish
- Computer Science

All applicants to the Middle Level Teacher Education Program must meet the following general entrance criteria:

- A demonstrated commitment to working with young people
- A minimum of 18 credit hours in one of the following areas: English, Science, Social Studies, or Mathematics
- A minimum overall grade point average of 3.00 in a State-approved licensing area (English, Science, Social Studies, or Mathematics)

Requests for further information and application instructions may be obtained by contacting the Directory of CESS Graduate Enrollments in Waterman 529B or via email at teachuvm@uvm.edu.

**Minimum Degree Requirements**

The Master of Arts in Teaching program has two tracks: Middle Level Education and Secondary Level Education.

Degree requirements for a Master of Arts in Teaching in Secondary Education are as follows:

Students enrolled in the M.A.T. in Secondary Education are required to complete a 31-credit program in education course work and an internship that will prepare them to teach in grades 7-12. At least 6 graded credits must be in courses at the 6000-level. In addition, some students may be required to complete additional content related course work to fulfill content requirements for State of Vermont licensure. Students pursuing an endorsement at the secondary level in World Languages must also complete the Oral Proficiency Interview (OPI) and score at the Advanced Low level.

EDSC 5207	Development:Theory & Applctn	3
EDSC 5209	Practicum in Teaching	4
EDSC 5215	Disciplinary Literacy Sec Schl	3
EDSC 5216	Curr,Instr&Assmt Sec Schl Tchr	3
EDSC 6991	Internship	9
EDSC 5230	Teaching for Results	3
EDSP 5100	Foundations of Special Ed	3
1 methods course from the student's discipline		3
Total Program Credit Requirements		31

In addition, M.A.T. students will take 2 required teaching exams for licensure (or meet alternative requirements as specified by the Director of Licensure): Praxis Core and Praxis II Content Exams and successfully complete the Vermont Licensure Portfolio.

Degree requirements for a Master of Arts in Teaching in Middle Level Education are as follows:

Students enrolled in the M.A.T. in Middle Level Teacher Education are required to complete a 30-credit program in education course work with an additional subject methods course to prepare them to teach math, English/Language Arts, Social Studies or Science in grades 5-9. At least 6 graded credits must be in courses at the 6000-level. Students seeking more than one content area endorsement will be required to complete additional methods courses.

EDML 6070	Adoles Lrng&Beh&Cog Perspect	3
EDML 6220	Social Justice Teaching & Adv	3
EDSP 5100	Foundations of Special Ed	3
EDML 5600	Middle Grades Integ Curr & Ped	3
EDML 5890	Equitable MG Learning Environ	3
EDML 5700	Middle Grades Organization	3
EDML 6991	Internship: Student Teaching	9

EDML 5860	ML Internship Seminar	3
Content Methods Course(s)		3-6
Total Program Credit Requirements		33

### Comprehensive Examination

Both the Middle Level and Secondary Education Comprehensive Examinations include satisfactory completion of the Vermont Licensure Portfolio (or its equivalent) submitted near the end of program course work.

### Requirements for Advancement to Candidacy for the Degree of Master of Arts in Teaching

Successful completion of any prerequisite courses, and at least 12 graded graduate credits with a 3.00 or better, including all core courses.

## CURRICULUM AND INSTRUCTION M.ED.

All students must meet the Requirements for the Master of Education Degree (p. 271)

### OVERVIEW

The Master's Degree in Curriculum and Instruction is designed to provide innovative educators with opportunities to grow within the profession by reinvigorating their current practice or gaining credentials to seek new roles within education. Emphasis in core coursework and across pathways is placed on advancing justice, building criticality, centering humanistic pedagogies, and building and sustaining a reflexive practice.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Education

Applicants must submit the following:

- Statement of purpose
- 3 formal letters of recommendation (in addition to the online letter of recommendation cover sheet)
- Official transcripts from all institutions attended
- Resume
- Any other items required by the Graduate College

#### Minimum Degree Requirements

30 credits are required. There is a 5-year time period to finish the degree. The 30 credits must include 4 concentration courses (detailed below) and 18 credits within 1 of the degree pathways (detailed below); all at the graduate level or with Graduate College approval. At least 6 credits of graded coursework must be at the 6000-level.

EDCI 6008	Curriculum Theory	3
EDCI 6009	Critical Pedagogies	3

EDLP 6008	Inequalities and Ed Policy	3
EDRM 6300	Applied Educational Research	3

Degree pathways include: Curriculum & Instruction; Education for Sustainability; School Library Media Science; Reading and Literacy; and Resiliency-Based Approaches.

### Comprehensive Examination

Students will develop an e-portfolio to highlight their learning and work from the courses they took as part of their M.Ed. coursework. They will then present that e-portfolio to a small group of faculty.

### Requirements for Advancement to Candidacy for the Degree of Master of Education

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all core courses.

## DIETETICS

<http://www.uvm.edu/nfs/>

### OVERVIEW

The Master of Science in Dietetics Program (MSD), housed in the Department of Nutrition and Food Sciences under the College of Agriculture and Life Sciences at the University of Vermont, is a 30-hour graduate credit degree that includes fully online didactic coursework, a graduate capstone project, and supervised practice experience culminating in student eligibility to write the exam for Registered Dietitian Nutritionist.

The mission of the MSD is to prepare and educate graduate students who will successfully function as entry-level Registered Dietitian Nutritionist with specialized knowledge of and ability to apply the principles of population health across all community health and nutrition practice settings. Students will also develop competence in evidence-based practice. Students will take graduate level courses throughout the University of Vermont as well as advanced nutrition courses offered in the Department of Nutrition and Food Sciences. For more information about the program, please visit the MSD website.

For the core MSD courses (NFS 6100, NFS 6110, NFS 6120, NFS 6130), there is a weekly mandatory online synchronous class meeting. During the supervised practice experience semesters, NFS 6110 and NFS 6120 class meetings are held every Monday.

The Master of Science in Dietetics is accredited by:

Accreditation Council for Education and Dietetics (ACEND)  
120 South Riverside Plaza, Suite 2190  
Chicago, IL 60606-6995  
800-877-1600, extension 5400

More information about ACEND and the Academy of Nutrition and Dietetics is available on their websites.



Following completion of the supervised practice experience and all requirements for the MSD, students will be issued a verification statement of completion of the program and will be eligible to write the exam for Registered Exam for Dietitians.

## DEGREES

Dietetics M.S (p. 133).

## FACULTY

**Bertmann, Farryl**; Clinical Associate Professor, Department of Nutrition and Food Sciences; PHD, Arizona State University

## DIETETICS M.S.

All students must meet the Requirements for the Master's Degree (p. 270).

## OVERVIEW

The Master of Science in Dietetics Program (M.S.D.), housed in the Department of Nutrition and Food Sciences under the College of Agriculture and Life Sciences at the University of Vermont, is a 30-hour graduate credit coordinated degree program that includes fully online didactic coursework, a graduate capstone project, an approximately 32 hour mandatory campus-based orientation to the M.S.D. Program, and supervised practice experience culminating in student eligibility to write the exam for Registered Dietitian Nutritionist.

The mission is to educate and prepare graduate students who will successfully function as entry-level dietitian nutritionists with specialized knowledge of and the ability to apply the principles of population health across all community health and nutrition practice settings. Students will also develop competence in research methodology. Students will take graduate level courses throughout the University of Vermont as well as advanced nutrition courses offered in the Department of Nutrition and Food Sciences. For more information about the program, please visit the M.S.D. website.

For the core M.S.D. courses (NFS 6100, NFS 6110, NFS 6120, NFS 6130), there is a weekly mandatory online synchronous class meeting. During the supervised practice experience semesters, NFS 6110 and NFS 6120 class meetings are held every Monday.

The Master of Science in Dietetics is accredited by:

Accreditation Council for Education and Dietetics (ACEND)  
120 South Riverside Plaza, Suite 2190  
Chicago, IL 60606-6995  
800-877-1600, extension 5400

More information about ACEND and the Academy of Nutrition and Dietetics is available at their websites.

Following completion of the supervised practice experience and all requirements for the M.S.D., students will be issued a verification statement of completion of the program and will be eligible to write the exam for Registration Exam for Dietitians.

## SPECIFIC REQUIREMENTS

### Requirements for Admission for the Degree of Master of Science in Dietetics

Minimum GPA of 3.00 in college-level courses with an overall science GPA of 2.50 in required courses with no required science grade less than 2.00. For prerequisite admission requirements, please visit the M.S.D. webpage.

### DIDACTIC CURRICULUM

The M.S.D. Program is designed for students who have completed a Didactic Program in Dietetics and have obtained a verification statement from an accredited program (these students would also be eligible to apply for any dietetic internship). Other students without a verification statement may apply following completion of prerequisite coursework (see the M.S.D. webpage).

### Minimum Degree Requirements for the Degree of Master of Science in Dietetics

The M.S.D. is a 2-year, 30 credit hour Master's degree program which includes the following coursework: M.S.D. Journal Club (2 credits), M.S.D. Supervised Practice I (4 credits), M.S.D. Supervised Practice II (4 credits), Evidence-based practice project (2 credits), Fundamentals of Critical Inquiry (3 credits), Biostatistics (3 credits), Pharmacology (3 credits), Food Regulation (3 credits) and two graduate elective courses to support their particular interest in the community nutrition, population health, sustainability, food systems, and public health nutrition concentration (6 credits); All courses are offered online.

Coursework will be completed online. However, university-designed SPE students will have the option of taking some courses on campus. All dietetics practice courses will be completed online.

NFS 6100	MSD Journal Club	2
NFS 6110	Supervised Practice I	4
NFS 6120	Supervised Practice II	4
NFS 6130	Evidence-based Practice Prjct	2

The M.S.D. program director will advise on the remaining courses that should be taken to fulfill the 30-credit requirement.

### SUPERVISED PRACTICE EXPERIENCES

The supervised practice portion of the curriculum is integrated with graduate course work. During the 2 semesters of supervised practice experience, NFS 6110 Dietetics Practice I and NFS 6120 Dietetics Practice II are coordinated whereby 2 hours of synchronous class time are held each Monday, and the remainder of the week (Tuesday – Friday) is spent in supervised practice settings (for a total of at least 32 hours/week).

Between NFS 6110 and NFS 6120 (at least 150 hours) and the 38 weeks of supervised practice the program exceeds the 1088-hour requirement established by the Accreditation Council for Education in Nutrition and Dietetics (ACEND).

The program also includes approximately 32 hours of mandatory campus-based orientation to the M.S.D. Program and supervised practice experience. All students will complete 16 weeks in community rotations, 10 weeks in clinical rotations, 6 weeks in food service management. The community rotation includes 2 weeks working with farm or food production and 3 weeks in a school nutrition program. After completing all rotations, students will select a rotation of their choice for further skill and knowledge development (staff relief). The staff relief rotation is a recommended minimum of 2 weeks, but it can be longer if a student desires and the preceptor agrees.

### COMMUNITY HEALTH AND NUTRITION CONCENTRATION

The M.S.D. Program will prepare entry-level dietetics practitioners with a concentration in community health and nutrition. With a focus on population health, the UVM M.S.D. program aims to address health inequities and disparities using a systems approach. The program explores social determinants of health (SDoH) while encouraging inclusion, diversity, equity, and access (IDEA). This program takes a weight-inclusive approach to improve population and community nutritional outcomes. Our dietetics program builds on the strengths of our university traditions while supporting culturally appropriate, inclusive solutions. Graduates will possess the confidence, skills and knowledge to function successfully as entry-level registered dietitian nutritionists in the clinical, community or food service management setting. Graduates will develop specialized knowledge and skills in Community Health and Nutrition, focusing on population health, through selected coursework, supervised practice experience and learning.

### GRADUATION COMPLETION REQUIREMENTS

M.S.D. students must successfully complete all coursework, the comprehensive exam, supervised practice rotations, and the capstone project in order to receive the M.S.D. degree and verification statement of eligibility to write the exam for Registered Dietitian Nutritionists.

#### Comprehensive Examination

Candidates will prepare a written and oral comprehensive exam that will test their ability to develop population health-based solutions to practice problems in all areas of dietetic practice.

#### Requirements for Advancement to Candidacy for the Degree of Master of Science in Dietetics

Completion of requirements as outlined in program description.

## ECOLOGICAL ECONOMICS

<http://www.uvm.edu/giee/>

### OVERVIEW

Ecological Economics examines the relationships between ecological, social, and economic systems while working to solve humanity's environmental challenges. It is based on the understanding that the socio-economic system is a subsystem of a larger ecological life support system, and strives to create an ecologically sustainable,

socially equitable, and economically efficient future. The certificate is a problem-based, interdisciplinary program focused on developing a practical framework for integrating socio-economic and ecological systems. Students will acquire a theoretical and pragmatic basis to carry these skills into the world of practice.

### DEGREES

Ecological Economics CGS (p. 134)

### FACULTY

**Erickson, Jon;** Professor, Gund Institute; PHD, Cornell University  
**Farley, Joshua C.;** Professor, Department of Community Development and Applied Economics; PHD, Cornell University  
**Galford, Gillian Laura;** Associate Professor, Rubenstein School of Environment and Natural Resources; PHD, Brown University  
**Gould, Rachelle;** Assistant Professor, Rubenstein School of Environment and Natural Resources; PHD, Stanford University  
**Panikkar, Bindu;** Assistant Professor, Rubenstein School of Environment and Natural Resources; PHD, Tufts University  
**Ricketts, Taylor H.;** Professor, Rubenstein School of Environment and Natural Resources; PHD, Stanford University  
**Zia, Asim;** Professor, Department of Community Development and Applied Economics; PHD, Georgia Institute of Technology

## ECOLOGICAL ECONOMICS CGS

All students must meet the Requirements for the Certificates of Graduate Study (p. 269)

### OVERVIEW

Ecological Economics examines the relationships between ecological, social, and economic systems while working to solve humanity's environmental challenges. It is based on the understanding that the socio-economic system is a subsystem of a larger ecological life support system, and it strives to create an ecologically sustainable, socially equitable, and economically efficient future. The certificate is a problem-based, interdisciplinary program focused on developing a practical framework for integrating socio-economic and ecological systems. Students will acquire a theoretical and pragmatic basis to carry these skills into the world of practice.

The Ecological Economics Certificate of Graduate Study is managed jointly by the Rubenstein School and the Gund Institute, and is conferred by the Graduate School.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Certificate of Graduate Study in Ecological Economics

**FOR CURRENT UVM STUDENTS:** Students currently enrolled in a graduate program must complete the online UVM Graduate Application.

**FOR DUAL GRADUATE DEGREE/CERTIFICATE PROGRAM APPLICANTS:** Students applying at the same time for a graduate degree program and a Certificate of Graduate Study at UVM must first complete the online UVM Graduate Application for the degree program. Once accepted into the degree program applicants can

then log back into the portal and choose the option to apply as a certificate student. A fee waiver will be provided by the Graduate Admissions office.

**FOR APPLICANTS TO THE CERTIFICATE PROGRAM:**  
Applicants seeking to enroll in only a Certificate of Graduate Study program must complete the online UVM Graduate Application and all associated requirements. Note: You must have completed an advanced degree (Master's, Ph.D., or J.D.) to apply for just the certificate and the GRE is not required.

**Minimum Degree Requirements**

Students may earn the certificate either in conjunction with a UVM master's or doctoral degree, or independent of a degree.

The Certificate of Graduate Study in Ecological Economics requires 15-21 credits, including 3 core courses and 2 approved electives. Students must also demonstrate competency in 4 areas: Natural Science, Social Science, Management, and Quantitative Methods. 2 of the competencies must be satisfied through 2 elective courses (6 credits) at UVM. The remaining 2 competencies may be satisfied through additional electives, through appropriate prior graduate course work, or through life experience.

The Certificate of Graduate Study in Ecological Economics requires 15 graduate credits that must be taken at UVM. They are distributed as follows<sup>1</sup>.

3 core courses (9 credits total) must be taken at UVM while enrolled in the program:		
NR 6410	Ecological Economic Theory	3
CDAE 6510	Research & Evaluation Methods	3
CDAE 6990	Special Topics (Ecological Economics Applications)	3
Below are examples of courses that could be taken to meet the 4 competencies. At least 6 credits toward competencies must be taken at UVM while enrolled in the program		
Natural Science:		
ALE 6110	Introduction to Agroecology	3
Social Science:		
CDAE 6540	Advanced Microeconomics	3
FS 6400	Food Systems & Society	3
PA 6110	Policy Analysis&Program Eval	3
Management:		
PA 6170	Systems Anly & Strategic Mgmt	3
Quantitative Methods:		
STAT 5210	Advanced Stat Methods & Theory	3

<sup>1</sup> The 15 credits that need to be taken at UVM may be earned either in conjunction with or independent of a UVM graduate degree program.

More information on the Certificate is available from the Gund Institute website.

**EDUCATION FOR SUSTAINABILITY**

<https://www.uvm.edu/cess/doe>

**OVERVIEW**

To accelerate transformative societal response to the interconnected environmental, social, and economic challenges of our time, the University of Vermont and the Shelburne Farms Institute for Sustainable Schools established a partnership to offer 2 certificates of graduate study in Education for Sustainability (EFS). Each certificate program is designed for practicing preK-12, post-secondary, and informal educators as well as those working in museum education, outdoor education, parks and recreation activities, and other fields where natural and built environments are part of the curriculum. Grounded in action research, transformative education, and youth leadership, the EFS coursework prepares educators to empower learners in making positive changes in their communities while shifting societies to improve the quality of life for current and for future generations.

**DEGREES**

Education for Sustainability CGS (p. 135)

Education for Sustainability mCGS (p. 136)

**FACULTY**

**Jorgenson, Simon**; Associate Professor, Department of Education; PHD, University of Cincinnati

**Poleman, Walter Mallery**; Senior Lecturer, Rubenstein School of Environment and Natural Resources; MS, University of Vermont

**Toolin, Regina**; Associate Professor, Department of Education; PHD, University of Wisconsin-Madison

**EDUCATION FOR SUSTAINABILITY CGS**

All students must meet the Requirements for the Certificates of Graduate Study (CGS) (p. 269)

**OVERVIEW**

The 18-credit Certificate of Graduate Study in Education for Sustainability (EFS) provides preK-12, postsecondary, and informal educators as well as those working in museum education, outdoor education, parks and recreation—and other fields where natural and built environments are part of the curriculum—with the knowledge and skills to empower learners in making positive changes in their communities while shifting societies to improve the quality of life for current and for future generations. Designed in partnership with the Shelburne Farms Institute for Sustainable Schools, this certificate features an innovative co-teaching arrangement and

scholarship opportunities to reduce costs for graduate students. Students completing this certificate will develop a strong practical and theoretical foundation in action research, transformative education, youth leadership, and education for sustainability. Elective courses provide an opportunity for students to deepen their understanding of EFS in the context of food systems, agroecology, community development, and participatory research methods.

## SPECIFIC REQUIREMENTS

### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE CERTIFICATE OF GRADUATE STUDY

Completed bachelor's degree

Completed Graduate College Application

Official transcripts from each college of university where credit has been earned

Three letters of recommendation

### MINIMUM DEGREE REQUIREMENTS

18 credits including the following:

Core Courses		
EDCI 6430	Fndns in Ed for Sustainability	3
EDCI 6440	Mthds in Ed for Sustainability	3
EDCI 6450	Trnsfrm Ldrshp Edu for Sustain	3
EDCI 6460	Edu for Sustain Inquiry Action	3
In addition to the core courses, students choose 2 electives (6 credits) from the following list:		
CDAE 6210	Econ of Sustainable Food Syst	
CDAE 6260	Community Economic Development	
CDAE 6760	Inclusive ScienceCommunication	
FS 6450	Food Systems & Science	
FS 6400	Food Systems & Society	
ALE 6110	Introduction to Agroecology	
ALE 6120	Ecological Foundations of Agro	
ALE 6130	PAR & Transdiscipl Agroecology	
ALE 6140	Agroecol, Food Sov. & Soc Mov.	

## EDUCATION FOR SUSTAINABILITY MCGS

All students must meet the Requirements for the micro-Certificates of Graduate Study (CGS) (p. 269)

### OVERVIEW

The 12-credit micro-Certificate of Graduate Study in Education for Sustainability (EFS) provides preK-12, postsecondary, and informal educators as well as those working in museum education, outdoor

education, parks and recreation—and other fields where natural and built environments are part of the curriculum—with the knowledge and skills to empower learners in making positive changes in their communities while shifting societies to improve the quality of life for current and for future generations. Designed in partnership with the Shelburne Farms Institute for Sustainable Schools, this certificate features an innovative co-teaching arrangement and scholarship opportunities to reduce costs for graduate students. Students completing this micro-certificate will develop a strong practical and theoretical foundation in action research, transformative education, youth leadership, and education for sustainability.

## SPECIFIC REQUIREMENTS

### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE micro-CERTIFICATE OF GRADUATE STUDY

- Completed bachelor's degree
- Completed Graduate College Application
- Official transcripts from each college of university where credit has been earned
- Three letters of recommendation

### MINIMUM DEGREE REQUIREMENTS

12 Credits including the following:

Core Courses		
EDCI 6430	Fndns in Ed for Sustainability	3
EDCI 6440	Mthds in Ed for Sustainability	3
EDCI 6450	Trnsfrm Ldrshp Edu for Sustain	3
EDCI 6460	Edu for Sustain Inquiry Action	3

## EDUCATIONAL LEADERSHIP AND POLICY STUDIES

<https://www.uvm.edu/cess/dae>

### OVERVIEW

The Educational Leadership and Policy Studies degrees are designed to cultivate educational and community leaders who apply knowledge to lead and build learning communities that make a positive difference in the lives of children, youth, families, adults, and educational and social service agencies. Framed around issues of equity and social justice, these programs are designed to prepare educational and community leaders to think and act creatively and effectively determine solutions to complex problems.

### DEGREES

Educational Leadership and Policy Studies AMP (p. 137)

Educational Leadership and Policy Studies M.Ed. (p. 138)

Educational Leadership and Policy Studies Ed.D. (p. 139)

Educational Leadership and Policy Studies Ph.D. (p. 140)



## FACULTY

**Callahan, Rebecca M.;** Professor, Department of Education; PHD, University of California, Davis

**Castro, Eliana;** Assistant Professor, Department of Education; PHD, Michigan State University

**Clark/Keefe, Kelly;** Associate Professor, Department of Education; EDD, University of Vermont

**Conroy, Nicole;** Assistant Professor, Human Development and Family Sciences; PHD, Syracuse University

**Demink-Carthew, Jessica;** Associate Professor, Department of Education, PHD; University of Maryland

**Garnett, Bernice Raveche;** Associate Professor, Department of Education; SCD, Harvard University

**Garvey, Jason C.;** Associate Professor, Department of Education, PHD; University of Maryland, College Park

**Garwood, Justin D.;** Assistant Professor, Department of Education; PHD, University of North Carolina at Chapel Hill

**Haines, Shana Jackson;** Associate Professor, Department of Education; PHD, University of Kansas

**Hurley, Sean M.;** Associate Professor, Department of Education; PHD, Vanderbilt University

**Jorgenson, Simon;** Assistant Professor, Department of Education; PHD, University of Cincinnati

**Kervick, Colby T.;** Associate Professor, Department of Education; EDD, University of Vermont

**Mayo, Cris;** Professor, Department of Education; PHD, University of Illinois at Urbana-Champaign

**McCluskey, Matthew;** Assistant Professor, Department of Educational Leadership and Policy Studies; EdD, Vanderbilt University

**Meyer, Lori;** Associate Professor, Department of Education; PHD, University of Illinois

**Neumann, Maureen D.;** Professor, Department of Education; PHD, University of Washington

**Northey, Kaitlin;** Assistant Professor, Department of Education; PHD, Rutgers University

**Reyes, Cynthia C.;** Associate Professor, Department of Education; PHD, University of Illinois at Chicago

**Strolin-Goltzman, Jessica S.;** Professor, Department of Education; PHD, University of Albany

**Sutherland, Daniella;** Associate Professor, Department of Educational Leadership and Policy Studies, PhD, Pennsylvania State University

**Toolin, Regina;** Associate Professor, Department of Education; PHD, University of Wisconsin-Madison

**Turner, Tracy Arámbula;** Assistant Professor, Department of Education; PHD, The University of Texas at Austin

**Vannest, Kimberly;** Professor, Department of Education; PHD, Louisiana State University, Baton Rouge

## EDUCATIONAL LEADERSHIP AND POLICY STUDIES AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

## OVERVIEW

An accelerated entry pathway into the Master's Program in Educational Leadership and Policy Studies (AMP-EDLP) affords opportunities for UVM undergraduates interested in the efficient linkage of their undergraduate and graduate degree programs. The AMP-EDLP allows UVM juniors in their spring semester to apply for admission to the graduate program. After acceptance into the M.Ed., students may take up to 9 credits of graduate-level courses at UVM toward both their Bachelor's and M.Ed. The targeted audience are those undergraduates who seek advanced training and experiences towards the leadership of learning organizations and programs.

Recruitment of students into AMP-EDLP would stem from five types of affiliated undergraduate programs:

1. Students interested in leadership positions in youth and adult recreation programs, intermural sports leagues, K-12 athletic program administration, and/or sports team management. Programs targeted include:

- a. Coaching-(CESS)-Undergraduate Minor
- b. Sports Management (CESS/Rubenstein)-Undergraduate Minor

2. Students interested in leading youth or adult groups through environmental curricula housed in state or national parks, curating educational exhibits in cultural or science museums, and/or administering youth camps. Programs targeted include:

- a. Parks, Recreation and Tourism (Rubenstein)-Undergraduate Major
- b. Environmental Studies (UVM)-Undergraduate Major/Minor

3. Students interested in pairing outdoor or environmentally based recreation programs with occupational, physical, or mental health therapies. These students have worked or envision working for organizations that lead youth or adults into wilderness or related environments in the pursuit of therapeutic goals. Programs targeted include:

- a. Human Development and Family Studies (CESS)-Undergraduate Major/Minor
- b. Social Work (CESS)-Undergraduate Major

4. Students interested in the leadership of and programming for community based learning centers. These centers might provide a range of educational, family, literacy and related support services for refugees, English language learners, and adult populations.

- a. Education for Cultural and Linguistic Diversity-ECLD (CESS)-Undergraduate Concentration/Minor
- b. Social Work (CESS)-Undergraduate Major
- c. Community Development and App. Economics (CALs)-Undergraduate Major/minor

5. Students from social science fields like political science, economics, sociology and community development who seek foundational training at the graduate level towards careers in educational policy studies, administration, and analysis. Students who have partially completed or completed teaching Majors, but seek alternatives upon graduation will also be welcomed. Programs targeted would include:

- a. Social science Majors (CAS)—Undergraduate Majors/Minors
- b. Teaching degrees (CESS)-Undergraduate Majors
- c. HDFS Program (CESS)

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of education for Accelerated Students

Admissions to the accelerated entry program requires the following:

1. Students who have earned a cumulative grade point average of 2.75 at the beginning of the 2nd semester of their Junior year will receive highest consideration for admission to the AMP-EDLP program.
2. Completion of the Graduate College Accelerated Master's Degree Permission Form.
3. Completion of the EDLP M.Ed. Graduate College Application Form online, which includes a written essay that matches their undergraduate program of study, professional experience and professional goals with the M.Ed. in EDLP; 3 letters of recommendation.
4. Applications will be reviewed by program faculty and finalists will be interviewed.

### Minimum Degree Requirements for the Degree of Master of Education

Please see the EDLP M.Ed. Program page of this Catalogue.

AMP-EDLP students may take courses limited to those offered in the Core Curriculum of the Master's program prior to the completion of the bachelor's, inclusive of:

- EDLP 6000 - Leading Learning Organization and any one or two of the following:
- EDRM 6300- Intro to Applied Research
- EDLP 6008 - Inequalities in Education Policy
- EDLP 6100 - Effecting and Managing Change
- EDLP 6200 - Collaborative Consultation.

In summary, AMP-EDLP students are expected to take 6 credit hours of EDLP core coursework during their senior year, but may take a total of 9. A total of 30 credit hours are needed to earn the Master's. The remaining core courses will be taken after completion of the bachelor's degree.

AMP-EDLP students are expected to maintain a minimum cumulative undergraduate GPA of 3.00 in their EDLP coursework.

Once fully enrolled as a graduate student, AMP-EDLP participants must adhere to the same standards defined in the Catalogue as other students in the M.Ed. in EDLP.

## EDUCATIONAL LEADERSHIP AND POLICY STUDIES M.ED.

All students must meet the Requirements for the Master of Education Degree

### OVERVIEW

The master's degree in Educational Leadership and Policy Studies is designed to cultivate leaders who can apply knowledge toward leading and building learning communities designed to make a positive difference in the lives of children, youth, families, adults, and communities. The program prepares public and private school leaders, curriculum leaders, teacher leaders, leaders of educational and social service agencies, and leaders for other educational organizations. Additionally, professionals (i.e. non-profit administrators, civil-servants, and care workers) involved in leading educational training and programming for their respective organizations and services are often attracted to this program of study. The program is designed to prepare leaders to think and act creatively, responsibly, and effectively in leadership roles.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Education

Candidates for the M.Ed. in Educational Leadership and Policy Studies must have a Bachelor's degree and a GPA of at least 3.00 in their degree. Preference given to candidates with evidence of leadership experience or interest/experience in education policy.

#### Minimum Degree Requirements

The program requirements include:

- 30 credits of graduate-level leadership courses and electives,
- 18 of which comprise the core curriculum, with the remainder making up the student's individual concentration.
- Note: This is not a licensure degree, but students are welcome to individually contact the Vermont Agency of Education to inquire about the state's transcript review process.
- The core curriculum consists of the following courses:
  - EDLP 6000 : Leading Learning Organizations
  - EDLP 6100 : Effecting and Managing Change
  - EDLP 6200 : Collaborative Consultation
  - EDLP 6350: Staff Evaluation & Development
  - EDRM 6300: Intro to Applied Research
  - EDLP 6008: Inequalities and Educational Policy
- A comprehensive exam consisting of a portfolio of leadership and policy research and analysis papers and a brief oral presentation.

- A maximum of 6 credits may be accepted in transfer into the program. Transfer credit may be completed prior to admission to the program provided that the credit is approved by the student's graduate studies committee and that the credit conforms to all other Graduate College requirements.

**THESIS OPTION**

The EDLP program has a thesis option in which 6 credits of EDLP 6391 , Master's Thesis Research, replaces the equivalent number of elective course credits. A thesis is developed in collaboration with a supervising EDLP faculty member and adheres to policies and procedures of the Graduate College.

**Comprehensive Examination**

The comprehensive examination consists of a portfolio of papers already written for classes with a brief analysis of a key leadership issue that has been central to the student's studies in the degree as well as a brief oral presentation.

**Requirements for Advancement to Candidacy for the Degree of Master of Education**

Successful completion of at least 18 graded graduate credits with a 3.00 GPA or better, including all core courses.

**EDUCATIONAL LEADERSHIP AND POLICY STUDIES ED.D.**

All students must meet the Requirements for the Doctor of Education (p. 273) Degree.

**OVERVIEW**

The Ed.D. (Doctorate in Education) is an applied research program for professionals serving in educational leadership positions in schools, colleges, policy arenas, non-profits and social service organizations. The 3-year-plus (10 semester) low-residency Ed.D. program is offered primarily online, with synchronous evening classes. The program seeks to produce leaders who can construct and apply knowledge to make a positive difference in the lives of children, youth, individuals, families and communities by promoting excellence in a number of areas:

- leadership and change strategies in and across organizations;
- development of learning organizations in response to social issues;
- design, implementation, and supervision of applied research in education;
- interpretation and application of research;
- understanding of broad social issues and policies from the perspectives of justice, equity, and diversity;
- meeting the needs of students with learning challenges and disabilities and their families;
- analysis of policy and fiscal management in education and social services;

- implementation of policies and practices that promote equity and social justice, collaboration, and cultural awareness and responsiveness.

This program has been designed to respond to the expanding demands placed on leaders in educational, social and human service, and non-profit organizations where leaders are increasingly expected to:

- design and supervise local research and varied evaluative studies;
- interpret and apply recent national research findings to practice;
- analyze and apply governmental regulations and court decisions;
- develop organizational responses to emerging social expectations;
- organize and lead staff development programs;
- understand and apply broad-based economic principles to social and fiscal policy;
- develop and manage budgets; and
- assess and respond to the psychological needs of educational consumers.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Doctor of Education**

Applicants must possess a:

- Master's Degree or equivalent, from an accredited institution,
- cumulative grade point average of 3.00 for previous graduate study,
- Online application,
- Current resume or curriculum vitae,
- Detailed Statement of Purpose including a summary of how the Ed.D. program relates to your professional, career, and educational goals,
- 3 letters of recommendation using the Graduate College form,
- Transcripts from all institutions attended, and
- Scholarly writing sample.

Applications must be submitted by the program deadline.

**Minimum Degree Requirements**

Students admitted to graduate studies must successfully complete core requirements in research, leadership, and organizational and policy studies. The required concentration is composed of courses chosen and approved by program faculty from an area of student interest ( e.g., curriculum and instruction, higher education, educational leadership, special education) within the College of Education and Social Services. Students must satisfactorily complete the following Program of Study:

Core Requirements (30 credits):		
EDLP 7010	ProSeminar: Doctoral Intro	3
EDLP 7030	Adv Sem Organizational Ldrshp	3
EDFS 7040	Soc Process & Institutionl Chg	3

EDLP 7050	Sem on Educational Policy	3
EDLP 7060	Improvement Science in Ed & SS	3
EDLP 6330	Education Finance & Policy	3
EDLP 6350	Staff Evaluation & Development	3
EDLP 6360	Curr Mgmt in Ed & Soc Srv Org	3
EDLP 6990	Special Topics (School Community Partnerships)	3
EDLP 7090	Dissertation Writing Seminar	3
Required Research Courses (12 credits):		
EDRM 6300	Applied Educational Research	3
EDRM 6110	Qualitative Research I	3
EDRM 6210	Quantitative Research I	3
EDRM 6310	Mixed Methods Research: Adv	3
Dissertation Research Credits:		
EDLP 7491	Doctoral Dissertation Research	18
Total Required		60

A maximum of 6 credit hours may be accepted in transfer from an accredited graduate program. Credits to transfer may be completed prior to admission to the Doctor of Education program provided that the credit is approved by the student's program advisor and conforms to all Graduate College and EDLP program requirements.

### Comprehensive Examination

Consistent with Graduate College requirements, the Ed.D. program requires students to complete a comprehensive examination of core knowledge prior to the completion of the degree program. This examination occurs in the semester following completion of the core course curriculum. The examination tests knowledge in areas of study germane to all Ed.D. students.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Education

Students may advance to candidacy upon completion of: (1) all core courses with 3.00 GPA, (2) the comprehensive examination, and (3) defense of a dissertation proposal.

For further information concerning program advising and Ed.D. requirements refer to the Educational Leadership and Policy Studies doctoral programs website.

## EDUCATIONAL LEADERSHIP AND POLICY STUDIES PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

## OVERVIEW

The Ph.D. program in Educational Leadership and Policy Studies is a multidisciplinary program that seeks to examine complex educational and social problems through the integration of multiple theoretical, methodological, and disciplinary lenses. The Ph.D. in Educational Leadership and Policy Studies is intended as a full-time program to prepare candidates to attain a high level of scholarly competence and to develop the capacity to contribute knowledge to their field. The program will develop scholars who can analyze and inform the development of educational systems and public policies that will positively impact the lives of children and youth and address broad societal issues such as child poverty. The degree will serve students who wish to pursue research/teaching careers in universities and/or research and policy positions in government agencies, think tanks, non-governmental organizations, and other public and private sector organizations.

The goals of the program include, but are not limited to:

- Preparing professional researchers, scholars, and faculty competent in conducting and sharing research.
- Focusing on research training that uses advanced quantitative, qualitative, and mixed method approaches to add to theoretical knowledge.
- Emphasizing publication of research findings to enhance knowledge in education and social services.
- Developing areas of interdisciplinary specialization.

Candidates will be mentored in conducting independent research, presenting papers at professional conferences, and submitting their work for publication.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

- Master's degree in a related field such as educational leadership, educational studies, higher education, public administration, counseling, social work, or curriculum and instruction characterized by a distinguished academic record;
- Demonstrated commitment in statement of purpose and references to social change and justice;
- Evidence of experience in inquiry at a level that will predict successful research and college teaching;
- GRE general test scores taken within the last 5 years;
- Research interests compatible with those of College of Education and Social Services faculty;
- Strong inquiry and writing skills as illustrated in a submitted scholarly writing sample;
- In-depth understandings of systems change, leadership, and policy in order to conduct high quality research;
- Articulated connection or fit with research agenda of existing program faculty; and
- Submission of an application by the program deadline.



### Minimum Degree Requirements

A minimum of 75 credits of doctoral studies following formal admission to the program comprised of:

Core Requirements (18 credits):		
EDLP 7010	ProSeminar: Doctoral Intro	3
EDLP 7020	Epistemologies in Education	3
EDLP 7030	Adv Sem Organizational Ldrshp	3
EDFS 7040	Soc Process & Institutional Chg	3
EDLP 7050	Sem on Educational Policy	3
EDLP 7090	Dissertation Writing Seminar	3
Required Research Courses (9 credits):		
EDRM 6110	Qualitative Research I	3
EDRM 6210	Quantitative Research I	3
EDRM 6310	Mixed Methods Research: Adv	3
Elective Research Courses (9 credits) Student will select 3 or more EDRM 6000-level courses in consultation with dissertation advisor		9
Concentration		18
Graduate course options (guided by student interest and committee approval; all elective courses taken must be at 6000-level or above)		
Comprehensive Exam:		
An empirical draft article on a topic agreed upon by the student, their Dissertation Advisor, and 2 additional dissertation committee members		
Dissertation Proposal: Required for Advancement to Candidacy		
Dissertation Research Credits		21
EDLP 7491	Doctoral Dissertation Research	
Total Credits		75

All course credits beyond the Core Requirements are distributed in educational leadership, research, critical perspectives, organizational change, and selected specialty content areas.

A maximum of 6 credit hours may be accepted in transfer from an accredited graduate program. Credits to transfer may be completed prior to admission to the EDLP Ph.D. program provided that the credit is approved by the student's graduate program advisor and that the credit conforms to all other Graduate College requirements. Candidates for the Ph.D. must satisfactorily complete a minimum of 69 hours in residence. This requirement is completed by courses taken through UVM and taken after the student has been admitted to the Graduate College.

### Dissertation Requirements

Dissertation expectations include either a traditional 5-chapter or 3-article format with a focus on original research, illustrating mastery

of competing theories with the goal of informing knowledge (per Graduate College guidelines). The journal article format requires that the candidate complete 3 related journal article(s) under the shared proposal topic with the goal of manuscript submission for publication in refereed journals.

### Comprehensive Examination

In order to assess students' scholarship and critical thinking, a comprehensive examination is required by the end of a student's course of study (typically the third year). The examination consists of a critical, empirical article on a topic to be agreed upon by the student, their mentor, and one additional faculty reader, with these individuals approving an abstract of the paper in advance. Students are allowed to use data already collected by their advisor, but must independently: pose their research questions, analyze the data, and draw conclusions from the analysis. The article must demonstrate comprehensive empirical and theoretical mastery of the agreed-upon topic, including relevant knowledge on which the specific research area is based.

Once the student's dissertation advisor and 2 additional committee members deem the article original and ready for review, the student will schedule a research colloquium on the topic of the paper for the CESS community. The student's faculty committee will serve as the examiners for the comprehensive examination. They will, by consensus, assign a grade of fail, conditional pass, or pass for the comprehensive examination. The article may later be incorporated into the student's doctoral dissertation if deemed appropriate by the student's dissertation committee.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Successful completion of all core courses with 3.00 GPA and a comprehensive examination, as well as defense of a dissertation proposal, allows the student to advance to doctoral candidacy.

For further requirements concerning program advising and Ph.D. requirements, refer to the Educational Leadership and Policy Studies doctoral programs website.

## ELECTRICAL ENGINEERING

<http://www.uvm.edu/~cems/soe/>

### OVERVIEW

The Electrical Engineering (EE) program at the University of Vermont is at the forefront of research in the areas of digital signal processing, control systems, power and energy systems, wireless communications, and electronic circuit and system design and testing. This rigorous and focused program offers competitive funding and prepares graduate students for careers in research and technical leadership. Graduate students can contribute to interdisciplinary research within a broad range of applications, including power/energy, biomedical, aerospace, and transportation. In addition, the EE program partners with other academic units to offer M.S. and Ph.D. degrees in Materials Science and a Ph.D. degree in Biomedical Engineering.

## DEGREES

Electrical Engineering AMP (p. 142)

Electrical Engineering M.S. (p. 142)

Electrical Engineering Ph.D. (p. 143)

## FACULTY

**Almassalkhi, Mads;** Associate Professor, Department of Electrical and Biomedical Engineering; PHD, University of Michigan

**Bates, Jason H. T.;** Professor, Department of Electrical and Biomedical Engineering; DSC, Canterbury University; PHD, University of Otago

**Chevalier, Samuel;** Assistant Professor, Department of Electrical and Biomedical Engineering; PhD, Massachusetts Institute of Technology

**Cipolla, Marilyn Jo;** Professor, Department of Neurological Sciences; Chair, Department of Electrical and Biomedical Engineering; PHD, University of Vermont

**Duffaut Espinosa, Luis;** Assistant Professor, Department of Electrical and Biomedical Engineering; PHD, Old Dominion University

**Frolik, Jeff L.;** Professor, Department of Electrical and Biomedical Engineering; PHD, University of Michigan

**Lee, Byung S.;** Professor, Department of Computer Science; PHD, Stanford University

**Ossareh, Hamid-Reza;** Associate Professor, Department of Electrical and Biomedical Engineering, PHD; University of Michigan

**Pandey, Amritanshu;** Assistant Professor, Department of Electrical and Biomedical Engineering, PHD, Carnegie Mellon University

**Wshah, Safwan;** Associate Professor, Department of Computer Science; PHD, State University of New York at Buffalo

**Xia, Tian;** Professor, Department of Electrical and Biomedical Engineering; PHD, University of Rhode Island

## ELECTRICAL ENGINEERING AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

## OVERVIEW

Qualified undergraduate students who plan to earn a M.S. in electrical engineering may enroll in the Accelerated Master's Entry Pathway, which enables students to begin working on the M.S. while still an undergraduate. Students apply by the second semester of their junior year. Following acceptance by the Graduate College, students may take up to 6 graduate credits while still an undergraduate that can be counted toward both the B.S. and the M.S. degrees. Another 3 graduate credits can be counted towards the M.S. degree while an undergraduate but cannot count towards the B.S. degree. This is subject to approval of the student's graduate advisor. Students in the program who want to pursue the thesis option typically engage in research in the summer following their junior year

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students

To apply to the program, students must have a cumulative grade point average of at least 3.20 at the time of application, must submit a letter of application to the graduate program coordinator naming a faculty member who has agreed to serve as their graduate advisor and must complete the Graduate College application.

### Minimum Degree Requirements

Advanced courses in electrical engineering, physics, computer science, and mathematics (18 to 24 credits, at least 6 of which must be at the 6000-level) with at least 15 credits appropriately distributed in approved areas of study in the Electrical Engineering department. Thesis research (6 to 12 credits).

Students are free to pursue any M.S. degree option: thesis, project, or course-work only options. For students interested in academic research and working closely with a faculty advisor, a thesis is normally expected in the program.

In all cases, successful completion of the M.S. degree will require passing a comprehensive examination. This examination will in part be based on course work that was taken in the pursuit of the M.S. degree. Thesis option students will be tested orally at the time of their thesis proposal while project students will be asked to write and present a report on a design or research topic of interest.

### Comprehensive Examination

**M.S. Thesis Option:** The student must orally present a proposal for their thesis research no later than the semester prior to the semester in which the student plans to graduate. The student's thesis committee will orally examine the student based on the student's coursework and research focus.

**M.S. Project Option:** Under the supervision of an EE graduate faculty member, the student must prepare and present a written proposal for their research project at least 3 months prior to graduation. The student's project committee will orally examine the student based on the student's coursework and research focus.

**M.S. Coursework Option:** The student must complete an oral comprehensive exam during the final semester of residence at UVM based on course work for EE graduate courses where a grade below a B+ was earned.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

An accredited bachelor's degree in electrical engineering or equivalent education.

## ELECTRICAL ENGINEERING M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

The Electrical Engineering (EE) program at the University of Vermont (UVM) offers a program of study leading to the M.S. degree in Electrical Engineering. Areas of research expertise in electrical engineering include control systems, signal processing, electric power & energy systems, solid state physical electronics, semiconductor materials and devices, wireless communications, VLSI design & testing, and biomedical engineering.

Typically candidates have obtained the Bachelor of Science degree in Electrical Engineering prior to application but those who haven't are encouraged to apply for the program if they have extensive background in mathematics and the basic sciences. In such cases, it may be necessary for a student to complete the entrance qualifications without receiving credit toward graduate studies. The general requirements for admission by the Graduate College must be met.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

An accredited bachelor's degree in an appropriate field.

### Minimum Degree Requirements

Advanced courses in electrical engineering, physics, computer science, and mathematics (18 to 24 credits, at least 6 of which must be at the 6000-level) with at least 15 credits appropriately distributed in approved areas of study in the Electrical Engineering department. Thesis research (6 to 12 credits).

Students are free to pursue any M.S. degree option: thesis, project, or course-work only options. For students interested in academic research and working closely with a faculty advisor, a thesis is normally expected in the program.

In all cases, successful completion of the M.S. degree will require passing a comprehensive examination. This examination will in part be based on course work that was taken in the pursuit of the M.S. degree. Thesis option students will be tested orally at the time of their thesis proposal while project option students will be asked to write and present a report on a design or research topic of interest.

### Comprehensive Examination

M.S. Thesis Option: The student must orally present a proposal for their thesis research no later than the semester prior to the semester in which the student plans to graduate. The student's thesis committee will orally examine the student based on the student's coursework and research focus.

M.S. Project Option: Under the supervision of an EE graduate faculty member, the student must prepare and present a written proposal for their research project at least 3 months prior to graduation. The student's project committee will orally examine the student based on the student's coursework and research focus.

M.S. Coursework Option: The student must complete a written and/or oral comprehensive exam during the final semester of residence at UVM.

M.S. Coursework Option: The student must complete an oral comprehensive exam during the final semester of residence at UVM based on course work for EE graduate courses where a grade below a B+ was earned.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

An accredited bachelor's degree in electrical engineering or equivalent education.

## ELECTRICAL ENGINEERING PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

## OVERVIEW

The Electrical Engineering (EE) Ph.D. program at the University of Vermont is at the forefront of research in the areas of digital signal processing, control systems, power and energy systems, wireless communications, and electronic circuit and system design and testing. This rigorous and focused Ph.D. program offers competitive funding and prepares graduate students for careers in research and technical leadership. EE Ph.D. graduate students can contribute to interdisciplinary research within a broad range of applications, including power/energy, biomedical, aerospace, and transportation. In addition, the EE program partners with other academic units to also offer a Ph.D. degree in Materials Science and a Ph.D. degree in Biomedical Engineering.

Typically candidates have obtained the Master of Science degree in Electrical Engineering prior to application but other applicants are encouraged to consider the program if they have extensive background in mathematics and/or the basic sciences. In such cases, it may be necessary for a student to complete the entrance qualifications without receiving credit toward graduate studies. The general requirements for admission as outlined under the Regulations of the Graduate College must be met.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A master's degree in electrical engineering or the equivalent is recommended, however, exceptional applicants with a bachelor's degree in electrical engineering or the equivalent may be directly admitted. Admission to the Ph.D. program from applicants outside of electrical engineering may need to complete entrance qualifications without receiving course credit towards graduate studies.

### Minimum Degree Requirements for the Degree of Doctor of Philosophy

A total of 75 credit hours of graduate work are required for the Ph.D. degree, with at least 51 credits taken in residence at UVM and at least 30 credits in coursework, 15 of which must be graded at UVM

following matriculation into the program and at least 9 of which must be at the 6000- or 7000-level. These courses should be selected to meet the following requirements:

2 courses to satisfy the EE Ph.D. core requirement ( $\geq 6$ credit hours), which consists of EE 6110 (System Theory) and EE 6120 (Stochastic Processes). These courses are typically offered in alternate years in the fall semester. To achieve candidacy, students must complete both courses with a B or better grade.	
At least 3 additional courses ( $\geq 9$ credit hours) of advanced topics in electrical engineering (5000-level or higher) specifically selected with their graduate advisor to facilitate your research goals.	
To bolster their background in a particular area and with their advisor's approval, a student may apply 3 3000- or 4000-level credit hours to their Ph.D. degree requirements. These credits may apply to the 75 in total required but not to the 15 credits of EE coursework specified above. Students interested in taking this course for graduate credit will need to submit a Permission to Take a 3000/4000 Level Course for Graduate Credit Form to the Graduate College before the first day of class.	
A student with a M.S. degree in Electrical Engineering can apply up to 24 credit hours from this M.S. degree toward the Ph.D. coursework requirements, subject to the approval of the EE graduate studies committee.	
At least 20 credit hours of EE 7491, doctoral dissertation research, supervised by the student's Ph.D. advisor.	
Following the successful completion of all course and research credits, students requiring continuing registration must enroll in either GRAD 9010 (less than half-time), GRAD 9020 (at least half-time), or GRAD 9030 (full-time) as a reflection of their current research activity.	

Students should complete a coursework plan in their first year of Ph.D. studies, and submit this plan to the graduate studies committee for review.

### Comprehensive Examination

In order to be advanced to candidacy for the Doctor of Philosophy in Electrical Engineering, a Ph.D. student is required to pass the Comprehensive Examination, prior to the start of a candidate's 4th semester of study, and no later than the end of the student's 4th semester (with the potential for an adjusted timeline for part-time students).

The written part of the examination will be a report presented in the form of an IEEE conference paper, with the format of double column and maximum length of 6 pages. The paper will be focused on a research topic in the area of the candidate's dissertation work, and will comprise three Specific Aims:

1. Introduction, background and literature review related to the research problem. Development of a comprehensive bibliography related to their research topic.
2. A clear description of open issues related to the research topic. Discussion of the value and innovative aspects of the student's proposed research.

3. Proposed research approach description, hypothesis(es) and/or goal(s), potential barriers and possible solutions, preliminary data, and experimental design plan.

The first aim will demonstrate the student's ability to collect and contextualize prior art in the area of research. The second aim will demonstrate the student's ability to identify new research problems and justify their value to the field. The third aim will be a "stretch aim" that extends beyond the completed aspects of the candidate's research. In this third aim, the candidate will be expected to exhibit evidence of an ability to generate imaginative and thoughtful hypotheses, and to think laterally about how their PhD research area could be developed in a new direction. The candidate should gain the approval of their thesis committee regarding the general area of the proposal prior to beginning work on it.

The oral part of the comprehensive examination will be a formal seminar by the student in front of the faculty committee, to take place after the committee members have had a chance to review the written report, which should be in the hands of the committee members at least 2 weeks prior to the oral presentation. The student will be asked to defend the paper and to answer any additional questions the committee members feel appropriate. It is expected that there will be specific questions directly associated with broad electrical engineering fundamentals. The Ph.D. comprehensive exam is meant to be "integrative", as in combining multiple theorems/definitions/results/concepts from different EE courses and topics. Questions may go beyond any single theorem or result or definition to allow students to show that they have attained mastery of EE graduate core Materials at the PhD level. The expectation is that the oral portion will be completed prior the start of the student's 3rd semester.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Candidacy is achieved with successful completion of the exam and successful completion (B or higher) of the second EE core course (EE 6110 or EE 6120) before the end of their 4th semester.

The majority of students will have completed a core program comprising graduate courses before taking the comprehensive examination.

## ENGINEERING MANAGEMENT

**This program is not currently accepting students.**

### FACULTY

**Burkman, Kenneth<sup>P</sup>**; Senior Lecturer, Department of Engineering Management; MS, Naval Postgraduate School

**Buzas, Jeff Sandor**; Professor, Department of Mathematics and Statistics; PHD, North Carolina State University Raleigh

**Dewoolkar, Mandar M.**; Professor, Civil and Environmental Engineering; PHD, University of Colorado Boulder

**Dubief, Yves C.**; Associate Professor Department of Mechanical Engineering; PHD, Institut National Polytechnique de Grenoble

**Frolik, Jeff L.**; Professor, Department of Electrical and Biomedical Engineering; PHD, University of Michigan Ann Arbor



**Huston, Dryver R.;** Professor, Department of Mechanical Engineering; PHD, Princeton University  
**Lucas, Marilyn T.;** Associate Professor, Grossman School of Business; PHD, University of Illinois Urbana-Champaign  
**Monsen, Erik;** Associate Professor, Grossman School of Business; PHD, University of Colorado at Boulder

<sup>P</sup> Practitioner-based appointment

## ENGINEERING MANAGEMENT AMP

This program is not currently accepting students.

## ENGINEERING MANAGEMENT M.S.

This program is not currently accepting students.

## ENGLISH

<http://www.uvm.edu/cas/english/>

### OVERVIEW

The degree combines the history of literatures in English, from the Medieval period to the 21st century, with literary theory and cultural criticism. The department also has graduate faculty who specialize in Film and Television Studies, and Rhetoric and Composition.

### DEGREES

English AMP (p. 145)

English M.A. (p. 146)

### FACULTY

**Alexander, Sarah C.;** Associate Professor, Department of English; PHD, Rutgers University  
**Barnaby, Andrew Thomas;** Professor, Department of English; PHD, Princeton University  
**Baruth, Philip Edward;** Professor, Department of English; PHD, University of California Irvine  
**Bernard, Emily E.;** Professor, Department of English; PHD, Yale University  
**Bessette, Jean M.;** Associate Professor, Department of English; PHD, University of Pittsburgh  
**Bottoms, Gregory Todd;** Professor, Department of English; MFA, University of Virginia  
**Fenton, Elizabeth A.;** Professor, Department of English; PHD, Rice University  
**Fogel, Daniel Mark;** Professor, Department of English; PHD, Cornell University  
**Gennari, John;** Professor, Department of English; PHD, University of Pennsylvania  
**Harrington, Susanmarie;** Professor, Department of English; PHD, University of Michigan Ann Arbor  
**Huh, Jinny;** Associate Professor, Department of English; PHD, University of Southern California  
**Jenemann, David;** Dean, Honors College; Professor, Department of English; PHD, University of Minnesota Twin Cities  
**Kete, Mary Louise;** Professor, Department of English; PHD, Harvard University

**Lindstrom, Eric Reid;** Professor, Department of English; PHD, Yale University  
**Losambe, Lokangaka;** Professor, Department of English; PHD, University of Ibadan  
**Magistrale, Anthony Samuel;** Professor, Department of English; PHD, University of Pittsburgh  
**McGowan, Todd;** Professor, Department of English; PHD, Ohio State University  
**Morgan Parmett, Helen;** Associate Professor, Department of English; PHD, University of Minnesota, Twin Cities  
**Neroni, Hilary L.;** Professor, Department of English; PHD, University of Southern California  
**Nilsen, Sarah Dawn;** Associate Professor, Department of English; PHD, University of Southern California  
**Noel, Deborah;** Senior Lecturer, Department of English; PHD, University of Georgia  
**Rohy, Valerie;** Professor, Department of English; PHD, Tufts University  
**Schnell, Lisa Jane;** Associate Professor, Department of English; PHD, Princeton University  
**Scott, Helen C.;** Professor, Department of English; PHD, Brown University  
**Sisk, Jennifer L.;** Associate Professor, Department of English; PHD, Yale University  
**Turner, Sarah;** Senior Lecturer, Department of English; PHD, Case Western Reserve University  
**Witters, Sean A.;** Senior Lecturer; Department of English; PHD, Brandeis University  
**Yoo, Hyon Joo;** Associate Professor, Department of English; PHD, Syracuse University

## ENGLISH AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

The Accelerated Master's Degree Pathway (AMP) is designed to allow current UVM undergraduate students to earn both bachelor's and master's degrees within a total of 5 years. Accepted AMP students in the department of English begin work toward their M.A. during their senior year while completing the B.A. Up to 9 credits may be taken in the senior year that count toward both the B.A. and the M.A.. 3 credits toward the MA are then taken in the summer after graduation, and the remaining MA credits (9 per semester) are completed in year 5.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Arts for Accelerated Students

An undergraduate major in English or its equivalent with evidence (in the form of transcripts, letters of recommendation from UVM faculty members, and writing sample) that the applicant's undergraduate career has adequately prepared him or her for the particular demands of graduate study (please contact the Director of Graduate Studies with questions regarding preparedness for graduate-level study of

English); minimum cumulative GPA of 3.0; and demonstration of proficiency in writing (both by a statement of purpose detailing the applicant’s academic interests and research agenda and by the writing sample). GRE scores are not required.

AMP students must choose the thesis or comprehensive option before the end of their senior year. Those AMP students electing to follow the thesis track must identify the thesis advisor before the end of the senior year. By the end of that academic year these thesis students will also submit a comprehensive reading list that will be the basis of preparation for the thesis exam. Those AMP students electing to follow the comprehensive track will choose advisors and submit reading lists for 3 field exams by the end of their senior year.

**Minimum Degree Requirements for the Degree of Master of arts**

OPTION A (THESIS)		
Completion of 24 credits of course work (normally 8 courses)		24
ENGL 6391	Master's Thesis Research	6
Following completion of the Bachelor's Degree, students may take 1 3000- or 4000-level course for graduate credit with approval of the course Instructor, the Director of Graduate Studies, and the Graduate College. Courses at the 3000- or 4000- level taken before completion of the Bachelor's will not count toward the Master's Degree. At least 6 credits of graded coursework must be at the 6000-level. Candidates must also submit a relevant reading list, pass a 4-hour written comprehensive exam based on it, write an acceptable thesis, and defend the thesis successfully in a 1-hour oral exam.		

OPTION B (COMPREHENSIVE OPTION)		
Completion of 30 credits of course work (normally 10 courses)		30
Following completion of the bachelor's Degree, students may take 1 3000- or 4000-level course for graduate credit with approval of the course Instructor, the Director of Graduate Studies, and the Graduate College. Courses at the 3000- or 4000- level taken before completion of the Bachelor's will not count toward the Master's Degree. At least 6 credits of graded coursework must be at the 6000-level. Candidates must submit 3 reading lists (covering 3 different areas of the discipline) and pass a 4-hour written comprehensive exam based on them.		

**Comprehensive Examination**

AMP students writing a thesis take their exam in the fall of their fifth year of study (first year following completion of the bachelor's degree). Students completing the Comprehensive Option track take their exam in the spring of their fifth year of study (first year following completion of the bachelor's degree). In both cases, the exam consists of three 75-minute essays. Exams are open-book and open-notes, but no portion of the exam may be pre-written.

For the Thesis Option exam, the student's first and second readers evaluate all 3 essays. If their assessments differ on any essay, the Director of Graduate Studies will ask an appropriate third reader to break the tie. Students who fail 1 or more essays have failed the examination and may ask to be re-tested not less than 1 month after the examination date. The first reader, in consultation with the second reader, will determine what constitutes a fair re-examination.

Both readers assess the re-examination essay or essays. Students who fail all or part of their re-examination must leave the Master's program.

For the Comprehensive Option, each of the student's 3 examiners will provide the student with an examination question. (A faculty member may write more than 1 question and offer the student a choice of essays to write.) The composer of each question grades that response. Students who fail 1 of their 3 essays may be re-tested in that area. Students who fail 2 or 3 areas must retake the entire examination. Any student who fails any part of the re-examination must leave the Master's program.

**Requirements for Advancement to Candidacy for the Degree of Master of arts**

Completion of the above requirements.

**ENGLISH M.A.**

All students must meet the Requirements for the Master's Degree (p. 270)

**OVERVIEW**

The degree combines the history of literatures in English, from the Medieval period to the 21st century, with literary theory and cultural criticism. The department also has graduate faculty who specialize in Film and Television Studies, and Rhetoric and Composition.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Arts**

An undergraduate major in English or its equivalent with evidence (in the form of transcripts, letters of recommendation, and writing sample) that the applicant’s undergraduate career provided adequate preparation for the particular demands of graduate study (please contact the Director of Graduate Studies with questions regarding preparedness for graduate-level study of English); and demonstration of proficiency in writing (both by a statement of purpose detailing the applicant’s academic interests and research agenda and by the writing sample).

**Minimum Degree Requirements for the Degree of Master of Arts**

OPTION A (THESIS)		
Completion of 24 credits of course work (normally 8 courses)		24
ENGL 6391	Master's Thesis Research	6
Students may take 1 3000- or 4000-level course for graduate credit with approval of the course Instructor, the Director of Graduate Studies, and the Graduate College. At least 6 credits of graded coursework must be at the 6000-level. Candidates must also submit a relevant reading list, pass a 4-hour written comprehensive exam based on it, write an acceptable thesis, and defend the thesis successfully in a 1-hour oral exam. Please note that all incoming Teaching Assistants are required to take ENGL 6790. This 3-credit course does count toward the requisite number of credits for course work (for both options).		

OPTION B (COMPREHENSIVE OPTION)	
Completion of 30 credits of course work (normally 10 courses)	30
Students may take 1 3000- or 4000-level course for graduate credit with approval of the course Instructor, the Director of Graduate Studies, and the Graduate College. At least 6 credits of graded coursework must be at the 6000-level. Candidates must also submit a relevant reading list, pass a 4-hour written comprehensive exam based on it, write an acceptable thesis, and defend the thesis successfully in a 1-hour oral exam. Please note that all incoming Teaching Assistants are required to take ENGL 6790. This 3-credit course does count toward the requisite number of credits for course work (for both options).	

### Comprehensive Examination

Students writing a thesis take their exam in the fall of their second year. Students completing the Comprehensive Option track take their exam in the spring of their second year. In both cases, the exam consists of three 75-minute essays. Exams are open-book and open-notes, but no portion of the exam may be pre-written.

For the Thesis Option exam, the student's first and second readers evaluate all three essays. If their assessments differ on any essay, the Director of Graduate Studies will ask an appropriate third reader to break the tie. Students who fail 1 or more essays have failed the examination and may ask to be re-tested not less than 1 month after the examination date. The first reader, in consultation with the second reader, will determine what constitutes a fair re-examination. Both readers assess the re-examination essay or essays. Students who fail all or part of their re-examination must leave the Master's program.

For the Comprehensive Option, each of the student's 3 examiners will provide the student with an examination question. (A faculty member may write more than 1 question and offer the student a choice of essays to write.) The composer of each question grades that response. Students who fail 1 of their 3 essays may be re-tested in that area. Students who fail 2 or 3 areas must retake the entire examination. Any student who fails any part of the re-examination must leave the Master's program.

### Requirements for Advancement to Candidacy for the Degree of Master of Arts

Completion of the above requirements.

## FIELD NATURALIST (PLANT BIOLOGY)

<http://www.uvm.edu/cals/plantbiology/field-naturalist-program>

### OVERVIEW

The Field Naturalist Program is a unique field-based experience that develops the potential of future conservation leaders by emphasizing scientific integration, oral and written communication, and environmental problem solving. Students receive a solid grounding in field-related sciences and are trained to integrate scientific disciplines into a coherent whole at the landscape level. Students also develop competence in evaluating field sites from a number of perspectives and/or criteria, translating scientific insights

into ecologically sound decisions, and communicating effectively to a wide range of audiences.

### DEGREES

Field Naturalist (Plant Biology) M.S. (p. 147)

### FACULTY

**Barrington, David Stanley**; Professor Emeritus, Department of Plant Biology; PHD, Harvard University

**Beckage, Brian**; Professor, Department of Plant Biology; PHD, Duke University

**Keller, Stephen Robert**; Associate Professor, Department of Plant Biology; PHD, University of Virginia

**Paris, Catherine Ann**; Senior Lecturer Emerita, Department of Plant Biology; PHD, University of Vermont

**Poleman, Walter Mallery**; Director, Field Naturalist Program; Senior Lecturer, Rubenstein School of Environment and Natural Resources; PHD, University of Vermont

## FIELD NATURALIST (PLANT BIOLOGY) M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Field Naturalist Program is a unique field-based experience that develops the potential of future conservation leaders by emphasizing scientific integration, oral and written communication, and environmental problem solving. Students receive a solid grounding in field-related sciences and are trained to integrate scientific disciplines into a coherent whole at the landscape level. Students also develop competence in evaluating field sites from a number of perspectives and/or criteria, translating scientific insights into ecologically sound decisions, and communicating effectively to a wide range of audiences.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science, Field Naturalist Option

- Sustained interest and engagement in the environment
- A track record of academic and professional achievement in science or environment
- At least some coursework in the natural sciences
- At least 3 years of job, professional, or life experience after college

#### Minimum Degree Requirements

All students must successfully complete a total of 30 credit hours including a set of core courses in the field sciences and professional writing as well as elective courses in the life sciences, earth sciences, and ecology, to be chosen in consultation with the program director and studies committee. At least 6 credits must be at the 6000-level or above. Satisfactory completion of an oral comprehensive examination is required. A Field Naturalist student's degree culminates in satisfactory completion of a field project for a sponsoring organization that includes a professional report, a



literature review, two oral presentations, and a journal publication or a popular article for a general audience.

### Comprehensive Examination

An oral examination takes place in the student's second year. During this examination the student identifies, inventories and assesses the pieces, patterns, and processes of a previously unvisited field site, then presents findings in a manner that would be meaningful to staff, officers, and scientists of a professional conservation organization.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Satisfactory completion of an oral comprehensive examination.

## FOOD SYSTEMS

[https://www.uvm.edu/foodsystems/graduate\\_programs](https://www.uvm.edu/foodsystems/graduate_programs)

### OVERVIEW

Food Systems is an exciting and flourishing domain of inquiry, one that looks at the complex and interdependent relationships between humans and their food - everything from microbes found in compost facilities to global trade agreements.

Always keeping in mind that food systems are evolving and dynamic, our curriculum integrates social science, humanities and natural science approaches to understanding connections among vital interests of humanity in creating nourishment, pursuing health and well-being and sustaining the environment.

The program draws from over 40 UVM faculty members with primary affiliations in 14 departments extended across 5 colleges. The program curriculum integrates humanities, social and natural science approaches to understanding complex and interdependent food systems of varying scope and scale.

Students examine key issues in our contemporary food system through:

- Collaborate with community partners on a variety of food systems problems and solutions
- Engage in experiential education from farm-to-plate, in the field and in the laboratory
- Integrate ideas and knowledge using a transdisciplinary approach

### DEGREES

Food Systems AMP (p. 149)

Food Systems M.S. (p. 149)

Food Systems Ph.D. (p. 150)

### FACULTY

**Aiyar, Anaka;** Assistant Professor, Department of Community Development and Applied Economics; PhD, University of California-Riverside

**Anderson, Colin;** Research Associate Professor, Department of Plant and Soil Science. PHD, University of Manitoba

**Barlow, John;** Associate Professor, Department of Animal and Veterinary Sciences; DVM, University of Illinois Urbana-Champaign; PHD, University of Vermont

**Belarmino, Emily Morgan;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, London School of Hygiene and Tropical Medicine

**Bertmann, Farryl;** Senior Lecturer, Department of Nutrition and Food Sciences; PHD, Arizona State University

**Bhurosy, Trishnee;** Assistant Professor, Department of Nutrition and Food Science; PhD, Indiana University School of Public Health-Bloomington

**Bishop-von Wettberg, Eric;** Associate Professor, Department of Plant and Soil Science; PHD, Brown University

**Bose, Pablo Shiladitya;** Associate Professor, Department of Geography; PHD, York University

**Chase, Lisa;** Extension Professor: Natural Resources Specialist and Director of the Vermont Tourism Research Center; PHD, Cornell University

**Chen, Yolanda H.;** Associate Professor, Department of Plant and Soil Science; PHD, University of California Berkeley

**Conner, David S.;** Associate Professor, Department of Community Development and Applied Economics; PHD, Cornell University

**DeWitt, Rocki-Lee;** Professor, Grossman School of Business; PHD, Columbia University

**Doggett, Tyler;** Professor, Department of Philosophy; PHD, Massachusetts Institute of Technology

**Etter, Andrea J.;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, Purdue University

**Farley, Joshua C.;** Professor, Department of Community Development and Applied Economics; PHD, Cornell University

**Floreani, Rachael Ann;** Associate Professor, Department of Mechanical Engineering; PHD, Colorado State University

**Galford, Gillian;** Research Assistant Professor, Rubenstein School of Environment and Natural Resources; PHD, Brown University

**Garnett, Bernice Raveche;** Associate Professor, Department of Education; SCD, Harvard University

**Gennari, John;** Professor, Department of English; PHD, University of Pennsylvania

**Heiss, Sarah Noel;** Associate Professor, Department of Community Development and Applied Economics; PHD, Ohio University

**Hurley, Stephanie E.;** Associate Professor, Department of Plant and Soil Science; DDES, Harvard University

**Izzo, Victor;** Senior Lecturer, Department of Plant and Soil Science; PHD, University of Vermont

**Jorgenson, Simon;** Assistant Professor, Department of Education; PHD, University of Cincinnati

**Kraft, Jana;** Associate Professor, Department of Animal and Veterinary Sciences; PHD, Friedrich-Schiller-University of Jena

**Leslie, Isaac (Ike);** Assistant Professor, Department of Extension—Programming and Faculty Support; PhD, University of Wisconsin-Madison

**Mares, Teresa Marie;** Associate Professor, Department of Anthropology; PHD, University of Washington

**Mazzoni, Cristina;** Wolfgang and Barbara Mieder Green and Gold Professor of Italian; PHD, Yale University

**Mendez, Victor E.;** Professor, Department of Plant and Soil Science; PHD, University of California Santa Cruz



**Merrill, Scott;** Research Assistant Professor, Department of Plant and Soil Science, PHD, Colorado State University

**Morse, Cheryl E.;** Associate Professor, Department of Geography; PHD, University of British Columbia

**Neher, Deborah;** Professor, Department of Plant and Soil Science; PHD, University of California Davis

**Niles, Meredith;** Associate Professor, Department of Nutrition and Food Sciences; PHD, University of California-Davis

**Pope, Lizzy;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, University of Vermont

**Reynolds, Travis;** Associate Professor, Department of Community Development and Applied Economics; PHD, University of Washington

**Scarborough, Matthew;** Assistant Professor, Department of Civil and Environmental Engineering; PHD, University of Wisconsin-Madison

**Skinner, R. Chris;** Assistant Professor, Department of Nutrition and Food Science; PhD, West Virginia University

**Smith, Julia M.;** Research Associate Professor, Department of Animal and Veterinary Sciences; DVM, Cornell University

**Tobin, Daniel;** Assistant Professor, Department of Community Development and Applied Economics; PHD, Pennsylvania State University

**Trubek, Amy B.;** Professor, Department of Nutrition and Food Sciences; PHD, University of Pennsylvania

**Usher, Mark D.;** Lyman-Roberts Professor of Classics, Department of Classics; PHD, University of Chicago

**Zia, Asim;** Professor, Department of Community Development and Applied Economics; PHD, Georgia Institute of Technology

## FOOD SYSTEMS AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

### OVERVIEW

Qualified University of Vermont undergraduate students who plan to earn a Master's degree in Food Systems may enroll in the Accelerated Master's Pathway (AMP), which enables students to begin working on a master's degree while still an undergraduate. Students apply to the program in the second semester of their Junior year or the first semester of their Senior year. After admission to the graduate program by the Graduate College, students will choose up to 9 credits of graduate level courses from the list of approved electives below that can be taken while still an undergraduate. The student should also take whichever required course(s) are offered in the semester of their admission. These credits will also count towards the Master's Degree.

### APPROVED ELECTIVES - FOR AMP STUDENTS PRIOR TO COMPLETION OF THE BACHELOR'S DEGREE.

CDAE 6260 - Community Economic Development

CDAE 6540 - Advanced Microeconomics

PA 6060 - Policy Systems

PA 6170 - Systems Analysis & Strategic Management

PH 6120 - Food Systems & Public Health

CDAE 6210- Economics of Sustainable Food Systems

NFS 5254 - Global Food Safety

### SPECIFIC REQUIREMENTS

Must be a UVM student with a declared Major or Minor in Food Systems. Please visit the Food Systems Graduate program website for application information and deadlines.

### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Master's Students

- A declared Food Systems Major or Minor
- Cumulative GPA of 3.00 or higher
- Completion of a college-level statistics course
- Completion of the Graduate College application form and 3 letters of recommendation, including a faculty letter of support from a current Food Systems Graduate Faculty member

### Minimum Degree Requirements

31 credits, including:		
Required Courses:		
FS 6400	Food Systems & Society	3
FS 6450	Food Systems & Science	3
FS 6475	Food Systems & Policy	3
FS 6510	Professional Development Sem.	1
FS 6520	Research Design Seminar	3
FS 6392	Master's Project Research (Project Students)	3-4
FS 6391	Master's Thesis Research (Thesis students)	6
At least 1 methods class		3
The remainder of required credit hours must be satisfied through graded electives. This is 11-12 credits for students completing a project and 9 credits for students completing a thesis.		
Students taking FS 6391 must complete and defend a thesis in order to graduate. Students taking FS 6392 must complete and defend a project in order to graduate.		

### Comprehensive Examination

There is a required comprehensive exam that involves a written component and oral defense of the Master's Project or Thesis Proposal.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Satisfactory completion of the Comprehensive Exam.

### FOOD SYSTEMS M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

Food Systems M.S. graduates gain a broad and deep understanding of contemporary food systems, as well as a set of applied skills and experience – preparing them to succeed.

Most students complete required coursework and spend one semester designing and researching a final project. However, upon request of a Food Systems faculty member, a student can design and complete a year-long thesis research project.

For more information, please contact the Program Coordinator.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

The Food Systems Graduate Program is transdisciplinary and involves an understanding of social, physical, and life science concepts related to food from production through consumption. Therefore, students from all academic backgrounds are welcome to apply.

Minimum requirements include:

- GPA of 3.00 or higher.
- TOEFL or IELTS exam scores must be submitted if you are an international student.
- Completion of a college-level statistics course. If this information is not clearly listed on a college transcript, you will need to provide additional documentation as evidence that you have fulfilled this requirement.

### Minimum Degree Requirements

31 credit hours, including:

Required Courses:		
FS 6400	Food Systems & Society	3
FS 6450	Food Systems & Science	3
FS 6475	Food Systems & Policy	3
FS 6510	Professional Development Sem.	1
FS 6520	Research Design Seminar	3
FS 6392	Master's Project Research (Project Students)	3-4
FS 6391	Master's Thesis Research (Thesis Students)	6
At least 1 methods course		3
The remainder of required credit hours must be satisfied through graded electives. This is 11-12 credits for students completing a project, and 9 credits for students completing a thesis.		
Students taking FS 6391 must complete and defend a thesis in order to graduate. Students taking FS 6392 must complete and defend a project in order to graduate.		

## Comprehensive Examination

There is a required comprehensive exam that involves a written component and oral defense of the Master's Project or Thesis Proposal.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Satisfactory completion of all degree requirements and the Comprehensive Exam.

## FOOD SYSTEMS PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree

## OVERVIEW

The Ph.D. in Food Systems combines a comprehensive investigation of food systems and a commitment to developing methods for solving the current problems of the food system through a cohort intensive experience. Every year, the food systems cohort will work together to address problems and devise potential solutions. Students then move towards disciplinary depth and mastery by designing a course of study with a dissertation committee and developing a research proposal. Students will also engage in independent research.

## SPECIFIC REQUIREMENTS

### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

There are two ways for a potential Ph.D. candidate to pursue this program. First, a student with a BA/BS can apply to the Ph.D. program. Second, a student can apply to the PhD after completing an M.A. or M.S. in an allied field, either at the University of Vermont or at another institution.

Minimum requirements include:

- GPA of 3.00 or higher
- TOEFL or IELTS exam scores must be submitted if you are an international student.
- Completion of a college-level statistics course. If this information is not clearly listed on a college transcript, you will need to provide additional documentation as evidence that you have fulfilled this requirement.
- A letter of support from a Food Systems Faculty member who agrees to serve as primary advisor during enrollment in the PhD Program.

### MINIMUM DEGREE REQUIREMENTS

75 credits, including a minimum of 30 hours of graded coursework and 20 credits of supervised dissertation research.

Required Courses:		
FS 6400	Food Systems & Society	3
FS 6450	Food Systems & Science	3

FS 6475	Food Systems & Policy	3
FS 6520	Research Design Seminar	3
FS 7491	Doctoral Dissertation Research	minimum of 20 credits
EDLP 7090	Dissertation Writing Seminar	1-3
or FS 6600	Dissertation Writing Seminar	
Students must also take a minimum of 9 credits of methodology coursework in consultation with advisor that represent a variety of methodological and research design approaches, such as FS 6350, CDAE 6510, EDRM 6310, and CSYS 6020. Consult with advisor for complete list.		
Students must also take FS 6810 - Issues and Solutions Seminar 2 times during their course of study. This is a 1-credit seminar.		
		2

## COMPREHENSIVE EXAMINATION

The comprehensive examination is a tool to evaluate the progress of each student and ensure that they are prepared to proceed toward the doctorate degree.

Phase 1 is an oral exam that tests the student's ability to read, analyze and synthesize scholarly knowledge across disciplines as well as to design a research-based response to a specific food systems issue or problem.

Phase 2 includes two steps: a dissertation pre-proposal and proposal submission. The form, content and timeline will be explained to the student by their advisor and will follow guidelines set forth by the Student Development & Evaluation Committee, in collaboration with the student's dissertation committee.

## REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Maintain a 3.00 GPA in designated first and second year courses and successful completion of the comprehensive exam.

## GEOLOGY

<http://www.uvm.edu/~geology/>

### OVERVIEW

The Master of Science in geology is a rigorous research thesis program with grounding in related course work. Research programs include environmental geology; geomorphology; water resources; environmental (bio)geochemistry; mineralogy; sedimentary, igneous and metamorphic environments; geochronology and structural geology; tectonics; and the evolution of orogen. Examples of specific faculty interests include geologic history and recent sedimentation in the Lake Champlain Basin; processes and chronology of glaciation; stable and cosmogenic isotopic studies; water quality and pollutant transport; crystal chemistry and crystallography; mineral structure analysis; molecular-scale environmental mineralogy; (bio)geochemical cycling in the critical zone; the tectonic evolution of continental margins and interiors; petrofabric and structural analysis of deformed rocks; partial melting and deep crustal

processes; timing of deformation and rates of tectonic processes; and stratigraphy and sedimentary environments of lower Paleozoic sandstones and carbonates.

## DEGREES

Geology M.S. (p. 151)

## FACULTY

**Coghill-Wemple, Beverley;** Professor, Department of Geography and Geosciences; PHD, Oregon State University

**Diehl, Rebecca;** Research Assistant Professor, Department of Geography and Geosciences; PHD, Utah State University

**Dupigny-Giroux, Lesley-Ann;** Professor, Department of Geography and Geosciences; PHD, McGill University

**Klepeis, Keith Andrew;** Professor, Department of Geography and Geosciences; PHD, University of Texas Austin

**Lini, Andrea;** Associate Professor, Department of Geography and Geosciences; PHD, ETH-Zurich

**Perdrial, Julia Nathalie;** Assistant Professor, Department of Geography and Geosciences; PHD, Université Louis-Pasteur, Strasbourg, France

**Perdrial, Nicolas;** Research Assistant Professor, Department of Geography and Geosciences; PHD, Université Louis-Pasteur, Strasbourg, France

**Rayback, Shelly A.;** Associate Professor, Department of Geography and Geosciences; PHD, University of British Columbia

**Schroth, Andrew W.;** Research Associate Professor, Department of Geography and Geosciences; PHD, Dartmouth College

**Webb, Laura E.;** Associate Professor, Department of Geography and Geosciences; PHD, Stanford University

## GEOLOGY M.S.

All students must meet the Requirements for the Master's Degree (p. 270).

### OVERVIEW

The Master of Science in Geology is a rigorous research thesis program with grounding in related course work. Research programs include environmental geology; geomorphology; water resources; environmental (bio)geochemistry; mineralogy; sedimentary, igneous and metamorphic environments; geochronology and structural geology; tectonics; and the evolution of orogen. Examples of specific faculty interests include geologic history and recent sedimentation in the Lake Champlain Basin; processes and chronology of glaciation; stable and cosmogenic isotopic studies; water quality and pollutant transport; crystal chemistry and crystallography; mineral structure analysis; environmental mineralogy; water-rock interactions; (bio)geochemical cycling in the critical zone; the tectonic evolution of continental margins and interiors; petrofabric and structural analysis of deformed rocks; partial melting and deep crustal processes; timing of deformation and rates of tectonic processes; and stratigraphy and sedimentary environments of lower Paleozoic sandstones and carbonates.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

- Bachelor's degree in geology or related field from an accredited institution with year-long courses in chemistry, physics, biology, and mathematics preferred. The M.S. program is also open to undergraduate majors in physics, chemistry, biology, engineering or mathematics who have accumulated 12 semester hours of course work in geology.
- Strong undergraduate record, letters of recommendation, and satisfactory basic GRE scores.

Applicants should identify a potential faculty advisor (or advisors) and include research interests in the application statement.

Acceptance to the program is a competitive process and admission is dependent upon available Teaching and/or Research Fellowships.

### Minimum Degree Requirements for the Degree of Master of Science

Admitted students will be assigned a 3-person advisory committee at the beginning of the first year of graduate study. The committee will prescribe a study program based on the interests of the student and the principal graduate advisor.

For the thesis option, successful writing, oral presentation and defense of a research thesis are required. Satisfactory completion will be determined by the candidate's thesis committee. Advanced courses in geology must total at least 30 semester hours, including 6 to 9 credits for thesis research. At least 6 credits of graded coursework must be at the 6000-level. Students enrolled in a traditional (thesis) M.S. cannot switch to the non-thesis option without prior approval from the thesis committee.

For the non-thesis option, at the time of enrollment the student must select a general area in which to write a project report. The report is the culmination of independent study and may be the result of an extensive literature search, fieldwork, laboratory work, or similar effort. The report must follow the general guidelines for writing a thesis and is subject to the principal advisor's approval. Advanced courses in geology must total at least 30 semester hours, including 3 to 6 credits for research. At least 6 credits of graded coursework must be at the 6000-level.

Both options require giving a public oral defense after the thesis or non-thesis research project is completed.

For both options, a minimum of 15 graded credits used in compilation of the graduate GPA must be taken in residence at UVM. Advanced courses in related sciences are encouraged and may be substituted for some selected geology courses on approval by the departmental advisor. With the prior approval of their department and the Graduate College, students may apply one 3000- or 4000-level, 3-credit undergraduate course towards their graduate program. A student's advisor must petition the Graduate College for approval before the student enrolls in the course. Consult individual programs

for further limitations. Under no circumstances will a course numbered below 3000 be applicable to a master's program.

### Comprehensive Examination

The comprehensive exam for the Geology M.S. comprises 2 parts. Part 1 is a written research proposal and oral presentation that must be completed before the end of the second semester. The proposal must discuss the research objectives and their significance and include a work plan demonstrating feasibility. The presentation is followed by geology faculty/thesis committee questions that cover the assumptions, methodology, and the relationship of the proposed work to and its dependence on auxiliary sciences. Part 2 is a written progress report and oral presentation and must be completed before the end of the third semester. The progress report presents the latest research findings and must demonstrate sufficient progress toward the M.S. degree. Faculty/committee questions cover the data presented, interpretations, and work plan to complete the thesis.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Advancement to candidacy requires satisfactory completion of a comprehensive examination. The comprehensive examination includes both a written and oral 1) research proposal and 2) progress report during the second and third semesters of enrollment, respectively.

## GERMAN

This program is not currently accepting students.

### FACULTY

**Schreckenberger, Helga;** Professor, Department of German and Russian; PHD, University of Kansas

## GERMAN M.A.

This program is not currently accepting students.

## GREEK AND LATIN

<http://www.uvm.edu/~classics/>

### OVERVIEW

Our program emphasizes mastery of general philological skills in Greek and Latin, in preparation for further training at the doctoral level, teaching in public and private highschools, and a variety of other interesting paths. Current faculty research interests include Mycenaean and Homeric Greece; Greek and Latin lyric poetry; Greek drama; Attic orators; ancient literary criticism; Greek and Roman philosophy and intellectual history; Greek and Roman historiography; Latin epic and satire; Greek and Roman technical authors; Roman imperial families; mythology; the Ancient Near East and Egypt; ancient music and performance.

### DEGREES

Greek and Latin AMP (p. 153)

Greek and Latin M.A. (p. 153)



Greek and Latin M.A.T. (p. 154)

## FACULTY

**Baily, Jacques A.;** Associate Professor, Department of Classics; PHD, Cornell University

**Chiu, Angeline C.;** Associate Professor, Department of Classics; PHD, Princeton University

**Franklin, John C.;** Professor, Department of Classics; PHD, University College London

**Usher, Mark David;** Associate Professor, Department of Classics; PHD, University of Chicago

## GREEK AND LATIN AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway

### OVERVIEW

This Accelerated Master's Entry Pathway (AMP) offers select UVM undergraduate students of Greek and Latin an opportunity to earn both the bachelor's and master's degrees in Greek and Latin in 5 years. 9 credits toward the M.A. are earned during the senior year that may also count toward the B.A. The remaining M.A. credits are completed in the 5th year. Full-time graduate student status can begin the summer after undergraduate graduation and be maintained until completion of the M.A. in Greek and Latin. Students typically pursue the master's degree in Greek and Latin either as a stepping stone to doctoral work (hopefully well-funded as a result), or to teaching in high schools (typically Latin).

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of arts for Accelerated Students

Students must apply for and be accepted to the AMP through the standard Graduate College application process. Normally, the application and admission process must be finalized prior to the beginning of the senior year (typically in the Spring of the junior year). Students must be admitted by the Graduate College before taking any courses that will apply to the master's degree, i.e., all courses used for the master's degree must be taken after formal admission to the AMP. Courses approved for graduate credit are 5000-level or higher with the prefix GRK, LAT, CLAS, or GKLT.

Consideration for admission requires the following:

- Minimum cumulative GPA of 3.00
- Minimum knowledge of Greek and Latin language: at least 1 course in each language at the 3700-level (the more the better).
- Standard Graduate College application, including:
- Completion of the Graduate College Application form
  - 3 letters of recommendation from UVM faculty members
  - Reading knowledge of German (preferred), French, or Italian. Students lacking this may submit a plan describing how they will acquire such knowledge outside of the Spring and Fall semester of their 5th year for consideration (e.g. intensive course in summer between 4th and 5th years).

### Minimum Degree Requirements for the Degree of Master of arts

TRACK A (NON-THESIS)	
30 credits of graded course work in advanced courses in Greek, Latin, Classics, or approved credits in related fields; at least 6 credits of coursework must be at 6000-level.	

Most students should expect to follow Track A, since maximum exposure to language and literature is usually most beneficial at this stage-of-career. The development of research and writing samples for subsequent Ph.D. applications comes rather from 4 research papers (1 per semester).

TRACK B (THESIS)	
24 credits of graded course work in advanced courses in Greek, Latin, Classics, or approved credits in related fields. At least 6 credits of coursework must be at 6000-level.	
6 credits of thesis research (CLAS 6391)	
Successful completion and defense of a master's thesis.	

Note: Students desiring to do an M.A. thesis must 1) secure explicit recommendations that they be allowed to do so from the 3 faculty who write recommendation letters for them to be admitted to the AMP; 2) identify the thesis advisor before the end of senior year; and 3) successfully complete the translation part of comprehensive M.A. Exams at the beginning of the Fall semester of their 5th year.

Both Options	
Comprehensive Examinations (see below)	

### Comprehensive Examination

Comprehensive Exams may be taken in the first and last 2 weeks of Fall and Spring semesters. The Exams are in the following subjects: 1) Greek and Latin sight translation of passages from the department's reading list. This must be attempted at the start of the fifth year; if not passed on the first attempt, it may be retaken at the start of the Spring term); 2) Greek and Roman History; 3) Literature and Philology. 4) Modern Language: reading knowledge of German (preferred), French, or Italian, sufficient to conduct research in that language.

### Requirements for Advancement to Candidacy for the Degree of Master of arts

Completion of all requirements listed above for either the thesis or the non-thesis option.

## GREEK AND LATIN M.A.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

Our program emphasizes mastery of general philological skills in Greek and Latin, in preparation for further training at the doctoral level, teaching in public and private high schools, and a variety of

other interesting paths. Current faculty research interests include Mycenaean and Homeric Greece; Greek and Latin lyric poetry; Greek drama; Attic orators; ancient literary criticism; Greek and Roman philosophy and intellectual history; Greek and Roman historiography; Latin epic and satire; Greek and Roman technical authors; Roman imperial families; mythology; the Ancient Near East and Egypt; ancient music and performance.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Arts**

An undergraduate major or minor or the equivalent; Greek and Latin language skills sufficient to take advanced courses (usually at least 2 years of each); a reading knowledge of a modern foreign language, usually French, German, or Italian.

**Minimum Degree Requirements**

Track A (Non-Thesis)	
30 credits of graded course work in advanced courses in Greek, Latin, Classics, or approved credits in related fields; at least 6 credits of coursework must be at 6000-level.	

Most students should expect to follow Track A, since maximum exposure to language and literature is usually most beneficial at this stage-of-career. The development of research and writing samples for subsequent Ph.D. applications comes rather from 4 research papers (1 per semester).

Track B (Thesis), by permission	
24 credits of graded course work in advanced courses in Greek, Latin, Classics, or approved credits in related fields. At least 6 credits of coursework must be at 6000-level.	
6 credits of thesis research (CLAS 6391)	
Successful completion and defense of a master's thesis	

Track B (Thesis) is by permission of the Faculty, and is reserved for those with sufficiently advanced philological skill; minimally candidates must have passed the Greek and Latin Exams by the beginning of the third semester.

Both Tracks	
Comprehensive Examinations (see below)	

**Comprehensive Examination**

Comprehensive Exams may be taken in the first and last 2 weeks of Fall and Spring semesters. The Exams are in the following subjects:

- Greek and Latin sight translation of passages from the department’s reading list (this exam must be attempted at the start of the third semester; if not passed on the first attempt, it may be retaken at the start of the fourth)
- Greek and Roman History
- Literature and Philology

- Modern Language (student must demonstrate reading knowledge of German (preferred), French, or Italian, sufficient to conduct research in that language)

**Requirements for Advancement to Candidacy for the Degree of Master of Arts**

Completion of all requirements listed above for either the non-thesis or thesis Track.

**GREEK AND LATIN M.A.T.**

All students must meet the Requirements for the Master's Degree (p. 270)

**OVERVIEW**

The M.A.T. is designed for 2 groups of people: those who already have licensure as secondary school teachers (but wish a higher qualification); and those who do not yet have licensure.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Arts in Teaching**

An undergraduate major or minor or the equivalent in Greek, Latin, or Classics; most importantly Greek and Latin language skills sufficient to take advanced courses (usually at least 2 years of each); a reading knowledge of a modern foreign language—especially German, French, or Italian—is highly recommended.

**Minimum Degree Requirements**

Those who already have licensure must complete a minimum of 30 credits of work, with at least 18 in the field of specialization (Latin, Greek and Classical Civilization courses) and at least 6 in education (consult with advisor in education). Those who are seeking licensure must complete at least 21 credits in the field of specialization and at least 30 credits in education (consult with advisor in education). In both cases at least 6 credits of coursework must be at the 6000-level.

In all cases, the individual program of study must be approved by advisors in Classics (for the Latin and related credits) and in Education (for the education credits).

Course requirements in Latin, Greek, or Classical Civilization include:

Students must complete 30 credits of Latin. The following substitutions may be possible at the discretion of the Classics faculty: 1 5000-level or higher course in Roman (or Greek) history; 1 5000-level or higher course in Roman (or Greek) Art History; and 5000-level Greek courses.	
A second foreign language is strongly recommended, either a modern one as a second teaching field, or Greek as a complement to Latin.	
The standards of performance in courses taken with the Department of Classics will be the same as for the M.A. in Greek and Latin.	

**Description and Timing of Comprehensive Examination**

Students must take Comprehensive Exams in their field of specialization as well as in Education (please consult with Education

for details about their comprehensive exam.) The student must pass the following specialization Exams:

- Latin sight translation Exam, to be taken at the end of the second semester (retaken, if needed, in the week before the start of third semester).
- Ancient History (emphasis on Roman, but including Greek and, if appropriate, Near Eastern History).
- Literature and Philology.
- Oral examination taken at the conclusion of the teaching Practicum.

The format of the Comprehensive Examinations is at the discretion of the faculty. Students pursuing licensure are strongly encouraged to complete these exams before the end of the second semester, if possible (candidates will be fully occupied by education requirements in their second year, and Classics faculty are not available to administer exams in the summer).

### Requirements for Advancement to Candidacy for the Degree of Master of Arts in Teaching

Completion of the above requirements.

## GREEK AND LATIN LANGUAGES

<http://www.uvm.edu/~classics/>

### OVERVIEW

Students and scholars in many disciplines (e.g. classics, history, English, Medieval studies, religious studies, philosophy) need proficiency in Latin and Greek to carry out research. Other students come to classics too late in their undergraduate career to acquire language proficiency at a level which qualifies them for Ph.D. or M.A.T. programs. Still other students are high school teachers who want to expand their repertoire of teaching subjects or who simply want to improve their mastery of their subject matter. Every year, excellent students inquire about the M.A. program who do not have sufficient Greek or Latin. Although some students may need to take a course or 2 prior to formally beginning the program in order to bring their Greek or Latin up to the level at which courses count for the certificate, this certificate offers an intensive language experience designed for such students.

### DEGREES

- Greek and Latin Languages (GKLT) CGS (p. 155)

### FACULTY

**Bailey, Jacques A.;** Associate Professor, Department of Classics; PHD, Cornell University

**Chiu, Angeline C.;** Associate Professor, Department of Classics; PHD, Princeton University

**Franklin, John C.;** Professor, Department of Classics; PHD, University College London

**Usher, Mark David;** Associate Professor, Department of Classics; PHD, University of Chicago

## GREEK AND LATIN LANGUAGES (GKLT) CGS

All students must meet the Requirements for the Certificates of Graduate Study (p. 269)

### OVERVIEW

Scholars in many disciplines (e.g. Classics, History, English, Medieval studies, Religion, Philosophy) need proficiency in Latin and Greek to conduct research. Other students come to Classics too late in their undergraduate career to have acquired language proficiency at a level which qualifies them for Ph.D. programs. Still others are high school teachers who want to expand their teaching repertoire, or improve their mastery. This certificate program offers an intensive language experience for such students. For students it can fulfill many of the same goals as Post-Baccalaureate programs elsewhere, but students are held to a graduate-level standard in most of their coursework. Students in the M.A. program who are unable to complete their Comprehensive Exams may receive the C.G.S. instead.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to the Certificate of Graduate Study

Greek and Latin language abilities sufficient to succeed in advanced courses (generally, the minimum is at least 3 semesters or the equivalent in each language; students will struggle if they meet only the minimum).

#### Minimum Degree Requirements for Certificate of Graduate Study in Greek and Latin Languages

- 15 credits of approved Greek and Latin course work at the 5000-level.
- Certificate students must maintain a GPA of 3.00.

## HIGHER EDUCATION AND STUDENT AFFAIRS ADMINISTRATION

<https://www.uvm.edu/cess/doe>

### OVERVIEW

The University of Vermont's Higher Education and Student Affairs Administration (HESA) graduate program is counted among the top programs in the country preparing professional educators to collaboratively transform higher education.

The program welcomes full-time and part-time students with various levels of experience and backgrounds. The student cohort model promotes strong and enduring relationships with fellow colleagues, award-winning faculty, and campus partners. The program engages educators committed to the future of the nation's higher education system to challenge UVM HESA students through a theory-to-practice curriculum creating an unparalleled learning experience.

### MISSION STATEMENT

To develop practitioner scholars through academic and professional preparation whose commitment to reflection and social justice will

transform higher education and student affairs in the spirit of The Vermont Connection.

## CORE VALUES

### ACADEMIC AND PROFESSIONAL PREPARATION

Through partnerships between faculty and higher education professionals, we promote excellence through academic and professional rigor. We cultivate the knowledge and skills necessary for success as an educator in higher education contexts through classroom and experiential learning as conceptualized by philosopher and UVM alumnus John Dewey.

### SOCIAL JUSTICE

We are committed to pursuing social justice as both a process and goal to dismantle individual, institutional, and societal oppression. Grounded in the ethos of HESA, UVM, and the profession, we strive to transform our field for more equitable and inclusive opportunities in higher education.

### REFLECTION

We foster reflection of self, others, and contexts as a critical component of growth in professional practice. Through critical consciousness we strive to improve higher education and student affairs with an aim toward promoting individual, institutional, and societal change.

### THE VERMONT CONNECTION

The Vermont Connection is a collegial network of former and current students, faculty, and student affairs professionals with the shared vision of uplifting community through relationships. The spirit of The Vermont Connection weaves together the history, present, and future of UVM HESA.

Campus partners cultivate relationships through supervising practica and assistantships, teaching HESA courses, and providing professional development opportunities. Funding opportunities are available to students through assistantships, full- and part-time work, and graduate travel stipends to professional and academic conferences.

Extensive information about the program is available on the HESA website.

Inquiries regarding this program should be addressed to:

The University of Vermont  
Higher Education and Student Affairs Administration  
208 Colchester Avenue  
Mann Hall 201  
Burlington, Vermont 05405  
802-656-2030

## DEGREES

Higher Education and Student Affairs Administration M.Ed.  
(p. 156)

## FACULTY

**Arámbula Turner, Tracy;** Associate Professor, Department of Education; PHD, University of Texas at Austin

**Garvey, Jason C.;** Associate Professor, Department of Education; PHD, University of Maryland, College Park

**Rocco, Melissa L.;** Senior Lecturer, Department of Education; PHD, University of Maryland, College Park

**Williams, Brittany;** Assistant Professor, Department of Education; PhD, University of Georgia

## HIGHER EDUCATION AND STUDENT AFFAIRS ADMINISTRATION M.ED.

All students must meet the Requirements for the Master of Education Degree (p. 271)

## OVERVIEW

The University of Vermont's Higher Education and Student Affairs Administration (HESA) graduate program is counted among the top programs in the country preparing professional educators to collaboratively transform higher education. The program welcomes full-time and part-time students with various levels of experience and backgrounds. The student cohort promotes strong and enduring relationships with fellow colleagues, award-winning faculty, and campus partners. The program engages educators committed to the future of the nation's higher education system to challenge UVM HESA students through a theory-to-practice curriculum, creating an unparalleled learning experience.

## SPECIFIC REQUIREMENTS

### Requirements for Admission

#### 1. APPLICATION INFORMATION

Applications to the HESA Program are processed by the UVM Graduate College via the online admissions process. This process includes the documents that are listed below.

Applicants are strongly advised to submit all materials (e.g., transcripts, recommendations, resume) by or before the deadline to receive a full and timely review. Applications will not be reviewed by the admissions committee until complete.

#### Required Application Materials

- Graduate Application Form- The online application form is available on the Graduate College website.
- Statement of Purpose- UVM is a community that celebrates the unique identity of every student, faculty and staff member. In your statement of purpose, please outline your reasons for wishing to undertake graduate study with the UVM HESA program, and how your identities and/or lived experiences inform your



career aspirations as a higher education and/or student affairs professional.

- Three Letters of Recommendation

Three letters of recommendation must be submitted directly to UVM by individuals who have an academic or professional relationship with the applicant. These individuals must be well acquainted with the applicant’s accomplishments and potential for becoming an effective higher education and student affairs professional, as well as readiness for graduate study. For applicants seeking to attend graduate school immediately after graduation from an undergraduate institution, at least two of these letters should be from an instructor/faculty member. Please do not include letters written by friends, family friends, therapists, or acquaintances.

All letters of recommendation should accompany the application by the application deadline. We allow a small buffer of a couple of days to allow for arrival and processing.

- Unofficial College Transcripts

Official transcripts are not necessary when submitting applications. An unofficial transcript of course work (undergraduate and graduate) should be submitted from every college and/or university attended for the Admissions Committee to review. Please make sure any community college credits are listed on the college or university transcript. If admitted to the program, applicants will be required to submit an official transcript for all course work (undergraduate and graduate) upon an acceptance of the offer.

- Professional Resume/Curricula Vitae (CV)

An up-to-date resume/CV that attests to the applicant’s education, professional experience, and volunteer work should be included in the application packet. Remember to highlight relevant higher education and student affairs experience (and transferable experiences), whether paid or volunteer.

- English Proficiency Examination

Applicants whose native language is not English are required to submit proof of English proficiency. Applicants must submit official scores of either the Test of English as a Foreign Language (TOEFL), the International English Language Testing System (IELTS), or Duolingo. The minimum score for admission to the Graduate College at UVM is 90 for TOEFL; 6.5 for IELTS; and 110 for Duolingo.

- Application Fee- \$65 (standard set by the Graduate College). Questions regarding application fee waivers should be directed to the Graduate College.

Please note:

- Candidates whose applications are COMPLETE (including the resume/CV) by the communicated application deadline will be

given priority consideration. Applications completed after the deadline cannot be guaranteed a full-review.

- All materials must be submitted online through the Graduate College. Materials that arrive external to the online process cannot be considered for academic admission.
- GRE scores are not required for academic admission into the HESA program, nor for applicants seeking graduate assistantships or university funding through financial aid.
- Students accepted into the HESA MED program as full-time students are eligible for HESA graduate assistantships. More details on the graduate assistantship consideration process can be found on the HESA program website.

## 2. INTERVIEW

A required program orientation session is held for students who pass the academic application screening. In some cases, a faculty interview may also be required for admission. Students who pass the academic application screening will be contacted directly about the required orientation and any request for an academic interview, if applicable.

### Minimum Degree Requirements

The HESA curriculum is 36 credits, including 12 credits in "Foundations of the Profession," 12 credits in "Student Learning and Development," and 12 credits in "Higher Education Administration." The program can be completed in 2 years full-time or 3 years part-time, and includes individualized practica and internships. Each student receives a faculty advisor to support academic and professional development that meets student needs and interests.

EDHI 6110	Foundations & Functions of CSP	3
EDHI 6120	Social Justice/Inclusion in HE	3
EDHI 6210	College Students and Contexts	3
EDHI 6220	Problems in Education	3
EDHI 6310	Student Development Theory	3
EDHI 6320	Higher Education Law	3
EDHI 6330	Prgm Eval & Assess in HESA	3
EDHI 6410	Higher Ed Admin & Organization	3
EDHI 6420	Capstone:Eth,Val&Mean/High Ed	3
EDHI 6850	Seminar in Higher Education	3
EDHI 6890	Lab Experience in Education	2
EDHI 6990	Special Topics	3

### Comprehensive Examination

The successful completion of the Capstone seminar course taken during the final semester of enrollment satisfies the comprehensive examination requirement. This culminating experience is designed to be a final assessment of a student’s professional portfolio as aligned with the ACPA & NASPA Professional Competencies.

**Requirements for Advancement to Candidacy for the Degree of Master of Education**

HESA core faculty have established several milestones to review each student’s academic and professional performance as graduate students. These reviews are to assess holistically whether or not students have demonstrated an adequate level of competency in academic performance and in other critical areas of higher education and student affairs professional practice as guided by the ACPA and NASPA Professional Competencies and the Masters-Level Graduate Preparation Standards set by the Council for the Advancement of Standards in Higher Education. These milestones include an academic review at the end of the first and third semesters, as well as a review of learning, development, and performance in practica and assistantship experiences (when applicable) at the end of year 1.

**HISTORIC PRESERVATION**

<http://www.uvm.edu/~histpres/>

**OVERVIEW**

The University of Vermont Historic Preservation program aims to prepare graduate degree students for broad-based careers in the conservation and sustainable management of the historic environment through studies and research in heritage preservation administration, planning, architectural conservation, adaptive use and economic development, architectural and cultural history, documentation, law, and cultural resource management.

**DEGREES**

Historic Preservation AMP (p. 158)

Historic Preservation M.S. (p. 159)

**FACULTY**

**McCullough, Robert L.;** Professor, Department of History; PHD, Cornell University; JD, Hamline University

**Visser, Thomas Durant;** Professor, Department of History; MS, University of Vermont

**HISTORIC PRESERVATION AMP**

All students must meet the Requirements for the Accelerated Master’s Degree Pathway (p. 269)

**OVERVIEW**

The Historic Preservation Accelerated Master’s Entry Pathway (AMP) provides an opportunity for capable undergraduate UVM students to enroll directly in the Historic Preservation graduate program while taking advantage of Accelerated Master’s Pathway degree incentives. Following their formal admission into the Historic Preservation AMP, students work simultaneously on their B.A. and M.S. requirements, counting up to 9 credits of 5000- or 6000-level courses toward both the B.A. and the M.S. degrees. The remaining 21 credits of graduate study required for Historic Preservation M.S. degree normally would be taken in 3 semesters following undergraduate graduation.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students**

- Students must be working towards a baccalaureate degree with a major in a preservation-related field such as history, architectural history, art history, architecture, engineering, planning, business administration, economics, community development, interior design, law, American studies, or environmental studies.
- Cumulative GPA of 3.0

**Minimum Degree Requirements for the Degree of Master of Science**

30 credits of course work with Grad Internship or 33 credits with Master’s Thesis. A minimum of 30 credits must be taken in historic preservation.

Required courses in Historic Preservation:		
HP 5200	Am Architectural History I	2
HP 5250	Practicum: Arch History I	1
HP 5202	Am Architectural History II	2
HP 5252	Practicum: Arch History II	1
HP 5206	Rschg Historic Structure/Sites	2
HP 5256	Practicum: Researching	1
HP 6304	HstPres Policy and Planning	2
HP 6354	Practicum: Policy and Planning	1
HP 6305	HstPres Practice Methods	2
HP 6355	Practicum: Practice Methods	1
HP 6306	Architectural Conservation I	2
HP 6356	Practicum: Conservation I	1
HP 6307	Architectural Conservation II	2
HP 6357	Practicum: Conservation II	1
HP 6308	Mgmt of Historic Site Museums	2
HP 6358	Practicum: Management	1
HP 6301	Culture, Nature, and Community	2
HP 6351	Practicum: Culture, Nature	1
HP 6991	Internship	3-6
or HP 6391	Master's Thesis Research	
A written comprehensive examination given during the third semester		

An internship in a preservation agency, or a written thesis. The internship or thesis may be undertaken upon completion of 2 semesters of concentrated course work with advisor's permission. For the thesis option, a total of 6 credits is required for HP 6391, as well as advisor's permission	
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Lecture courses will be offered synchronously for in-person and remote students. Practica courses will allow in-person and remote students to convene in Vermont for seven-day symposia, two offered each fall semester and one each spring semester. These bookend symposia will provide opportunities for members of each group to establish working relationships, to interact with UVM's non-profit and public-agency preservation partners, and to work with members of Vermont's historic preservation community. During the intervening semesters, all courses will be offered in a manner that establishes clear, identical expectations for in-person and low-residency students.

**Comprehensive Examination**

The comprehensive examination for M.S. Historic Preservation students is required to be taken by the end of the final semester of courses. Normally this is scheduled during the second half of the fall semester. This written examination covers broad knowledge in historic preservation. Information on the date, general details, and format of this examination is provided to students in advance.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

Completion of the above requirements.

**HISTORIC PRESERVATION M.S.**

All students must meet the Requirements for the Master's Degree (p. 270)

**OVERVIEW**

All graduate students enter the program in the fall. Most complete their studies after 3 semesters and a summer internship. Part-time enrollment is also possible by special arrangement.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

A baccalaureate degree with a major in a preservation-related field such as history, architectural history, art history, architecture, engineering, planning, business administration, economics, community development, interior design, law, American studies, or environmental studies.

**Minimum Degree Requirements for the Master of Science**

30 credits of course work with Grad Internship or 33 credits with Master's Thesis. A minimum of 30 credits must be taken in historic preservation.

Required courses in Historic Preservation:		
HP 5200	Am Architectural History I	2
HP 5250	Practicum: Arch History I	1
HP 5202	Am Architectural History II	2
HP 5252	Practicum: Arch History II	1
HP 5206	Rschg Historic Structure/Sites	2
HP 5256	Practicum: Researching	1
HP 6304	HstPres Policy and Planning	2
HP 6354	Practicum: Policy and Planning	1
HP 6305	HstPres Practice Methods	2
HP 6355	Practicum: Practice Methods	1
HP 6306	Architectural Conservation I	2
HP 6356	Practicum: Conservation I	1
HP 6307	Architectural Conservation II	2
HP 6357	Practicum: Conservation II	1
HP 6308	Mgmt of Historic Site Museums	2
HP 6358	Practicum: Management	1
HP 6301	Culture, Nature, and Community	2
HP 6351	Practicum: Culture, Nature	1
HP 6991	Internship	3-6
or HP 6391	Master's Thesis Research	
An internship in a preservation agency or a written thesis. For the internship option, a total of 3 credits is required for HP 6991. For the thesis option, a total of 6 credits is required for HP 6391, as well as advisor's permission. The internship or thesis may be undertaken upon completion of 2 semesters of concentrated course work with advisor's permission.		
A written comprehensive examination given during the third semester		

Lecture courses will be offered synchronously for in-person and remote students. Practica courses will allow in-person and remote students to convene in Vermont for seven-day symposia, two offered each fall semester and one each spring semester. These bookend symposia will provide opportunities for members of each group to establish working relationships, to interact with UVM's non-profit and public-agency preservation partners, and to work with members of Vermont's historic preservation community. During the intervening semesters, all courses will be offered in a manner that establishes clear, identical expectations for in-person and low-residency students.

**Comprehensive Examination**

The comprehensive examination for M.S. Historic Preservation students is required to be taken by the end of the final semester of courses. Normally this is scheduled during the second half of the

fall semester. This written examination covers broad knowledge in historic preservation. Information on the date, general details, and format of this examination is provided to students in advance.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Completion of the above requirements.

## HISTORY

<http://www.uvm.edu/cas/history>

### OVERVIEW

The Department of History offers a comprehensive program of courses in the history of the Americas, Europe, Asia, and Africa, and in global and comparative studies. At the graduate level, students develop broad historical knowledge and acquire training in historical interpretation and methods.

### DEGREES

History AMP (p. 160)

History M.A. (p. 161)

### FACULTY

**Briggs, Charles;** Senior Lecturer, Department of History; PHD, University of North Carolina, Chapel Hill

**Buchanan, Andrew N.;** Senior Lecturer, Department of History; PHD, Rutgers University

**Deslandes, Paul Raymond;** Professor, Department of History; PHD, University of Toronto

**Ergene, Bogac A.;** Professor, Department of History; PHD, Ohio State University

**Esselstrom, Erik W.;** Professor, Department of History; PHD, University of California Santa Barbara

**Field, Sean Linscott;** Professor, Department of History, PHD, Northwestern University

**Grimmer, Ian;** Senior Lecturer, Department of History; PHD; University of Chicago

**Gustafson, Melanie Susan;** Professor, Department of History; PHD, New York University

**Huener, Jonathan D.;** Professor, Department of History; PHD, University of Illinois Urbana-Champaign

**Kornbluh, Felicia A.;** Professor, Department of History; PHD, Princeton University

**Massell, David Perera;** Professor, Department of History; PHD, Duke University

**McGowan, Abigail S.;** Associate Professor, Department of History; PHD, University of Pennsylvania

**Osten, Sarah Elizabeth;** Associate Professor, Department of History; PHD, University of Chicago

**Phelps, Nicole M.;** Professor, Department of History; PHD, University of Minnesota Twin Cities

**Schrafstetter, Susanna B.;** Professor, Department of History; PHD, University of Munich

**Steinweis, Alan E.;** Professor, Department of History; PHD, University of North Carolina

**Stilwell, Sean Arnold;** Professor, Department of History; PHD, York University

**Zdatny, Steven M.;** Professor, Department of History; PHD, University of Pennsylvania

## HISTORY AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

The accelerated master's pathway in history is designed to allow current UVM undergraduate history majors to earn both bachelor's and master's degrees in a streamlined period of time. Following formal admission to the Accelerated Master's Pathway, students will work simultaneously on their B.A. and M.A. requirements, counting up to 6 graduate credits (5000- or 6000-level) toward both the B.A. and the M.A. degrees. Another 3 graduate credits can be counted towards the M.A. degree while an undergraduate but cannot count towards the B.A. degree.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF MASTER OF ARTS FOR ACCELERATED STUDENTS

Applicants should be undergraduate history majors in the third year of the undergraduate program. Candidates must submit applications to the AMP through the standard Graduate College application process. The application includes an undergraduate transcript; 3 letters of recommendation from faculty members; a writing sample; and a statement of purpose. GREs are not required for the AMP. The application and admission process must be finalized before courses may be counted toward the M.A.

#### MINIMUM DEGREE REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS

OPTION A (PORTFOLIO)		
HST 5050	Graduate Historiography	3
HST 6993	Independent Study	3
18 credits at the 5000-level or above		18
6 credits at the 6000-level or above		6
Successful completion of the comprehensive examination		
Successful compilation of a portfolio of work demonstrating the student's thematic and methodological proficiencies		
OPTION B (EXPANDED ESSAY)		
HST 5050	Graduate Historiography	3
HST 6993	Independent Study	3
18 credits at the 5000-level or above		18
6 credits at the 6000-level or above		6
Successful completion of the comprehensive examination		



Successful completion and defense of the Expanded Essay		
Option C (Thesis)		
HST 5050	Graduate Historiography	3
HST 6391	Master's Thesis Research	6
15 credits at the 5000-level or above		15
6 credits at the 6000-level or above		6
Successful completion of the comprehensive examination		
Successful completion and defense of the master's thesis		

HST 5050 is required for all students. Those enrolled in the Accelerated Master's Pathway may take this required course in the senior undergraduate year, when it will count toward the M.A., but not the B.A.

At least 15 credits of course work must be earned in seminars, but students may complete independent study courses that involve the creation of individualized reading lists and regular meetings with instructors appointed to the graduate faculty. With the consent of the student's advisor, 6 credits of the required course work for the M.A. may be taken in related fields outside of the history department. Students must maintain a grade point average of at least 3.30 (B+) each semester. Students failing to maintain this average will be dismissed from the program.

### COMPREHENSIVE EXAMINATION

Students in the Accelerated Master's Pathway must pass a comprehensive examination in a field of specialization, to be defined in consultation with the primary faculty advisor.

The examination requires students to provide a comprehensive analysis of major themes and problems in their field of historical specialization, including attention to historiography and interpretive problems. The examination may take 1 of several forms, to be determined by the faculty advisor in consultation with the student and the director of graduate studies. Options include: a timed written examination; an oral examination; a take-home essay; a historiographical review undertaken as part of the student's master's thesis; an annotated syllabus or detailed lesson plans for a field of study. Exams will be assessed by the primary faculty advisor and a second faculty member.

Candidates whose initial efforts are not judged satisfactory may re-take the exam. In most instances, reexamination will occur within 1 month. Students failing the examination twice will be dismissed from the program.

AMP students will ordinarily take the Comprehensive Examination in December or January of the second year of the program.

### REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF ARTS

Completion of the above requirements.

## HISTORY M.A.

All students must meet the Requirements for the Master's Degree (p. 270).

### OVERVIEW

The Department of History offers a comprehensive program of courses in the history of the Americas, Europe, Asia, and Africa, and in global and comparative studies. At the graduate level, students develop broad historical knowledge and acquire training in historical interpretation and methods. Students may pursue the M.A. on either a part-time or full-time basis. Additional details about our faculty and current course offerings can be found on the department website.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Arts

Applicants should have an undergraduate major in history or in a related field of the humanities or social sciences with the equivalent of a minor in history. The Graduate College application requires: 3 letters of recommendation; a statement of purpose; and a writing sample (normally a research paper completed in an undergraduate history course). Applicants are welcome to submit Graduate Record Examination scores or other evidence of achievement as optional additions to the required submissions.

To be considered for admission, a candidate must have a grade point average of 3.00 (B) in their last 2 years of undergraduate study, with evidence of better work 3.30 (B+) in history.

#### Minimum Degree Requirements for the Degree of Master of Arts

Option A (Portfolio)		
HST 5050	Graduate Historiography	3
HST 6993	Independent Study	1-18
18 credits at the 5000-level or above		18
6 credits at the 6000-level or above		6
Successful completion of the comprehensive examination		
Successful compilation of a portfolio of work demonstrating the student's thematic and methodological proficiencies		
Option B (Expanded Essay)		
HST 5050	Graduate Historiography	3
HST 6993	Independent Study	1-18
18 credits at the 5000-level or above		18
6 credits at the 6000-level or above		6
Successful completion of the comprehensive examination		
Successful completion and defense of the Expanded Essay		
Option C (Thesis)		

HST 5050	Graduate Historiography	3
HST 6391	Master's Thesis Research	6
15 credits at the 5000-level or above		15
6 credits at the 6000-level or above		6
Successful completion of the comprehensive examination		
Successful completion and defense of the master's thesis		

All students enrolled in the M.A. program are required to take HST 5050 during their first semester. Students may complete independent study courses that involve the creation of individualized reading lists and regular meetings with instructors appointed to the graduate faculty. With the consent of the student's advisor, 6 credits of the required course work for the M.A. may be taken in related fields outside of the history department. Students must maintain a grade point average of at least 3.30 (B+) each semester. Students failing to maintain this average will be dismissed from the program.

### Comprehensive Examination

All graduate students must pass a comprehensive examination in a field of specialization, to be defined in consultation with the primary faculty advisor.

The examination requires students to provide a comprehensive analysis of major themes and problems in their field of historical specialization, including attention to historiography and interpretive problems. The examination may take 1 of several forms, to be determined by the faculty advisor in consultation with the student and the director of graduate studies. Options include: a timed written examination; an oral examination; a take-home essay; a historiographical review undertaken as part of the student's master's thesis; an annotated syllabus or detailed lesson plans for a field of study. Exams will be assessed by the primary faculty advisor and a second faculty member.

Candidates whose initial efforts are not judged satisfactory may re-take the exam. In most instances, reexamination will occur within 1 month. Students failing the examination twice will be dismissed from the program.

The exam should take place by the end of the student's third semester in the graduate program. Students may petition the director of graduate studies to take the exam in the fourth semester.

### Requirements for Advancement to Candidacy for the Degree of Master of Arts

Completion of the above requirements.

## INTERDISCIPLINARY - EDUCATION

<https://www.uvm.edu/cess/doe>

### OVERVIEW

Interdisciplinary studies provide tools to deepen research, theory, and practice for those seeking academic advancement, professional development, and/or lifelong learning. This degree includes a

strand in social justice education and a strand for individually-designed programs in consultation with an advisor. Many students pursue graduate certificates in Disability Studies, Education for Sustainability, and/or Resiliency-Based Approaches with Families, Schools, and Communities. Students may include graduate courses from other departments within the college and the university.

### DEGREES

Interdisciplinary - Education AMP (p. 162)

Interdisciplinary - Education M.Ed. (p. 163)

### FACULTY

**Carter, Chalais "Cee"**; Assistant Professor, Department of Education; PhD, University of Massachusetts Amherst  
**Clark/Keefe, Kelly**; Professor, Department of Education; EDD, University of Vermont  
**Mayo, Cris**; Professor and Director; Department of Education; PHD, University of Illinois at Urbana-Champaign

## INTERDISCIPLINARY - EDUCATION AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

This accelerated master's degree pathway (AMP) is designed to offer select UVM undergraduate students the opportunity to earn both the bachelor's degree and the master's degree in Interdisciplinary studies (M.Ed.) in about 2 years. 9 credits toward the 30 credit M.Ed. will be earned during the junior and senior year (6 of which will also count toward the B.A.).

Whether students are pursuing studies in social justice in education or creating an independently-designed interdisciplinary studies in education (in consultation with your advisor) master's degree, all students will take three core course out of these choices: EDFS 6010 Introduction to Interdisciplinary Studies, EDFS 6020 Philosophy of Education, EDLP 6008 Inequalities in Educational Policy, and/or EDCI 6008 Curriculum Theory. Students pursuing the social justice in education strand are expected to take at least 18 credits of courses that focus on race, gender, disability, and/or other aspects of diversity or focusing on issues related to inclusion, accessibility, and/or equity in education. All students must take 18 of their credits in the College of Education and Social Services. The program is designed principally as preparation for work as an educator in a wide array of settings that do not require state licensure: professional development for in-service teachers, community organizers and non-profit organization workers, diversity consultants and trainers, and/or as a precursor to more advanced graduate degrees in disciplines like Educational Leadership and Policy Studies, studies in race, gender, and/or disability.

## SPECIFIC REQUIREMENTS

### Requirements for Admission for the Degree of Master of Education

Students should apply for admission into the AMP in the beginning of their junior year. Consideration for admission requires the following:

- A minimum cumulative GPA of 2.7
- Completion of the Graduate College Application
  - The three letters of recommendation preferably from UVM faculty members
  - A writing sample is required as part of the application
  - A personal statement discussing a proposed independently-designed area of study or interest in studying social justice in education

Students must be admitted through the Graduate College before taking any courses that will be applied toward the master's degree requirements.

### Minimum Degree Requirements

The Interdisciplinary degree may focus on social justice education or a largely self-designed curriculum. All programs are worked out under the supervision of the program director. All programs are subject to student modification at any time depending on the changing personal, academic, and professional interests of the student. Here are the basic curriculum requirements:

- 30 credits are required. There is a 5-year time period to finish the degree. All courses are offered once a week in the evening, usually online. Most summer courses run daily for two weeks, 4 1/2 hours at a time. The average number of years that students take to complete the Interdisciplinary program is currently 3 years. The majority of students are part-time.
- A minimum of 18 graduate level credits must be taken in the College of Education and Social Services. The other remaining 12 graduate-level credits can be taken anywhere in the University of Vermont (if desired). 9 graduate credits can be taken outside the University of Vermont and transferred into the Interdisciplinary studies program. All courses must be graduate-level courses and must be directly relevant to each student's overall goals and purposes.
- The Interdisciplinary program has a 6-credit thesis option. These 6 credits replace 6 course credits.

### COMPREHENSIVE EXAMINATION

All College of Education and Social Services graduate programs have a no-credit comprehensive examination requirement for graduation. This requirement includes a portfolio of papers and reflection and is designed according to the unique professional needs of the student and is worked out with the program director.

## REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF EDUCATION

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all core courses.

## INTERDISCIPLINARY - EDUCATION M.ED.

All students must meet the Requirements for the Master of Education Degree (p. 271)

### OVERVIEW

Interdisciplinary studies provide tools to deepen research, theory, and practice for those seeking academic advancement, professional development, and/or lifelong learning. This degree includes a strand in social justice education and a strand for individually-designed programs in consultation with an advisor. Many students pursue graduate certificates in Disability Studies, Education for Sustainability, and/or Resiliency-Based Approaches with Families, Schools, and Communities. Students may include graduate courses from other departments within the college and the university.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Education

Applicants should have a clear understanding of how the Interdisciplinary graduate program will serve their career goals. For this reason, major emphasis in admissions is placed upon the applicant's Statement of Purpose. Detailed information about admission criteria is as follows:

- Applicants are welcome to schedule an interview or correspond via email with the director.
- Submit three letters of reference, at least one of which should be an academic reference. Because some students have been out of college for a number of years (even decades), professional workplace references are also accepted.
- Transcripts are required from all previous institutions attended.
- A writing sample is required only if requested.
- There is no Graduate Record Examination (GRE) requirement.
- There is no deadline for application, the program has a rolling admissions policy that is in effect 12 months a year.
- Up to 9 graduate credits previously earned within a 5-year period can be transferred into the program.

### Minimum Degree Requirements

The Interdisciplinary degree may focus on social justice education or a largely self-designed curriculum. All programs are worked out under the supervision of the program director. All programs are subject to student modification at any time depending on the changing personal, academic, and professional interests of the student. Here are the basic curriculum requirements:

- 30 credits are required. There is a 5-year time period to finish the degree. All courses are offered once a week in the evening, usually

online. Most summer courses run daily for two weeks, 4 1/2 hours at a time. The average number of years that students take to complete the Interdisciplinary program is currently 3 years. The majority of students are part-time.

- A minimum of 3 core courses are required, to be chosen from 4 potential core courses: EDFS 6020 Philosophy of Education, EDFS 6010 Introduction to Interdisciplinary Studies, EDLP 6008 Inequalities and Educational Policy, and EDCI 6008 Curriculum Theory.
- A minimum of 18 graduate level credits must be taken in the College of Education and Social Services. The other remaining 12 graduate-level credits can be taken anywhere in the University of Vermont (if desired). 9 graduate credits can be taken outside the University of Vermont and transferred into the Interdisciplinary studies program. All courses must be graduate-level courses and must be directly relevant to each student’s overall goals and purposes.
- The Interdisciplinary program has a 6-credit thesis option. These 6 credits replace 6 course credits.

**Comprehensive Examination**

All College of Education and Social Services graduate programs have a no-credit comprehensive examination requirement for graduation. This requirement includes a portfolio of papers and reflection and is designed according to the unique professional needs of the student and is worked out with the program director.

**Requirements for Advancement to Candidacy for the Degree of Master of Education**

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all core courses.

**INTERDISCIPLINARY STUDY OF DISABILITIES**

<https://www.uvm.edu/cess/cdci/disability-studies>

**OVERVIEW**

The Certificate of Graduate Study in ISD provides education, social services, healthcare, other professionals, and individuals with disabilities and their family members, access to a cohesive and relevant course of study to enhance their education and instructional knowledge of Disability Studies. The certificate includes a total of 18 credits, 9 in core courses and 9 in approved elective courses. Two options are offered:

1. Establish a general understanding of disabilities and of related interdisciplinary practices across disciplines;
2. Combine core courses with the focused study of a specific disability or related practice area.

The certificate was created through a partnership between Special Education and Communication Science Disorders. The courses listed are from those programs, but they are not the only courses that can be used for the certificate.

**DEGREES**

- Interdisciplinary Study of Disabilities (ISD) CGS (p. 164)

**FACULTY**

**Avila, Maria Mercedes;** Associate Professor, Department of Medicine-Pediatrics; PHD, University of Vermont  
**Killeen, Kieran M.;** Associate Professor, Department of Leadership and Developmental Sciences; PHD, Cornell University  
**Suter, Jesse C;** Research Associate Professor, Center on Disability and Community Inclusion; PHD, University of Vermont

**INTERDISCIPLINARY STUDY OF DISABILITIES (ISD) CGS**

All students must meet the Requirements for the Certificates of Graduate Study (p. 269)

**OVERVIEW**

The Certificate of Graduate Study in ISD provides education, social services, healthcare, other professionals, and individuals with disabilities and their family members, access to a cohesive and relevant course of study to enhance their education and instructional knowledge of Disability Studies. The certificate includes a total of 18 credits, 9 in core courses and 9 in approved elective courses. Two options are offered:

1. Establish a general understanding of disabilities and of related interdisciplinary practices across disciplines;
2. Combine core courses with the focused study of a specific disability or related practice area.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Certificate of Graduate Study**

- Completed Bachelor’s Degree
- Completed Graduate College Application
- Official transcripts from each college or university where credit has been earned
- Three letters of recommendation
- A personal statement of purpose
- A cumulative grade point average of 3.00 is recommended

**Minimum Degree Requirements**

The Certificate of Graduate Study in the ISD requires eighteen credits. Students admitted to the program must complete EDSP S250/CSD S740, and EDSP S260, and must develop an individualized plan of study for the remaining 12 credits. Depending on the chosen field of study, students work with their graduate advisor (if applicable) and the coordinator of this certificate program to identify 12 additional credits of coursework for their degree plan.

The core courses that are required for this certificate are:

EDSP S250	Gr Culture of Disability	3
EDSP S260	GlobalDisabilityStudies:Africa	3



Although not an exhaustive list, suggested courses include:		
CSD 6110	Intrdisc Sem Neurodev Disabil I	
CSD 6120	Intrdisc Sem Neurodev Disabil 2	
CSD 6430	Augmentative Communication	
EDFS 6050	Race, Justice, and Education	
EDSP 5100	Foundations of Special Ed	
EDSP 5130	Severe Disabil Char&Intervent	
EDSP 6130	Collaborative Consultation	
EDSP 6300	The Trauma Lens	
EDSP 6993	Independent Study	
EDFS 6010	Intro to Interdisciplinarity	
PH 6010	Public Health & Health Policy	
PH 6110	Global Public Health	
SWSS 5200	Soc Welfare Pol & Services I	
SWSS 5160	Th Found of Hum Beh&Soc Envr I	

Exception: VT LEND students taking this certificate are required to complete 3 elective courses (9 credits) and the following 3 required courses (9 credits):

CSD 6110	Intrdisc Sem Neurodev Disabil I	3
CSD 6120	Intrdisc Sem Neurodev Disabil 2	3
EDSP 5250/ CSD 5740	Gr Culture of Disability	3

Additional information about this program in the ISD is available from the Certificate of Graduate Study website.

## INTERPROFESSIONAL HEALTH SCIENCES

<http://www.uvm.edu/cnhs/>

### OVERVIEW

Interprofessional Health Sciences is translational in nature focusing on understanding the spectrum of human functioning from the basic physiological function of cells and body systems to overall physical and psychological health and unified by the common theme of human performance. The program is designed to consider health at three levels: 1) status of body structures and functions (molecular, cellular, and organ systems levels); 2) ability of the individual to participate in human activities and assume societal roles; and, 3) psychological and social aspects of the environment that support the health of individuals and populations. This program prioritizes interprofessional and translational research. Students come from a wide range of disciplines (e.g., physical therapy and movement science, biomedical sciences, special education, communication disorders, nursing, neuroscience, psychology, nutrition, and related

health professions). They learn side by side with other students and faculty from unique but related health professions to address the contextual nature of health conditions that affect body functioning and/or societal participation.

Although not required, students have the option to pursue concentrations in the following disciplines:

- Biomedical Health Sciences
- Communication Sciences and Disorders
- Integrated Health
- Rehabilitation and Movement Sciences

### DEGREES

Interprofessional Health Sciences Ph.D. (p. 166)

### FACULTY

**Amiel, Eyal;** Associate Professor, Department of Biomedical and Health Sciences; PHD, Dartmouth College

**Angelopoulos, Theodore;** Professor, Department of Rehabilitation and Movement Sciences, PHD, University of Pittsburgh

**Bauerly, Kim;** Associate Professor, Department of Communication Sciences and Disorders, PHD, University of Toronto

**Cannizzaro, Michael S.;** Associate Professor, Department of Communication Sciences and Disorders; PHD, University of Connecticut

**Coderre, Emily;** Associate Professor, Department of Communication Sciences and Disorders, PHD, University of Nottingham

**Deming, Paula;** Associate Professor, Department of Biomedical and Health Sciences; PHD, University of North Carolina at Chapel Hill

**Escorpizo, Reuben Samsuya;** Professor, Department of Rehabilitation and Movement Science; DPT, Des Moines University

**Failla, Mathew;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, University of Delaware

**Frietze, Seth;** Associate Professor, Department of Biomedical and Health Sciences; PHD, Harvard University

**Gell, Nancy;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, Auburn University

**Hutchins, Tiffany L.;** Associate Professor, Department of Communication Sciences and Disorders; PHD, University of South Florida

**Kasser, Susan;** Professor, Department of Rehabilitation and Movement Science; PHD, Oregon State University

**Keiffer, Melanie;** Assistant Professor, Department of Graduate Nursing, DNP, Vanderbilt University

**Krementsov, Dimitry N.;** Associate Professor, Department of Biomedical and Health Sciences, PHD; University of Vermont

**Laurent, Jennifer S.;** Professor, Department of Nursing; PHD, Duquesne University

**Lewis, Laura Foran;** Associate Professor, Department of Nursing; PHD., University of Connecticut

**Martin,Lili;** Clinical Associate Professor, Department of Nursing; DNP, University of Vermont

**Nagle, Rebecca;** Clinical Assistant Professor, Department of Nursing; DNP, University of Vermont

**Ouellette-Morton, Rebecca;** Clinical Associate Professor, Department of Rehabilitation and Movement Science; DPT, University of New England

**Palumbo, Mary Val;** Professor, Department of Nursing; DNP, Rush Medical College

**Peters, Denise;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, DPT, University of South Carolina

**Prelock, Patricia A.;** Provost and Senior Vice President; Professor, Department of Communication Sciences and Disorders; Professor, Department of Medicine-Pediatrics; PHD, University of Pittsburgh

**Sibold, Jeremy;** Associate Professor, Department of Rehabilitation and Movement Science; EDD, West Virginia University

**Smith, Paula;** Clinical Associate Professor, Department of Rehabilitation and Movement Science; PHD, Virginia Commonwealth University

**Tompkins, Connie L.;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, University of New Orleans

**Tourville, Timothy;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, University of Vermont

**Westervelt, Karen C.;** Clinical Associate Professor, Department of Rehabilitation and Movement Science; PHD, Bond University-Robina, Queensland, Australia

**Whitcomb, Holly Thomas;** Clinical Assistant Professor, Department of Nursing; DNP, University of Vermont

## INTERPROFESSIONAL HEALTH SCIENCES PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree

### OVERVIEW

Interprofessional Health Sciences is translational in nature focusing on understanding the spectrum of human functioning from the basic physiological function of cells and body systems to overall physical and psychological health and unified by the common theme of human performance. The program is designed to consider health at 3 levels: 1) status of body structures and functions (molecular, cellular, and organ systems levels); 2) ability of the individual to participate in human activities and assume societal roles; and 3) psychological and social aspects of the environment that support the health of individuals and populations. This program prioritizes interprofessional and translational research. Students come from a wide range of disciplines (e.g., physical therapy and movement science, special education, communication disorders, nursing, neuroscience, psychology, nutrition, and related health professions). They learn side by side with other students and faculty from unique but related health professions to address the contextual nature of health conditions that affect body functioning and/or societal participation.

Doctoral student preparation considers three central principles:

1. Educating students as researchers and scientists, including how to contribute to evidence-based practice.

2. Fostering in students an interdisciplinary approach to education, research, and practice.
3. Engaging students in innovative instruction and assessment that is interprofessional and aligns with changes in delivery of health and human services.

## SPECIFIC REQUIREMENTS

### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Students with at least a master's degree or the equivalent in a health-related field (e.g., kinesiology, exercise physiology, exercise science, movement sciences, communication sciences and disorders, rehabilitation science, nursing, psychology, education) may apply.

Evaluations will be based upon the applicant's grade point average, previous research experience, a statement of purpose for graduate study, and 3 letters of reference. Although not required, it is strongly recommended that one of those letters come from a graduate faculty in the College of Nursing in Health Sciences (or Osher Center if appropriate) expressing support for the student as well as interest in the student's area of scholarship. In rare circumstances students with a bachelor of science degree showing exceptional promise as evidenced by their previous research experience, mentor recommendations, undergraduate GPA will be considered.

### MINIMUM DEGREE REQUIREMENTS

For students entering with a prior graduate degree in a relevant field, the Ph.D. in Interprofessional Health Sciences requires 76 credits, 32 of which are required course credits and 20 of which are required research credits. The remaining 24 credits are elective, 12 of which may transfer in from the prior degree. Students must maintain a 3.0 average in coursework, have no more than 1 grade below a B, have acceptable evaluations of their research, and pass their qualifying examination. Students will be required to teach in at least 1 course under the mentorship of a faculty member or serve as a teaching assistant for at least 1 course and mentor/co-mentor an undergraduate or master's degree research project. Students are also required to submit an article to a peer-reviewed journal as a first or co-author and to present research at a national or international conference. The dissertation will be based on original research focusing on a significant problem in the student's area of specialization with an interprofessional application.

### BIOMEDICAL AND HEALTH SCIENCES (BHSC)

Students in this concentration may focus in 2 general areas, that include, but are not limited to, the following topics:

#### BASIC SCIENCE RESEARCH

- Cancer
- Cell signaling and metabolism
- Immunology and Infectious diseases
- Genomics and Genetics

#### MEDICAL LABORATORY SCIENCE

- Molecular diagnostics and genomic medicine
- Molecular pathology and functional genomics
- Clinical microbiology
- Clinical hematology

Students should contact the IHS PHD program director for more information on concentration requirements.

**COMMUNICATION SCIENCES & DISORDERS (CSD)**

Students in this concentration may focus communication disorders that include:

- Apraxia of speech
- Autism and other developmental disabilities
- Fluency disorders
- Neurogenic disorders
- Social cognition
- Speech sound disorders

Students work with their academic advisor, research mentors, and committee to design and complete 3 professional rotations in the department of CSD or related field. This provides students with an opportunity to work in depth on multiple projects relevant to current CSD theories and methodologies.

**INTEGRATIVE HEALTH**

Students in this concentration may focus on Integrative Health topics such as:

- Traditional European Medicine (TEM)
- Yoga
- Nature Therapy / Forest Bathing
- Culinary Medicine
- Mindfulness
- Anxiety Management Strategies
- Integrative Pain management
- Integrative psychology
- Acupuncture
- Integrative Oncology
- Behavior change/ health coaching
- Integrative physical therapy/ manual therapy

Students work with their research mentors and committee to design and complete 3 professional rotations within an approved Integrative Health research setting and educational elective requirements. This provides students with an opportunity to work in depth on multiple projects relevant to current Integrative Health theories and methodologies. UVM Integrative Health is a member of the Academic Consortium for Integrative Medicine and Health (ACIMH) and students are encouraged to take an active role in the Consortium’s Research Working Group.

**REHABILITATION AND MOVEMENT SCIENCE (RMS)**

Students in this concentration may focus on topics that include, but are not limited to:

- Biomechanics
- Motor control
- Muscle physiology
- Exercise and physical activity
- Neurophysiology and neurorehabilitation
- Movement analysis
- Physiological biomarkers
- Imaging
- Outcome measure assessment

Students work with their research mentor(s) and committee to design and fulfill degree requirements within this concentration. 3 professional rotations should take place in the department of RMS or in an RMS-approved research laboratory. This provides students with an opportunity to work in-depth on various research projects relevant to current RMS research areas.

Students in all concentrations are required to take the following courses:

CTS 6010	Design Clin&Translational Res	3
CTS 6200	Analyze Clin&T translational Res	3
CTS 6250	Multi Analysis Clin&Trans Res	3
EDRM 6310	Mixed Methods Research: Adv	3
IHS 7010	Topics & Measurement in IHS	2
IHS 7020	Applying the ICF Model in IHS	3
IHS 7300	Sem/Pract Teach & Learn IHS	3
IHS 7500	Prof Writing & Grantsmanship	3
IHS 7000-Level Doctoral Seminar/Professional Rotation		10
20 credit hours of IHS 7491, Doctoral Dissertation Research		20
Elective courses related to Interprofessional Health Sciences (face to face, online, evening)		12
Students coming into the program with a graduate degree will transfer in 12 credits from their prior degree		12
<b>Total Credits</b>		<b>76</b>
Students coming into the program with an undergraduate degree will need to earn an additional 12 credits of elective courses, for a total of 88 credits.		

**COMPREHENSIVE EXAMINATION**

The qualifying examination process (QE), which serves as a comprehensive exam and the exam for advancement to candidacy for the PhD, will be undertaken after students have completed all of the didactic course requirements of the program with a GPA of 3.0 or better. This exam process will consist of 2 portions, a research proposal written in the form of a grant proposal and an oral defense of this proposal, and a dissertation concept paper.

## REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Doctoral candidacy is achieved after the student passes a formal proposal defense. After approval of the concept paper, the student works on the formal dissertation proposal, and, with guidance from his/her dissertation chair, schedules a date with the committee for the formal proposal defense.

## MATERIALS SCIENCE

<http://www.uvm.edu/matsci/>

### OVERVIEW

UVM's graduate program in Materials Science is engaged in interdisciplinary education and research on the fundamental physical, chemical, electrical and mechanical properties and applications of materials. Our internationally recognized faculty and our graduate students focus on a variety of theoretical and experimental research topics ranging from electronic materials to bio-polymers. Current interests include nanomechanics, graphene and quantum magnetism, dynamics of quantum systems, spin-dependent phenomena in semiconductors, real-time X-ray scattering and thin film microfabrication, synthesis of novel organometallics and small molecule semiconductors, supramolecular nanomaterials, computational multiscale modeling of complex materials, as well as materials for biomedical applications. Experimental and computational on-campus facilities include state-of-the-art transport, microscopy, spectroscopy (optical and X-ray) characterization and a supercomputing center. Our experimental faculty and graduate students work in close collaboration with scientists from national laboratories such as the Brookhaven National Lab and the National High Magnetic Field Lab.

We offer students the opportunity to follow customized curricula organized in 3 tracks (Electronic Materials, Biomaterials and Mechanics of Materials) that prepares them to be successful in their chosen research area. Research and teaching graduate assistantships are available for full-time students on a competitive basis and the program also welcomes self-supporting part-time students in partnership with industry.

### DEGREES

Materials Science AMP (p. 168)

Materials Science M.S. (p. 169)

Materials Science Ph.D. (p. 170)

### FACULTY

**Badireddy, Appala Raju;** Assistant Professor, Department of Civil and Environmental Engineering; PHD, University of Houston  
**Clougherty, Dennis Paul;** Professor, Department of Physics; PHD, Massachusetts Institute of Technology  
**Doiron, Amber L.;** Assistant Professor; Department of Electrical and Biomedical Engineering; PHD, University of Texas Austin  
**Dubief, Yves C.;** Associate Professor Department of Mechanical Engineering; PHD, Institut National Polytechnique de Grenoble

**Fletcher, Douglas G.;** Professor, Department of Mechanical Engineering; PHD, University of Virginia  
**Floreani, Rachael Ann;** Associate Professor, Department of Mechanical Engineering; PHD, Colorado State University  
**Furis, Madalina Ioana;** Adjunct Professor, Department of Physics; PHD, University of Buffalo  
**Headrick, Randall L.;** Professor, Department of Physics; PHD, University of Pennsylvania  
**Kotov, Valeri N.;** Professor, Department of Physics; PHD, Clarkson University  
**Kozen, Alexander;** Assistant Professor, Department of Physics; PHD, University of Maryland  
**Landry, Christopher C.;** Professor, Department of Chemistry; PHD, Harvard University  
**Li, Jianing;** Adjunct Associate Professor, Department of Chemistry; PHD, Columbia University  
**Li, Wei;** Assistant Professor, Department of Mechanical Engineering, PHD, Michigan State University  
**Ma, Jihong;** Assistant Professor, Department of Mechanical Engineering, PHD, University of Minnesota, Twin Cities  
**Ma, Wen;** Assistant Professor, Department of Physics; PHD, University of Illinois at Urbana-Champaign  
**Punihaole, David;** Assistant Professor, Department of Chemistry, PHD, University of Pittsburgh  
**Ruggiero, Michael;** Assistant Professor, Department of Chemistry; PHD, Syracuse University  
**Sansoz, Frederic P.;** Professor, Department of Mechanical Engineering; PHD, Ecole Des Mines de Paris  
**Schadler, Linda S.;** Dean, College of Engineering and Mathematical Sciences; Professor, Department of Mechanical Engineering; PHD, University of Pennsylvania  
**Schneebeli, Severin;** Adjunct Associate Professor, Department of Chemistry; PHD, Columbia University  
**Vanegas, Juan;** Assistant Professor, Department of Physics, PHD; University of California Davis  
**Waterman, Rory;** Professor, Department of Chemistry; PHD, University of Chicago  
**White, Matthew S.;** Associate Professor, Department of Physics; PHD; University of Colorado Boulder  
**Xia, Tian;** Professor, Department of Electrical and Biomedical Engineering; PHD, University of Rhode Island

## MATERIALS SCIENCE AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

### OVERVIEW

The Accelerated Master's Pathway leads to both B.S. and M.S. degrees in 5 years. The pathway is open to undergraduate physics, electrical engineering, and mechanical engineering majors. Interested students should contact the Materials Science Director by the beginning of their Junior year.

Following formal Graduate College admission to the Accelerated Master's Degree Pathway, up to 9 credits of approved graduate



coursework may be taken that may be counted toward both the undergraduate and graduate degree requirements.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

A major in physics, chemistry, engineering, or mathematics.

**Minimum Degree Requirements**

The above requirements for admission must be supplemented in either of the following ways:

OPTION A (THESIS)	
30 graduate credits of an approved program of study including at least 18 credits of coursework; completion, 6 of which must be at the 6000-level of at least 1 3-credit course in each of the following categories: electrical and optical properties of materials, thermodynamics and kinetics, mechanical properties of materials, quantum properties of materials*, computational materials science*, and synthesis and characterization of materials* (* = select 2 out of 3); satisfactory completion of a comprehensive examination, and satisfactory completion of an M.S. thesis including its defense at an oral examination.	
OPTION B (NON-THESIS)	
30 graduate credits of an approved program of study with at least 6 credits at the 6000-level; completion of at least 1 3-credit course in each of the following categories: electrical and optical properties of materials, thermodynamics and kinetics, mechanical properties of materials, quantum properties of materials*, computational materials science*, and synthesis and characterization of materials* (* = select 2 out of 3), and satisfactory completion of a comprehensive examination.	

**Comprehensive Examination**

Full-time Materials Science M.S. candidates are required to pass a written Comprehensive (Qualifying) Exam with a score of 50% or better, no later than 4 semesters after joining the program. Failure to pass the test will result in dismissal from the program. The deadline for part-time students is the semester they complete 24 credits. All students (full and part-time) are allowed a maximum of 2 attempts to pass the exam. Offered annually, the 3-hour exam requires students to solve a minimum of 3 problems that cover the following topics: electrical and optical properties of materials, thermodynamics and kinetics, mechanical properties of materials, quantum properties of materials, computational materials science, synthesis and characterization of materials or equivalent core course requirements.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

Successful completion of a comprehensive examination in Materials Science.

**MATERIALS SCIENCE M.S.**

All students must meet the Requirements for the Master's Degree (p. 270)

**OVERVIEW**

Students typically engage in research and defend a thesis and must complete a comprehensive exam.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

A bachelor's degree in physics, chemistry, metallurgy, engineering, materials science, or mathematics. Applicants with other backgrounds will be evaluated individually.

**Minimum Degree Requirements**

The above requirements for admission must be supplemented in either of the following ways:

OPTION 1 (THESIS)	
30 graduate credits of an approved program of study including at least 18 credits of coursework, 6 of which must be at the 6000-level; completion of at least 1 3-credit course in each of the following categories: electrical and optical properties of materials, thermodynamics and kinetics, mechanical properties of materials, quantum properties of materials*, computational materials science*, and synthesis and characterization of materials* (* = select 2 out of 3); satisfactory completion of a comprehensive examination; and satisfactory completion of an M.S. thesis including its defense at an oral examination.	30
OPTION 2 (NON-THESIS)	
30 graduate credits of an approved program of study, 6 of which must be at the 6000-level; completion of at least 1 3-credit course in each of the following categories: electrical and optical properties of materials, thermodynamics and kinetics, mechanical properties of materials, quantum properties of materials*, computational materials science*, and synthesis and characterization of materials* (* = select 2 out of 3) solid state theory, quantum mechanics, applied mathematics, and materials properties of solids, and satisfactory completion of a comprehensive examination.	30

**Comprehensive Examination**

Full-time Materials Science M.S. candidates are required to pass a written Comprehensive (Qualifying) Exam with a score of 50% or better, no later than 4 semesters after joining the program. Failure to pass the test will result in dismissal from the program. The deadline for part-time students is the semester they complete 24 credits. All students (full and part-time) are allowed a maximum of 2 attempts to pass the exam. Offered annually, the 3-hour exam requires students to solve a minimum of 3 problems that cover the following topics: electrical and optical properties of materials, thermodynamics and kinetics, mechanical properties of materials, quantum properties of materials, computational materials science, synthesis and characterization of materials or equivalent core course requirements.

**Requirement for Advancement to Candidacy for the Degree of Master of Science**

Successful completion of a comprehensive examination in Materials Science.

## MATERIALS SCIENCE PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

The Materials Science Ph.D. leads to a degree in 5 years. Students must engage in research and defend a dissertation. Successful completion of a comprehensive exam within the first 2 years of the program is required.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A Bachelor's Degree in physics, chemistry, metallurgy, engineering, materials science, or mathematics. Applicants with other backgrounds will be evaluated individually.

#### Minimum Degree Requirements

In addition to the above, the following are required:

- A minimum of 75 graduate credits including a minimum of 20 in dissertation research and 30 in coursework, at least 15 of which must be graded and 9 of which must be at the 6000- or 7000-level. An overall grade point average in graduate courses of 3.00 or better.
- Completion of at least one 3-credit course in 5 of the following 6 categories (other appropriate core area courses may be approved by the Program Director). Note that 2 of the selected courses need to be from the following categories: Quantum Properties of Materials, Computational Materials Science, Synthesis and Characterization of Materials, and 3 of the selected courses need to be from the following categories: Electrical and Optical Properties of Materials, Thermodynamics and Kinetics, and Mechanical Properties of Materials.

Electrical and Optical Properties of Materials - Core Courses:		
EE 5440	Gr Semiconductor Materials/Dev	0 or 4
Thermodynamics and Kinetics - Core Courses:		
CHEM 5600	Gr Advanced Physical Chemistry	3
ME 5440	Biothermodynamics	3
Mechanical Properties of Materials - Core Courses:		
ME 5110	Mechanical Behavior Materials	3
ME 5120	Adv Engineering Materials	3
Quantum Properties of Materials - Core Courses:		
CHEM 5600	Gr Advanced Physical Chemistry (cannot be double-counted to simultaneously satisfy 2 categories)	3
PHYS 5500	Quantum Mechanics II	3
Computational Materials Science - Core Courses:		

CHEM 6620	Computational Chemistry	3
ME 6550	Multiscale Modeling	3
Synthesis and Characterization of Materials - Core Courses:		
CHEM 5400	Gr Advanced Inorganic Chem	3
CHEM 6610	Solid State Chemistry	3

- Satisfactory completion of a Ph.D. dissertation including its defense at an oral examination

### Comprehensive Examination

Full-time Materials Science Ph.D. candidates are required to pass a written Comprehensive (Qualifying) Exam with a score of 50% or better, no later than 4 semesters after joining the program. Failure to pass the test will result in dismissal from the program. The deadline for part-time students is the semester they complete 24 credits. All students (full and part-time) are allowed a maximum of 2 attempts to pass the exam. Offered annually, the 3-hour exam requires students to solve a minimum of 4 problems that cover the following topics: electrical and optical properties of materials, thermodynamics and kinetics, mechanical properties of materials, quantum properties of materials, computational materials science, synthesis and characterization of materials or equivalent core course requirements.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Successful completion of a comprehensive examination in Materials Science.

## MATHEMATICAL SCIENCES

<http://www.uvm.edu/cems/mathstat/>

### OVERVIEW

The Department of Mathematics and Statistics offers programs towards the Master of Science, Master of Science for Teachers, and Doctor of Philosophy in Mathematical Sciences. The Ph.D. program has three areas of concentration: Pure Mathematics, Applied Mathematics, and Statistics. The Department also offers a M.S. degrees in Statistics and in Biostatistics and M.S. and Ph.D. degrees in Complex Systems & Data Science. It has Accelerated Master's Programs in Mathematics and in Statistics, which are available to UVM undergraduate students.

Opportunities for research arise from the research interests of the Department faculty, which include: algebraic geometry, algebraic and computational topology, arithmetic geometry, combinatorics/graph theory, complex systems, computational social science, Fourier/harmonic analysis, logic, mathematical cryptography, network science, number theory, topological data analysis, biomathematics, fluid mechanics, numerical methods for, and analytical theories of, partial differential equations, as well as bioinformatics, time series analysis, survival analysis, discriminant analysis, classification

methods, bootstrap methods, categorical data analysis, measurement error models, and experimental design.

## DEGREES

Mathematical Sciences AMP (p. 171)

Mathematical Sciences M.S. (p. 172)

Mathematics M.S.T. (p. 172)

Mathematical Sciences Ph.D. (p. 173)

## FACULTY

**Backman, Spencer;** Assistant Professor, Department of Mathematics and Statistics, PHD, Georgia Institute of Technology

**Bagrow, James;** Assistant Professor, Department of Mathematics and Statistics; PHD, Clarkson University

**Bentil, Daniel E.;** Associate Professor, Department of Mathematics and Statistics; DPHIL, University of Oxford

**Buzas, Jeff Sandor;** Professor, Department of Mathematics and Statistics; PHD, North Carolina State University Raleigh

**Cole, Bernard F.;** Professor, Department of Mathematics and Statistics; PHD, Boston University

**Danforth, Chris;** Associate Professor, Department of Mathematics and Statistics; PHD, University of Maryland College Park

**Dupuy, Taylor;** Assistant Professor, Department of Mathematics and Statistics; PHD, University of New Mexico

**Lakoba, Taras Igorevich;** Associate Professor, Department of Mathematics and Statistics; PHD, Clarkson University

**Patania, Alice;** Research Assistant Professor, Department of Mathematics and Statistics; PHD, Politecnico di Torino

**Rombach, Puck;** Assistant Professor, Department of Mathematics and Statistics; PHD, University of Oxford, Somerville College

**Single, Richard M.;** Associate Professor, Department of Mathematics and Statistics; PHD, SUNY Stony Brook

**Vincent, Christelle;** Assistant Professor, Department of Mathematics and Statistics; PHD, University of Wisconsin-Madison

**Warrington, Gregory S.;** Professor, Department of Mathematics and Statistics; PHD, Harvard University

**Wilson, James Michael;** Professor, Department of Mathematics and Statistics; PHD, University of California Los Angeles

**Yang, Jianke;** Professor, Department of Mathematics and Statistics; PHD, Massachusetts Institute of Technology

**Young, Jean-Gabriel;** Assistant Professor, Department of Mathematics and Statistics; PHD, Université Laval

**Yu, Jun;** Professor, Department of Mathematics and Statistics; PHD, University of Washington Seattle

## MATHEMATICAL SCIENCES AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

## OVERVIEW

A Master's Degree in mathematical sciences, statistics or biostatistics can be earned in a shortened time by careful planning during the Junior and Senior years at UVM. For example, the M.S. could be earned in just 1 additional year, because 6 credits of undergraduate

courses can also be counted concurrently toward the M.S. degree requirements. Another 3 graduate credits can be counted towards the M.S. degree while an undergraduate at UVM, but cannot count towards the B.S. degree.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students

Students are strongly encouraged to declare their wish to enter the Accelerated Master's Entry Pathway in writing to the Director of the Mathematics Program by the end of their Sophomore year at UVM. This is needed for successful planning of the student's coursework, as indicated below. The student needs to apply to and be accepted by the Graduate College before taking the first course that they wish to count towards the M.S. degree requirements. Following acceptance by the Graduate College, they can receive concurrent undergraduate and graduate credit for up to 6 credits of 5000- or 6000-level courses. Another 3 graduate credits can be counted towards the M.S. degree while an undergraduate but cannot count towards the B.S. degree.

Additional information is available in the Handbook for Graduate Studies in Mathematics, found on the Mathematics and Statistics Department website.

### Minimum Degree Requirements for the Degree of Master of Science

Each student must complete one of the following options:

OPTION A (THESIS)	
24 semester hours of acceptable graduate credits in advanced mathematics courses, and 6 semester hours of thesis research (MATH 6391) culminating in a master's thesis.	30
OPTION B (NON-THESIS)	
30 semester hours of acceptable graduate credits in advanced mathematics courses. No thesis is required.	
BOTH OPTIONS	
Under either option, students must take, or acquire the knowledge of the content in, the courses MATH 6441 and MATH 6444, and must satisfactorily complete at least 4 6000-level mathematics courses.	
In both options students must select a major concentration from among the following areas: Analysis, Algebra, Applied Mathematics, or Discrete Mathematics. The concentration shall consist of at least 9 approved credits in advanced mathematics courses in the respective area, 3 of which must be at the 6000-level; students writing a thesis may count the 6 hours of thesis credit toward these 9 hours.	
With approval of the student's advisor up to 6 credits of courses outside mathematics may be used to fulfill the major, minor, or degree requirements.	

### Comprehensive Examination

M.S. students must pass a comprehensive exam consisting of two parts: a written exam and either a second written exam or a thesis.

All students in must take the written exam in analysis, which are offered each August and January. Students in the AMP program in Mathematical Sciences may opt to take the analysis exam in August at the beginning of their year as a Master's student, or earlier. Their final opportunity to take this exam is in January before their final semester. For students who are not writing a thesis, the second exam is chosen from the areas of algebra, numerical analysis, differential equations, or combinatorics. For students who are writing a thesis, a successful M.S. thesis defense takes the place of the second exam.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Students who have been admitted to the Accelerated Master's Program in mathematics normally advance to candidacy in this program at the end of their senior year. The criteria for advancement to candidacy are:

1. Completion of a bachelor's program in mathematics at UVM, or completion of a bachelor's program in science or engineering at UVM with a minor in mathematics;
2. Completion of at least 2 additional mathematics or statistics courses at the 5000-level approved for graduate credit with grades of B or better in each. Of the 5000-level courses in mathematics, 2 must have been completed with a grade of B+ or better.
3. Completion of a 6000-level course in Mathematics with a grade of B or better. This course will count towards the master's degree but may not be counted towards the student's undergraduate degree or GPA, and so must be taken as an overload.

Students who have been admitted to the AMP on the completion of their junior year but who fail to meet the requirements for advancement to candidacy for the M.S. degree will only be permitted to continue towards their M.S. degree after review by the Mathematics Graduate Committee and with the written approval of the Director of the Graduate Program in Mathematics.

## MATHEMATICAL SCIENCES M.S.

All students must meet the Requirements for the Master's Degree

### OVERVIEW

The Department of Mathematics and Statistics offers programs towards the Master of Science (M.S.) in Mathematical Sciences. Each student declares a major subject, which may be algebra, analysis, applied mathematics, or discrete mathematics. Within this major, the student may pursue either course work or a thesis; the last of the two options requires the student to find an advisor within the department faculty.

Opportunities for research arise from the research interests of the department faculty. See the Department of Mathematics and Statistics website for further details. The department also offers the Ph.D. and an Accelerated Master's Program in Mathematical Sciences, as well as M.S. degrees in Statistics and Biostatistics and Ph.D. and M.S. degrees in Complex Systems & Data Science.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

Applicants should have demonstrated strength in either pure or applied mathematics, a bachelor's degree with a major in mathematics or a closely related discipline, and satisfactory recommendations. See the departmental website for further details.

### Minimum Degree Requirements for the Degree of Master of Science

Each student must complete one of the following options:

OPTION A (THESIS)	
24 semester hours of acceptable graduate credits in advanced mathematics courses, and 6 semester hours of thesis research (MATH 6391) culminating in a master's thesis.	
OPTION B (PROJECT)	
24 semester hours of acceptable graduate credits in advanced mathematics courses, and 6 semester hours of MATH 6993.	
OPTION C (COURSE)	
30 semester hours of acceptable graduate credits in advanced mathematics courses. No thesis is required.	
ALL OPTIONS	
Under all options, students must take, or acquire the knowledge of the content in, the courses MATH 6441 and MATH 6444, and must satisfactorily complete at least 4 6000-level mathematics courses.	
In all options students must select a major concentration from among the following areas: Analysis, Algebra, Applied Mathematics, or Discrete Mathematics. The concentration shall consist of at least 9 approved credits in advanced mathematics courses in the respective area, 3 of which must be at the 6000-level; students writing a thesis may count the 6 hours of thesis credit toward these 9 hours.	
With approval of the student's advisor up to 6 credits of courses outside mathematics may be used to fulfill the major, minor, or degree requirements.	

### Comprehensive Examination

M.S. students must pass a comprehensive exam consisting of two parts: a written exam and either a second written exam or a thesis. All students need to take the analysis exam, which are offered each August and January. For non-thesis students, the second exam may be in any of the following areas: algebra, numerical analysis, differential equations, or combinatorics. For thesis students, a successful M.S. thesis defense satisfies the requirement of the second exam.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

The requirements for advancement to candidacy are the completion of any prerequisites noted when the student was admitted.

## MATHEMATICS M.S.T.

All students must meet the Requirements for the Master's Degree



**Mathematical Sciences is not currently accepting applications to the Master of Science in Teaching degree.**

## OVERVIEW

The Department of Mathematics offers programs towards the Master of Science, Master of Science for Teachers, and the Doctor of Philosophy in Mathematical Sciences. There are two areas of concentration: pure mathematics and applied mathematics. The programs emphasize the interaction between these two areas and the common role of scientific computation. Students can take courses common to both areas, enabling them to gain an appreciation of the mathematical techniques and the connections between theory and applications. Department research interests include analysis, algebra, arithmetic geometry, number theory, graph theory, combinatorics, complex systems, computational social science, fluid mechanics, biomathematics, differential equations, network science, mathematics education, numerical analysis, and modeling.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Teachers

A bachelor's degree from an accredited institution, licensure as a teacher, and experience teaching grades K-12. GRE scores are not required.

### Minimum Degree Requirements for the Degree of Master of Science for Teachers

30 credits of course work in mathematics. With the approval of their advisor and the Graduate College, students may choose courses from the 5000- or 6000-level or from closely related fields. The student must have a curriculum program approved by her/his advisor. The student must pass an oral comprehensive examination. No thesis is required.

### Comprehensive Examination

The comprehensive examination must be taken no later than 5 weeks before the end of the semester preceding the conferral of the degree. The details of the examination are decided upon by each student's examination committee and will be discussed with the student in advance of the exam.

### Requirements for Advancement to Candidacy for the Degree of Master of Science in Teaching

The requirements for advancement to candidacy are the completion of any prerequisites noted when the student was admitted.

## MATHEMATICAL SCIENCES PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

## OVERVIEW

The Department of Mathematics and Statistics offers programs towards the Doctor of Philosophy in Mathematical Sciences in 3 areas of concentration: applied mathematics, pure mathematics and statistics.

Opportunities for research arise from the research interests of the Department faculty, which include: algebraic geometry, algebraic and computational topology, arithmetic geometry, combinatorics/graph theory, complex systems, computational social science, Fourier/harmonic analysis, logic, mathematical cryptography, network science, number theory, topological data analysis, biomathematics, fluid mechanics, numerical methods for, and analytical theories of, partial differential equations. Research foci in statistics include bioinformatics, classification methods, time series analysis, survival analysis, discriminant analysis, bootstrap methods, categorical data analysis, measurement error models, and experimental design. Opportunities are available for biostatistical research related to problems in agriculture and the life sciences, health and medicine, and natural resources and the environment.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

Because of the breadth of pure and applied mathematics and statistics, it is recognized that applicants for admission will have diverse backgrounds. Admission requirements are therefore flexible. Applicants should have demonstrated strength in either pure or applied mathematics, a bachelor's degree with a major in mathematics, statistics or a closely related discipline.

### Minimum Degree Requirements for the Degree of Doctor of Philosophy

Each student must complete the comprehensive examination and an approved plan of study including at least 75 credits in course work or dissertation research. The student is required to write a doctoral dissertation and pass a final oral defense of that dissertation. The department requires 2 semesters of college-teaching experience. Students are expected to demonstrate appropriate proficiency in the use of technology. There is no formal language requirement.

**MASTER'S DEGREE CREDENTIAL:** Students who do not have a master's in mathematical science in the track they are pursuing for the doctorate may petition their doctoral Studies Committee and the Graduate College to receive a master's degree during the progression of their doctoral studies. Students must complete the requirements of the course-based option for the master's in the relevant discipline (mathematics, biostatistics or statistics). Students should indicate their intent to pursue the master's degree prior to the second year in the doctoral program to provide appropriate advising for completion of the master's degree requirements. Completion of the requirements for the master's and the petition to the Graduate College to award the master's degree must occur before completion of the final component of the doctoral comprehensive examination.

### Comprehensive Examination

**PURE AND APPLIED MATHEMATICS TRACKS:** The Examination consists of 3 parts: 2 written exams and 1 written survey of the proposed research area accompanied by an oral presentation. Syllabi for these exams are available from the Director of Graduate Studies in Mathematics. They are taken at distinct times and all 3 must be satisfactorily completed in order to advance to candidacy. For students with a concentration in Pure Mathematics,

2 three-hour written exams are chosen from among 3 options: real and complex analysis, algebra, and combinatorics. For students with a concentration in Applied Mathematics, 1 three-hour written exam is in numerical analysis and the other 3-hour written exam is in differential equations.

The survey and oral presentation is conducted by the studies committee on a topic chosen by the student in consultation with the committee.

The 2 written examinations must be passed by the middle of the second year in the program. All 3 exams must be passed by the beginning of the third year.

**STATISTICS TRACK:** The Examination consists of 3 parts, 2 written and 1 oral. They are taken at distinct times and all 3 must be satisfactorily completed in order to advance to candidacy. The first written exam is based on the courses STAT 5230, STAT 5310, STAT 5510, and STAT 5610. The first component of the comprehensive exam is typically held 2 weeks after the final exam period in the spring semester. The second written exam is an extensive literature review of a topical area written in the form of a review paper and must be passed by the middle of the second year in the program. The oral exam is scheduled after successful completion of both written exams and must be passed by the beginning of the third year. The oral exam is a presentation of the current state of research in a defined area and proposal for the future work to be conducted.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Successful completion of the comprehensive examination.

## MECHANICAL ENGINEERING

[https://www.uvm.edu/cems/me/graduate\\_program](https://www.uvm.edu/cems/me/graduate_program)

### OVERVIEW

The main asset of the UVM mechanical engineering graduate program is certainly the human factor, including our dedicated faculty and staff, and motivated students.

### Curriculum

We continuously update our curriculum to address modern topics in mechanical engineering, and to offer a breadth of courses that makes studying in our program more flexible, whether the student intends to earn an M.S. as a continuing student from local industries, or directly obtain a doctorate right from the bachelor's degree. Most of our graduate students are full-time and actively engaged in research projects with one or two faculty mentors who are dedicated to their success. The size of the program also enables them to have close interactions with the rest of the faculty, and to regularly participate in the life of the program via graduate student seminars and invited speaker presentations.

### Graduate

Since its creation, students from across the United States and various countries around the world have graduated from the UVM

mechanical engineering graduate program. Also, we actively seek to admit a diverse group of students in mechanical engineering to address the contemporary challenges of our society. To date, our graduates have achieved successful careers in academia as distinguished professors, in industry as engineers and entrepreneurs, and in government positions as program directors for national funding agencies or scientists at national laboratories.

### Faculty and Research

The success of our graduate program is built on a distinguished faculty whose research is recognized nationally and internationally through innovation, dissemination of knowledge in high-impact journals, and research awards. Our focus is to create a research environment that is often interdisciplinary and collaborative from which our students can flourish. Our faculty is actively engaged in applied and fundamental research to address timely scientific questions relevant to mechanical engineering, using experimental, computational and theoretical methods. The mechanical engineering faculty at UVM works closely with students in five research areas: 1- Computational Multiscale Simulations & Theory; 2- Thermo-fluid & Aerospace Engineering; 3- Medical Research; 4 - Dynamical Sensing, Robotics and Control, and 5- Materials Science and Engineering.

### DEGREES

Mechanical Engineering AMP (p. 175)

Mechanical Engineering M.S. (p. 175)

Mechanical Engineering Ph.D. (p. 176)

### FACULTY

**Dubief, Yves C.**; Associate Professor, Department of Mechanical Engineering; PHD, Institut National Polytechnique de Grenoble

**Fiorentino, Niccolo M.**; Assistant Professor, Department of Mechanical Engineering; PHD, University of Virginia

**Fletcher, Douglas G.**; Professor, Department of Mechanical Engineering; PHD, University of Virginia

**Floreani, Rachael Ann**; Associate Professor, Department of Mechanical Engineering; PHD, Colorado State University

**Garimella, Suresh**; President, University of Vermont, Professor, Department of Mechanical Engineering; PHD, University of California at Berkeley

**Huston, Dryver R.**; Professor, Department of Mechanical Engineering; PHD, Princeton University

**Louisos, William**; Senior Lecturer, Department of Mechanical Engineering; PHD, University of Vermont

**Ma, Jihong**; Assistant Professor, Department of Mechanical Engineering, PHD, University of Minnesota, Twin Cities

**Marshall, Jeffrey Scott**; Professor, Department of Mechanical Engineering; PHD, University of California Berkeley

**Sansoz, Frederic P.**; Professor, Department of Mechanical Engineering; PHD, Ecole des Mines de Paris

**Schadler, Linda S.**; Dean, College of Engineering and Mathematical Sciences; Professor, Department of Mechanical Engineering; PHD, University of Pennsylvania

## MECHANICAL ENGINEERING AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

Qualified undergraduate students who plan to earn a M.S. in mechanical engineering may enroll in the Accelerated Master's Entry Pathway, which enables students to begin working on the M.S. while still an undergraduate. Students apply to the program in the second semester of their junior year. Following acceptance by the Graduate College, students may take up to 6 graduate credits while still an undergraduate that can be counted toward both the B.S. and the M.S. degrees, subject to approval of the student's graduate advisor. Another 3 graduate credits can be counted towards the M.S. degree while an undergraduate but cannot count towards the B.S. degree. Students in the Accelerated Masters Pathway must follow either the non-thesis option or research thesis option M.S. degree requirements. For the thesis option, research counting toward the thesis must begin immediately in the summer following the completion of the bachelor's degree.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students

To apply for the program, students must be enrolled at the University of Vermont in mechanical engineering with a cumulative grade point average of at least 3.20 at the time of application and must complete the CEMS Accelerated Masters Permission Form and the Graduate College application. For thesis students, the application should name a graduate faculty member who has agreed to serve as their thesis advisor. No Graduate Record Examination (GRE) is required for AMP applicants.

#### Minimum Degree Requirements for the Degree of Master of Science

The Mechanical Engineering AMP requires the completion of advanced courses in mechanical engineering, mathematics, and other approved courses and research (for thesis students) totaling at least 30 credits.

Students are required to complete 30 credits, at least 6 of which must be at the 6000-level, including:

ME 5040	Adv Engineering Analysis I	3
ME 5160	Continuum Mechanics	3
Numerical Methods requirement: Either ME 5980 (Numerical Methods for Engineer), ME 5990 (AST: Computational Fluid Dynamics), ME 5520 (Computational Solid Mechanics), ME 6550 (Multiscale Modeling), or equivalent course at 5000- or 6000- level.		3
6 course credits in the same area of specialization within mechanical engineering.		6

Currently, the program offers areas of specialization in:

- Biomechanics and Biomaterials
- Control and Design of Mechanical Systems;
- Materials Engineering and Nanomechanics;
- Thermodynamics, Fluids and Energy; and
- Computational Mechanics.

Further details on the core course requirements and the areas of specialization can be obtained from the Mechanical Engineering Graduate Program website.

OPTION A (THESIS)	
In addition to core courses, students selecting the thesis option must complete between 6 and 9 thesis credits (ME 6391) prior to the master's thesis defense, with the expectation that the student's research must culminate in an original piece of work publishable as a conference proceedings paper or a peer-reviewed journal article. Those opting for a 6-credit thesis must complete an additional 3 credits of approved course work	
OPTION B (NON-THESIS)	
Students selecting the non-thesis option must complete an additional 15 credits of course work beyond the core credits in lieu of a thesis. Of the additional course work, a minimum of 9 credits must be in a chosen area of specialization.	

### Comprehensive Examination

The comprehensive examination for the thesis option consists of successfully presenting a proposal research seminar.

Candidates in the non-thesis option must successfully present a 25-min. public seminar for the Mechanical Engineering Seminar Series. The seminar should be a comprehensive literature review on a subject matter relevant to the candidate's chosen area of specialization in mechanical engineering.

The candidate is given a maximum of 2 opportunities to pass the comprehensive examination.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

A cumulative grade point average of 3.00 or better.

## MECHANICAL ENGINEERING M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Mechanical Engineering Graduate Program offers a Master's of Science (M.S.) degree in mechanical engineering. Each student must meet the general requirements for admission as outlined under the regulations of the University of Vermont Graduate College. Typically, students entering the program have received a bachelor's degree in mechanical engineering or a related field. Applicants with other backgrounds will be evaluated individually and must complete prescribed undergraduate technical course work. Part-time study leading to the M.S. degree is also possible for engineers who are employed in the vicinity. Areas of research interest in the program

currently include: Aerospace Engineering, Turbulence, Complex and Bio Fluids, Multiscale Mechanics, Robotics, Nanomaterials & Composites, Energy Harvesting, System Control & Diagnostics, Biomechanics & Orthopedics, Biomaterials, and High-performance Computing.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

An accredited bachelor's degree in Mechanical Engineering or equivalent is the typical requirement; however, students holding a bachelor's degree in a related engineering or scientific field may also qualify for admission. Completion of the general (aptitude) portion of the Graduate Record Examination is required only for those students who are applying for a Graduate Teaching or Research Assistantship.

**Minimum Degree Requirements for the Degree of Master of Science**

The Mechanical Engineering Graduate Program offers both thesis and non-thesis options for the master's degree. Both options require the completion of advanced courses in mechanical engineering, mathematics, and other approved courses and research (for thesis students) totaling at least 30 credits. Graduate students receiving financial support via teaching or research fellowships are required to select the thesis option. Part-time students typically select the non-thesis option but may choose the thesis option if they prefer. Students normally decide on which option they intend to pursue at the beginning of their program.

All students are required to complete 30 credits, at least 6 of which must be at the 6000-level, including:

ME 5040	Adv Engineering Analysis I	3
ME 5160	Continuum Mechanics	3
Numerical Methods requirement: Either ME 5980 (Numerical Methods for Engineer), ME 5990 (AST: Computational Fluid Dynamics), ME 5520 (Computational Solid Mechanics), ME 6550 (Multiscale Modeling), or equivalent course at 5000- or 6000- level.		3
6 course credits in the same area of specialization within mechanical engineering.		6

Currently, the program offers areas of specialization in:

- Biomechanics and Biomaterials;
- Control and Design of Mechanical Systems;
- Materials Science and Engineering
- Thermodynamics, Fluids and Energy; and
- Computational Mechanics

Further details on the core course requirements and the areas of specialization can be obtained from the Mechanical Engineering Graduate Program website.

Option A (Thesis)	
In addition to core courses, students selecting the thesis option must complete between 6 and 9 thesis credits (ME 6391) prior to the master's thesis defense, with the expectation that the student's research must culminate in an original piece of work publishable as a conference proceedings paper or a peer-reviewed journal article. Those opting for a 6-credit thesis must complete an additional 3 credits of approved course work	
Option B (Non-thesis)	
Students selecting the non-thesis option must complete an additional 15 credits of course work beyond the core credits in lieu of a thesis. Of the additional course work, a minimum of 9 credits must be in a chosen area of specialization.	

**Comprehensive Examination**

The comprehensive examination for the thesis option consists in successfully presenting a proposal research seminar.

Candidates in the non-thesis option must successfully present a 25-min. public seminar for the Mechanical Engineering Seminar Series. The seminar should be a comprehensive literature review on a subject matter relevant to the candidate's chosen area of specialization in mechanical engineering.

The candidate is given a maximum of 2 opportunities to pass the comprehensive examination.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

A cumulative grade point average of 3.00 or better.

**MECHANICAL ENGINEERING PH.D.**

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

**OVERVIEW**

The Mechanical Engineering Graduate Program offers a Doctor of Philosophy (Ph.D.) degree in mechanical engineering. Each student must meet the general requirements for admission as outlined under the regulations of the University of Vermont Graduate College. Typically, students entering the program have received a master's degree in mechanical engineering or a closely-related field. Applicants with other backgrounds will be evaluated individually and may be asked to complete prescribed undergraduate technical course work. Areas of research interest in the program currently include: Aerospace Engineering, Turbulence, Complex and Bio Fluids, Multiscale Mechanics, Robotics, Nanomaterials & Composites, Energy Harvesting, System Control & Diagnostics, Biomechanics & Orthopedics, Biomaterials, and High-performance Computing.



## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

An accredited master's degree in mechanical engineering or closely related discipline is required. Completion of the general (aptitude) portion of the Graduate Record Examination is required.

### Minimum Degree Requirements for the Degree of Doctor of Philosophy

The degree of Doctor of Philosophy requires of candidates a minimum of 75 credits to be earned in course work and in dissertation research. All Ph.D. candidates must assist in teaching at least 1 full semester and complete a doctoral dissertation consisting of original research and of sufficient quality to merit publication in peer-reviewed conference proceedings and/or archival journals.

#### Minimum Coursework Requirements:

Total graduate-level coursework that includes up to 24 transferred M.S. course credits earned at UVM or another institution. Students must complete at least 15 of those credits at UVM after matriculation into the doctoral program.	39
ME 7491      Doctoral Dissertation Research	≥ 21
Graduate-level mechanical engineering coursework at UVM at the 6000- or 7000-level from any areas of specialization. This coursework requirement may include M.S. course credits earned at UVM.	6
Additional graduate-level mechanical engineering coursework at UVM at the 5000-, 6000- or 7000- level from the same area of specialization. This coursework requirement may include M.S. course credits earned at UVM.	6
Graduate-level Engineering, Mathematics, Statistics, Physical or Life Sciences coursework at UVM at the 5000-, 6000- or 7000- level.	3

Currently, the program offers 5 areas of specialization in:

- Biomechanics and Biomaterials;
- Control and Design of Mechanical Systems;
- Materials Science and Engineering;
- Thermodynamics, Fluids and Energy; and
- Computational Mechanics.

### Comprehensive Examination

All Ph.D. candidates must pass the comprehensive examination. The comprehensive examination tests the proficiency of the students in 4 topics of the mechanical engineering curriculum or closely related fields. The candidate works with his/her advisor and the graduate program coordinator to form a committee of 4 graduate faculty, 1 of whom should hold an appointment outside of mechanical engineering (1 faculty member may test the student on two distinct topics). The first part of the comprehensive examination consists of a written part spanning no more than 4 hours (1 hour per topic). In the second part of the examination, the committee meets with the student to ask questions regarding the written exam and any follow up topics that may be necessary to establish the proficiency of the candidate in mechanical engineering. A candidate must

pass the comprehensive examination in no more than 2 attempts. Comprehensive examinations are typically scheduled at the end of the Fall or Spring semesters. It is strongly advised that the Ph.D. candidate take the comprehensive examination at the completion of his/her second or third semester of studies.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Successful completion of the Ph.D. comprehensive examination.

## MEDICAL LABORATORY SCIENCE

<http://www.uvm.edu/cnhs/bhsc>

### OVERVIEW

The Master of Science in Medical Laboratory Science (MMLS) program is designed to provide students with the knowledge and skills required for leadership roles in management, education, and research related to advanced clinical practice in the medical laboratory profession.

Individuals may enter the program via two tracks, depending on their background:

- Track 1 is for individuals with a Bachelor's Degree who are not certified in medical laboratory science but desire a career in the clinical laboratory sciences. Upon completion of the program, these students will be eligible to take the national certification exam in medical laboratory science offered by the American Society of Clinical Pathology (ASCP).
- Track 2 is for medical laboratory science-certified graduates who seek advanced training and expertise in evidence-based practice, scientific research, health care management and leadership. Track 2 also includes an accelerated Master's option for current UVM Medical Laboratory Science students (we are currently not accepting applications for Track 2).

Both Track 1 and Track 2 involve a research-based capstone project that will engage students in hands-on research methodology, experimental practice, and scientific communication. The capstone project provides students with the opportunity to develop important skills in evidence-based practice and clinically-related research.

Our faculty offer advanced practice courses in molecular methods, clinical laboratory correlations, emerging diagnostic technologies, healthcare leadership and management, quality, evidence-based practice, research design and methods; and research experiences to prepare graduates of both tracks to become future leaders in the profession.

Students in Track 1 will complete a semester-long clinical practicum at one of our clinical affiliate hospitals as part of the core NAACLS-accredited program.

Degrees

- Medical Laboratory Science AMP (p. 178)
- Medical Laboratory Science M.S. (p. 179)

**FACULTY**

**Amiel, Eyal;** Associate Professor, Department of Biomedical and Health Sciences; PHD, Dartmouth College  
**Deming, Paula;** Associate Professor, Department of Biomedical and Health Sciences; PHD, University of North Carolina at Chapel Hill  
**Frietze, Seth;** Associate Professor, Department of Biomedical and Health Sciences; PHD, Harvard University  
**Fung, Mark K.;** Professor, Department of Pathology and Laboratory Medicine; MD, PHD, University of Alabama School of Medicine  
**Krementsov, Dimitry N.;** Associate Professor, Department of Biomedical and Health Sciences, PHD; University of Vermont  
**Moreau, Katrina;** Clinical Associate Professor, Department of Biomedical and Health Sciences; M.A.T., MLS, Tufts University  
**Scheiber, Melissa;** Clinical Assistant Professor, Department of Biomedical and Health Sciences, PHD: Medical University of South Carolina

**MEDICAL LABORATORY SCIENCE AMP**

All students must meet the Requirements for the Accelerated Master’s Degree Pathway (p. 269)

**Medical Laboratory Science is currently not accepting applications to the Accelerated Master's Pathway.**

**OVERVIEW**

The Accelerated Master’s Degree Entry Pathway (AMP) in Medical Laboratory Science is designed to offer select UVM medical laboratory science students an opportunity to earn both the bachelor’s degree and the master’s degree in Medical Laboratory Science in 5 years. 6 credits toward the M.S. will be earned during the senior year; which will also count toward the B.S.. 6 credits will then be completed during the summer after college graduation, with all remaining requirements fulfilled in academic year 5.

The objective of this program is to prepare certified medical laboratory scientists for leadership roles in medical laboratory science practice and research. Graduates will have advanced training and expertise in evidence-based practice, scientific research, and healthcare management. Students in the AMP will complete the MLS Track 2 curriculum requirements.

Track 2 involves a research-based capstone project that will engage students in hands-on research methodology, experimental practice, and scientific communication. The capstone project provides students with the opportunity to develop important skills in evidence-based practice and clinically-related research (we are currently not accepting applications for Track 2).

Our faculty offer advanced practice courses in molecular methods, clinical laboratory correlations, emerging diagnostic technologies, healthcare leadership and management, quality, evidence-based practice, research design and methods; and research experiences

to prepare graduates of both tracks to become future leaders in the profession.

**SPECIFIC REQUIREMENTS**

**REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF MASTER OF SCIENCE**

Students should apply for admission into the AMP in Medical Laboratory Science in the beginning of the spring semester of their junior year. Consideration for admission requires the following:

- Must be a current 3<sup>rd</sup> year medical laboratory science student in good standing
- A minimum cumulative GPA of 3.00
- Completion of the Graduate College Application form
- Written personal statement
- Recommendation by a MLS faculty member

**MINIMUM DEGREE REQUIREMENTS**

A minimum of 30 credits and successful completion of a comprehensive written exam are required for completion of the AMP in Medical Laboratory Science. In addition, students must successfully complete and defend a research-based capstone project.

Students must also meet the Graduate College requirements for the Master's Degree including maintaining a minimum GPA of 3.0.

30 credits of advanced practice coursework. Students should work closely with the program or their advisor on their academic plan.

FOURTH YEAR UNDERGRADUATE/FIRST YEAR GRADUATE DUAL ENROLLMENT		
Summer Session or Fall Semester		
STAT 5000	Biostatistics and Epidemiology	3
or STAT 5210	Advanced Stat Methods & Theory	
Spring Semester		
NH 6899	Fundamentals Critical Inquiry	3
FIFTH YEAR GRADUATE ONLY		
Summer Session		
MLS 6900	Clinical Leadership & Mgt	3
MLS 6500	Research and Design II	3
Fall Semester		
MLS 6300	Emerging Diag. Technologies	3
MLS 6600	Research Capstone	1-3
Approved Elective		3
Spring Semester		
PATH 6250	Genetics for Clinicians	3
GRNS 6280	Quality in Healthcare	3

MLS 6200	Clinical Correlations	3
MLS 6600	Research Capstone	1-3

### COMPREHENSIVE EXAMINATION

Students will complete a written comprehensive exam by the end of the spring semester of the fifth year.

### REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF SCIENCE

Successful completion of the comprehensive exam and in academic good standing.

## MEDICAL LABORATORY SCIENCE M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Master of Science in Medical Laboratory Science (MMLS) program is designed to provide students with the knowledge and skills required for leadership roles in management, education, and research related to advanced clinical practice in the medical laboratory profession.

Individuals may enter the program via 2 tracks, depending on their background:

- Track 1 is for individuals with a Bachelor's Degree who are not certified in medical laboratory science but desire a career in the clinical laboratory sciences. Upon completion of the program, these students will be eligible to take the national certification exam in medical laboratory science offered by the American Society of Clinical Pathology (ASCP). Graduation is not contingent upon passing the ASCP certification exam.
- Track 2 is for medical laboratory science-certified graduates who seek advanced training and expertise in evidence-based practice, scientific research, healthcare management and leadership. Track 2 also includes an accelerated Master's option for current UVM medical laboratory science students (we are currently not accepting applications for Track 2).

Both Track 1 and Track 2 involve a research-based capstone project that will engage students in hands-on research methodology, experimental practice, and scientific communication. The capstone project provides students with the opportunity to develop important skills in evidence-based practice and clinically-related research.

Our faculty offer advanced practice courses in molecular methods, clinical laboratory correlations, health care leadership and management, policy, ethics, quality, research design and methods; and research experiences to prepare graduates of both tracks to become future leaders in the profession.

Students in Track 1 will complete a semester-long clinical practicum at one of our clinical affiliate hospitals as part of the core NAACLS-accredited program.

## SPECIFIC REQUIREMENTS

### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF MASTER OF SCIENCE

#### TRACK 1

- B.S. or B.A. in one of the life sciences (or related field) from accredited college or university
- Minimum overall GPA of 3.0
- Undergraduate and (when applicable) graduate transcripts
- General biology or anatomy and physiology (8 credits), general chemistry (8 credits), organic chemistry or biochemistry (4 credits), general microbiology with lab (4 credits), college level math (3 credits)
- TOEFL or IELTS scores (international students)
- UVM Graduate College Application

#### TRACK 2 (NOT CURRENTLY ACCEPTING APPLICATIONS)

- B.S. in Medical Laboratory Science or related field
- ASCP certification in Medical Laboratory Science or ASCP certification-eligible
- Minimum overall GPA of 3.0
- Undergraduate and (when applicable) graduate transcripts
- General biology or anatomy and physiology (8 credits), general chemistry (8 credits), organic chemistry or biochemistry (4 credits), general microbiology with lab (4 credits), college level math(3 credits)
- TOEFL or IELTS scores (international students)
- UVM Graduate College Application

### MINIMUM DEGREE REQUIREMENTS

#### TRACK 1

43 credits NAACLS accredited courses and 24 credits Advanced Practice courses (67 credits total). Students should work closely with the program or their advisor on their academic plan

FIRST YEAR		
Fall Semester		
MLS 5100	Gr Clinical Chemistry I	4
BHSC 5810	Gr Applied Molecular Bio	3
BHSC 5820	Gr Applied Molec Bio Lab	1
STAT 5000	Biostatistics and Epidemiology	3
	or STAT 5210	Advanced Stat Methods & Theory
MLS 6100	Advanced Immunobiology	3
Spring Semester		
BHSC 5440	Gr Immunology Lab	1
MMG 5220	Gr Medical Micro w/lab	4
MLS 5110	Gr Clinical Chemistry II	3
GRNS 6280	Quality in Healthcare	3

PATH 6250	Genetics for Clinicians	3
NH 6899	Fundamentals Critical Inquiry	3
Summer Semester		
MLS 6900	Clinical Leadership & Mgt	3
MLS 6500	Research and Design II	3
SECOND YEAR		
Fall Semester		
MLS 6300	Emerging Diag. Technologies	3
MLS 5200	Gr Hematology	3 or 4
MLS 5300	Gr Clinical Micro II	3
MLS 5400	Gr Immunohematology	4
MLS 6600	Research Capstone	1-3
Spring Semester		
MLS 6700	Clinical Practicum	12
MLS 6600	Research Capstone	1-3
MLS 6000	Certification Review	1

**TRACK 2 (NOT CURRENTLY ACCEPTING APPLICATIONS)**

30 credits of advanced practice coursework.

FIRST YEAR		
Fall Semester		
MLS 6300	Emerging Diag. Technologies	3
STAT 5000	Biostatistics and Epidemiology	3
or STAT 5210	Advanced Stat Methods & Theory	
Spring Semester		
NH 6899	Fundamentals Critical Inquiry	3
PATH 6250	Genetics for Clinicians	3
Summer Semester		
MLS 6900	Clinical Leadership & Mgt	3
MLS 6500	Research and Design II	3
SECOND YEAR		
Fall Semester		
MLS 6600	Research Capstone	1-3
Approved Elective		
Spring Semester (Note: these courses may also be taken in the Spring of year 1)		
MLS 6200	Clinical Correlations	3

GRNS 6280	Quality in Healthcare	3
MLS 6600	Research Capstone	1-3

**COMPREHENSIVE EXAMINATION**

Students will complete a written comprehensive exam prior to graduation.

**REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF SCIENCE**

Successful completion of the comprehensive exam and in academic good standing.

**MEDICAL SCIENCE**

<https://learn.uvm.edu/program/uvm-master-of-medical-science-degree/>

**OVERVIEW**

The main objective of the Master of Science in Medical Science Program is to provide a rigorous curriculum in the basic biomedical sciences that prepares students with the background knowledge and skills required to gain acceptance into and succeed in medical school as well as other health-related professional doctoral-level degree programs including dental and pharmacy school. The program offers a cohesive set of core courses that cover the major biomedical disciplines that together provide the foundation of understanding how the human body works from the molecular (biochemistry), cellular (cell biology), and systems (anatomy and physiology) levels, as well as the fundamentals required to understand drug actions in the body (pharmacology) and the principles of quantitatively interpreting scientific and epidemiological data (biostatistics).

**DEGREES**

Medical Science M.S. (p. 181)

**FACULTY**

**Anathy, Vikas;** Assistant Professor, Department of Pathology and Laboratory Medicine; PHD, Madurai Kamaraj University

**Berger, Christopher Lewis;** Professor, Department of Molecular Physiology and Biophysics; PHD, University of Minnesota Twin Cities

**Deming, Paula B.;** Associate Professor, Department of Biomedical and Health Sciences; PHD, University of North Carolina at Chapel Hill

**Francklyn, Christopher Steward;** Professor, Department of Biochemistry; PHD, University of California Santa Barbara  
**Godsey, Michael;** Associate Professor, Department of Biochemistry; PhD, Oregon Health & Science University

**Howe, Alan K.;** Associate Professor, Department of Pharmacology; PHD, Northwestern University

**Kelm, Robert;** Associate Professor, Department of Medicine-Cardiovascular; PHD, University of Vermont

**Khan, Shamima;** Assistant Professor, Department of Medicine; PHD, University of Louisiana

**Lounsbury, Karen M.;** Professor, Department of Pharmacology; PHD, University of Pennsylvania



**May, Victor**; Professor, Department of Neurological Sciences; PHD, Northwestern University

**Previs, Michael**; Assistant Professor, Department of Molecular Physiology and Biophysics; PHD, University of Vermont

**Salogiannis, John**; Assistant Professor, Department of Molecular Physiology and Biophysics; PHD, Harvard University

**Stumpff, Jason K.**; Associate Professor, Department of Molecular Physiology and Biophysics; PHD, University of Colorado

**Thali, Markus Josef**; Professor, Department of Microbiology and Molecular Genetics; PHD, University of Zurich

**Ward, Gary E.**; Professor, Department of Microbiology and Molecular Genetics; PHD, University of California San Diego

**Wellman, George C.**; Professor, Department of Pharmacology; PHD, University of Vermont

## MEDICAL SCIENCE M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The goal of the Master of Science in Medical Science Program is to provide a rigorous curriculum in the basic biomedical sciences that prepares students with the background knowledge and skills required to gain acceptance into and succeed in healthcare-related professional degree programs such as medical, dental, or pharmacy programs. The program offers a cohesive set of core courses in biomedical disciplines that together provide foundational understanding of human structure and function. Courses provide graduate-level training in biochemistry, cell biology, anatomy, and physiology as well as pharmacology and evidence-based medicine.

The faculty below are UVM faculty in addition to those who have been formally appointed Graduate Faculty members:  
**Akselrod, Dmitry**; Associate Professor, Department of Radiology; MD, SUNY Upstate Medical University  
**Geeslin, Matthew**; Assistant Professor, Department of Radiology; MD, University of Minnesota  
**Hielscher, Abigail**; Associate Professor, Department of Neurological Sciences; PhD, University of Nebraska  
**Jebbett, Nathan**; Assistant Professor, Department of Neurological Science; PHD, University of Vermont  
**McBride, Carole Anne**; Assistant Professor, Department of Obstetrics Gynecology&Reprod; PHD, University of Vermont  
**Spear-Bishop, Estelle**; Assistant Professor, Department of Neurological Sciences; PHD, University of Vermont

### Specific Requirements

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

Applicants are required to have a B.S. or B.A. from accredited college or university, 2 semesters of general biology, general physics, general chemistry, and organic chemistry. International Students are required to submit scores for TOEFL or IELTS.

### Minimum Degree Requirements

UVM's Master of Medical Science degree is a 30-credit program that is designed to be completed within 1 year (12 months). Students complete Core Course Requirements, 1 anatomy, 1 biostatistics, 1 pharmacology, and additional electives to complete the 30-credit program.

Core Courses:		
BIOC 6001	General Biochemistry I	3
BIOC 6002	General Biochemistry II	3
MPBP 6010	Human Physiology & Pharm I	4
PH 6030	Biostatistics I:App Rsch in PH	3
The following cell biology course:		
CLBI 6010	Cell Biology	3
or PHRM 6060	Medical Cell Biology	
The following pharmacology course:		
PHRM 6080	Integrative Physiol. & Pharm.	3
or PHRM 6010	Applied Systems Pharmacology	
1 from the following anatomy courses:		
ANNB 6000	Human Gross Anatomy	6
RAD 6890	Human Anatomy via Radiology	3
Choose at least 2 electives from the following or other health-related courses approved by the Director (core and elective credits must combine for an overall total of at least 30 credits):		
BIOC 6051	Proteins I: Structure&Function	
BIOC 6072	Cancer Biology	
MPBP 6100	Molecular Control of the Cell	
MPBP 6900	Medical Master's Capstone (only 1 Capstone course allowed)	
NSCI 6020	Neuroscience	
OBGY 5000	Understanding Human Pregnancy	
PATH 6280	Techniques in Microscopy	
PH 6010	Public Health & Health Policy	
PH 6020	Epidemiology I	
PH 6030	Biostatistics I:App Rsch in PH	
PH 6040	Environmental Public Health	
PH 6060	Social&Behavioral Public Hlth	
PH 6070	Epidemiology 2	
PH 6120	Food Systems & Public Hlth	
PH 6220	One Health: Zoonoses	

PHRM 5400	Molecules & Medicine	
PHRM 6050	Milestones in Pharmacology	
PHRM 6900	Medical Master's Capstone (only 1 Capstone course allowed)	

LCOM Medical Student Program Transfer to Medical Science M.S.: Larner College of Medicine (LCOM) medical students who wish to withdraw from the Vermont Integrated Curriculum may transfer up to 30 qualifying credits from their pre-clinical courses to the Graduate College Medical Science M.S. program. Applicants submit a program transfer request to the Dean of the Graduate College, with approval from the LCOM Dean of Students.

### Comprehensive Examination

Students must complete a comprehensive exam, integrating their knowledge of core course material in a written paper, by their end of their final semester in the program.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of a comprehensive examination in Medical Science.

## MICROBIOLOGY AND MOLECULAR GENETICS

### OVERVIEW

<https://www.med.uvm.edu/mmg/home>

### OVERVIEW

The goal of the Microbiology and Molecular Genetics Master's Programs is to prepare students for careers in science. The program provides an increased knowledge base in both microbiology and molecular genetics as well as the ability to think critically, communicate scientific knowledge clearly and perform independent scientific research. In addition to the Microbiology and Molecular Genetics M.S. and Accelerated Master's Pathway (AMP), the MMG faculty participate in the interdisciplinary doctoral program in Cellular, Molecular, and Biomedical Sciences.

### DEGREES

Microbiology and Molecular Genetics AMP (p. 182)

Microbiology and Molecular Genetics M.S. (p. 184)

### FACULTY

**Bruce, Emily**; Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Cambridge University

**Celli, Jean**; Professor, Department of Microbiology and Molecular Genetics; PHD, Université Pierre & Marie Curie

**Chatterjee, Nimrat**; Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Baylor College of Medicine

**Diehl, Sean**; Associate Professor, Department of Microbiology and Molecular Genetics; PHD, University of Vermont

**Doublié, Sylvie**; Professor, Department of Microbiology and Molecular Genetics; PHD, University of North Carolina Chapel Hill

**Dragon, Julie**; Associate Professor, Department of Microbiology and Molecular Genetics; PHD, University of Vermont

**Kirkpatrick, Beth Diane**; Professor, Department of Microbiology and Molecular Genetics; MD, Albany Medical College

**Knodler, Leigh**; Associate Professor, Department of Microbiology and Molecular Genetics; PHD, University of New South Wales

**Martorelli Di Genova, Bruno**; Assistant Professor, Department of Microbiology and Molecular Genetics; PHD, Federal University of Sao Paulo

**Roberts, Steven**; Associate Professor, Department of Microbiology and Molecular Genetics; PhD, University of North Carolina

**Thali, Markus Josef**; Professor, Department of Microbiology and Molecular Genetics; PHD, University of Zurich

**Ward, Gary E.**; Professor, Department of Microbiology and Molecular Genetics; PHD, University of California San Diego

**Wargo, Matthew**; Associate Professor, Department of Microbiology and Molecular Genetics; PHD, Dartmouth College

## MICROBIOLOGY AND MOLECULAR GENETICS AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

### OVERVIEW

The Accelerated Master's Degree Entry Pathway (AMP) in Microbiology and Molecular Genetics is designed to offer select UVM undergraduate science majors the opportunity to obtain both their Bachelor's degree and Master's degree in Microbiology and Molecular Genetics in a total of 5 years of study. The objective of this program is to provide a broad knowledge base of microbiological and molecular genetic concepts to improve students' relative standing towards pursuing additional graduate degrees (Ph.D., M.D.) or to prepare students for careers in pharmaceutical, biotechnology and related industries.

Students enrolled in this pathway can have up to 9 credits of graduate-level (5000- or 6000-level) courses, which are taken during their Senior undergraduate year, count towards both a Bachelor's Degree and the Master's Degree in Microbiology and Molecular Genetics. Students must apply and be admitted to the M.S. in Microbiology and Molecular Genetics prior to taking any graduate courses that will count towards both degrees. In their Senior year, their primary curriculum is their undergraduate major with a secondary curriculum for the M.S. Following completion of their Bachelor's, the graduate program becomes the primary curriculum and students are expected to complete the remaining Master's Degree requirements during a 5<sup>th</sup> year of full-time study. Students interested in the Microbiology and Molecular Genetics AMP should contact the Program Coordinator.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science in Microbiology and Molecular Genetics

Students should apply for admission into the Accelerated Master's Degree Program in Microbiology and Molecular Genetics with a minimum of 75 credits and before the start of their 1<sup>st</sup> semester of their Senior year. Admission into this program requires the following:

- A minimum cumulative grade point average of 3.00.
- Enrollment in an undergraduate Bachelor's degree program and completion of at least 1 year of Introductory Chemistry, 1 year of Organic Chemistry, Calculus I, MMG 2010, MMG 2040, BCOR 2300, and BCOR 2500 or MMG 2990C.
- GRE/GMAT scores are NOT an admission requirement for the Accelerated Master's Degree Program in Microbiology and Molecular Genetics program.
- Students must identify a research mentor within the Department of Microbiology and Molecular Genetics in whose laboratory they will conduct their Master's degree research.
- Students MUST be admitted through the Graduate College before taking any courses that will be applied to the Master's Degree.
- Courses taken as an undergraduate that will then count towards the Master's Degree must be graded with letter grades (A-F, not P/F, S/U, SP/UP). Independent study, internship and research credits are not allowed to count towards the Master's degree.
- If more than 9 credits of graduate level coursework are taken prior to receipt of the Bachelor's, ONLY 9 credits will count towards the Master's. There are no exceptions.
- Students are expected to initiate Master's Degree research in the summer following their undergraduate graduation. Students who graduate in January may initiate Master's research in the spring semester and are expected to continue the research in the summer.

### Application Process

- Completion of application to the Graduate College, meeting all Graduate College application requirements.
- Include at least 3 letters of recommendation, 1 must be from your identified research mentor.
- Include the "Accelerated Masters Permission" form, which can be found on the Graduate College website. This document must be signed by the indicated parties before being uploaded to your application.

### Minimum Degree Requirements

A minimum of 30 credits are required for completion of the Accelerated Master's Degree in Microbiology Molecular Genetics. Of the 30 credits, at least 15 must be graded coursework (with at least 6 of those at the 6000-level or above) and 8 must be Master's thesis research credits. Students must also meet the Graduate College

requirements for the Master's Degree including maintaining a minimum GPA of 3.00.

Courses should be selected from the following lists.

Complete the following courses:		
BIOC 6001	General Biochemistry I *Successful completion of BIOC 3005 can substitute for the BIOC 6001 requirement for previous UVM students only. However, this will NOT count towards the 30-graduate credit requirement for the degree and thus cannot be used as part of the 9 credits that double count towards the bachelor's and master's degree.	3
MMG 6890	Graduate Teaching Practicum	3
MMG 6990	Special Topics (Ethics in Graduate Research)	1
Students must complete at least 1 approved course in Bioinformatics Databases		
MMG 5310	Bioinformatics & Data Analysis	3
MMG 5320	Advanced Bioinformatics (MMG 5310 or equivalent experience required as a prerequisite)	3
Students must complete at least 1 upper-level course in Molecular Genetics		
MMG 5110	Gr Bacterial Genetics	3
MMG 5270	Advanced Cancer Genetics	3
Students must complete at least 1 upper-level course in Microbiology		
MMG 5210	Gr Medical Microbiology	3
MMG 5220	Gr Medical Micro w/lab	0 or 4
MMG 5230	Immunology Concepts	3
MMG 6200	Cellular Microbiology	4
Remaining credits in the degree program should be selected from graduate courses approved by the student's Studies Committee		
At least 8 (and up to 14) credits of Master's Thesis Research (MMG 6391) are required. In addition, a written thesis and defense of this thesis must occur according to the guidelines laid out by the Graduate College.		

### Comprehensive Examination

By the end of the first semester following receipt of the Bachelor's Degree, M.S. students will write either an extensive literature review or research proposal that pertains to their research interests. Students can expect guidance from their advisor and Studies Committee in the writing of the proposal, but must assume responsibility for the final version and must acquire sufficient mastery of their chosen subject area to defend the proposal. Students will present their written proposal to their Studies Committee. That Committee will determine if the written proposal is satisfactory and, if it is, schedule an oral defense. During the oral defense, the Committee shall be free to explore the knowledge of the student on a range of subjects related to the proposal, much as occurs during a thesis defense. If the written review/proposal is deemed unsatisfactory or if a student fails the oral defense, the candidate will be given 1 opportunity to rewrite or re-

defend his/her proposal. If the student fails a second time, s/he/they will be dismissed from the M.S. program.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Advancement to candidacy requires satisfactory completion of the comprehensive exam.

#### Studies Committee:

The student's Studies Committee will consist of the student's research mentor, a member of the MMG graduate faculty, a faculty member from outside the Microbiology and Molecular Genetics Department to serve as the Chair of the Studies Committee and a fourth member at the discretion of the student in consultation with their research mentor.

#### Thesis Writing and Defense:

Thesis writing cannot begin until a student has become a Candidate for the Degree of Master of Science in Microbiology and Molecular Genetics and has received approval from the student's Studies Committee.

## MICROBIOLOGY AND MOLECULAR GENETICS M.S.

All students must meet the Requirement for the Master's Degree (p. 270)

### OVERVIEW

The Department of Microbiology and Molecular Genetics offers a Master of Science Degree. The M.S. degree is a thesis-based program. The program requires a minimum of 30 credits of research and coursework, a qualifying exam for candidacy, and the writing and defense of a thesis.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science in Microbiology and Molecular Genetics

- A Bachelor's Degree with a minimum cumulative grade point average of 3.00.
- Minimum course requirements: Completion of 2 semesters of undergraduate biology, general chemistry, organic chemistry and 1 semester of calculus; in addition, 1 course in genetics, one course in microbiology with a laboratory, and 1 course in cell biology.
- GRE/GMAT scores are NOT an admission requirement for the Master's Degree Program in Microbiology and Molecular Genetics program.
- Graduate student status will start 1 week prior to the start of Fall classes and will be expected to be maintained full time including summers until completion of their Master's Degree in Microbiology and Molecular Genetics.
- Students MUST be admitted through the Graduate College before taking any courses that will be applied to the Master's Degree requirements.

### APPLICATION PROCESS

- Completion of application to the Graduate College, meeting all Graduate College application requirements.
- Admission to the program will be contingent upon the capacity and interests of participating departmental laboratories.

### Minimum Degree Requirements

A minimum of 30 credits are required for completion of the Master's Degree in Microbiology and Molecular Genetics. Of the 30 credits, at least 15 must be graded coursework (with at least 6 of those at 6000-level or above) and at least 8 must be Master's thesis research credits. Students must also meet the Graduate College requirements for the Master's Degree including maintaining a minimum GPA of 3.00.

Students must complete the following courses:		
BIOC 6001	General Biochemistry I *Successful completion of BIOC 3005 can substitute for the BIOC 6001 requirement for previous UVM students only. However, these will NOT count towards the 30-graduate credit requirement for the degree.	3
MMG 6890	Graduate Teaching Practicum	3
MMG 6990	Special Topics (Ethics in Graduate Research)	1
Students must complete at least 1 approved course in Bioinformatics Databases		
MMG 5310	Bioinformatics & Data Analysis	
MMG 5320	Advanced Bioinformatics (MMG 5310 or equivalent experience required as a prerequisite)	
Students must complete at least 1 upper-level course in Molecular Genetics		
MMG 5110	Gr Bacterial Genetics	
MMG 5270	Advanced Cancer Genetics	
Students must complete at least 1 upper-level course in Microbiology		
MMG 5210	Gr Medical Microbiology	
MMG 5220	Gr Medical Micro w/lab	
MMG 5230	Immunology Concepts	
MMG 6200	Cellular Microbiology	
Remaining credits in the degree program should be selected from graduate courses approved by the student's Studies Committee.		3-4
At least 8 (and up to 14) credits of Master's Thesis Research (MMG 6391) are required. In addition, a written thesis and defense of this thesis must occur according to the guidelines laid out by the Graduate College.		

#### Studies Committee:

The student's Studies Committee will consist of the student's research mentor, a member of the Microbiology and Molecular Genetics graduate faculty, a faculty member from outside the Microbiology and Molecular Genetics Department to serve as



the Chair of the Studies Committee, and a fourth member at the discretion of the student in consultation with their research mentor.

#### Thesis Writing and Defense:

Thesis writing cannot begin until a student has become a Candidate for the Degree of Master of Science in Microbiology and Molecular Genetics and has received approval from the student's Studies Committee.

### Comprehensive Examination

By the end of the first year, M.S. candidates will write either an extensive literature review or research proposal that pertains to their research interests. Students can expect guidance from their advisor and Studies Committee in the writing of the proposal but must assume responsibility for the final version and must acquire sufficient mastery of their chosen subject area to defend the proposal. Students will present their written proposal to their Studies Committee. That Committee will determine if the written proposal is satisfactory and, if it is, schedule an oral defense. During the oral defense, the Committee shall be free to explore the knowledge of the student on a range of subjects related to the proposal, much as occurs during a thesis defense. If the written review/proposal is deemed unsatisfactory or if a student fails the oral defense, the candidate will be given one opportunity to rewrite or re-defend his/her/their proposal. If the student fails a second time, s/he/they will be dismissed from the M.S. program.

### Requirements for Advancement to Candidacy for the Degree of Master of Science in Microbiology and Molecular Genetics

Advancement to candidacy requires satisfactory completion of the comprehensive exam.

## NATURAL RESOURCES

<http://www.uvm.edu/rsenr/>

### OVERVIEW

Graduate students in the Rubenstein School work closely with faculty who are dedicated to applied environmental research in service of society and have very active research programs. Faculty take an integrated approach to their research projects, work with other faculty teams in the School, and collaborate nationally and internationally with other researchers.

### DEGREES

Natural Resources AMP (p. 187)

Natural Resources M.S. (p. 187)

Natural Resources: Leadership for Sustainability M.P.S. (p. 189)

Natural Resources: Master of Environmental Law and Policy/Master of Science in Natural Resources (MELP/MSNR) (p. 190)

Natural Resources Ph.D. (p. 191)

Transdisciplinary Leadership and Creativity for Sustainability Ph.D. (p. 251)

### FACULTY

**Adair, Elizabeth Carol;** Associate Professor; Rubenstein School of Environment and Natural Resources; PHD, Colorado State University

**Bierman, Paul Robert;** Professor, Rubenstein School of Environment and Natural Resources; PHD, University of Washington

**Bowden, William Breck;** Professor Emeritus; Rubenstein School of Environment and Natural Resources; PHD, North Carolina State University Raleigh

**Chase, Lisa Cheryl;** Extension Professor and Associate Professor; Department of Ext - Programming and Faculty Support; PHD, Cornell University

**Coghill-Wemple, Beverley;** Professor, Department of Geography; PHD, Oregon State University

**D'Amato, Anthony;** Professor, Rubenstein School of Environment and Natural Resources; PHD, University of Massachusetts Amherst

**Danks, Cecilia Marie;** Associate Professor; Rubenstein School of Environment and Natural Resources; PHD, University of California Berkeley

**Dimov, Luben D.;** Senior Lecturer, Rubenstein School of Environment and Natural Resources; PHD, Louisiana State University

**Donovan, Therese M.;** Research Associate Professor; Rubenstein School of Environment and Natural Resources; PHD, University of Missouri Columbia

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**Perdrial, Nicholas;** Research Assistant Professor, Department of Geology; PHD, Université Louis Pasteur, Strasbourg, France

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**Vea, Marie C.;** Research Assistant Professor, Rubenstein School of Environment and Natural Resources; Ed.D., University of Vermont

**Vivanco, Luis A.;** Professor, Department of Anthropology; PHD, Princeton University

**Wollenberg, Eva (Lini);** Research Professor, Rubenstein School of Environmental and Natural Resources; PHD, University of California, Berkeley

**Yamamoto, Britt;** Adjunct Associate Professor, Rubenstein School of Environment and Natural Resources; PHD, University of Washington Seattle

## NATURAL RESOURCES AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

The Accelerated Master's Degree Entry Pathway (AMP) in Rubenstein is designed to give select UVM undergraduate students the opportunity to earn a Bachelor's and a Master's Degree in Natural Resources in 5 years. This option is only available for the thesis, and not the project-based Masters in Natural Resources.

Following admission to the Graduate College, students may earn up to 9 graduate level credits toward the M.S. degree in Natural Resources during their B.S./B.A. that also count toward their B.S./B.A. The remaining 21 credits will be fulfilled after completion of the B.A./B.S. when the M.S. degree becomes the primary curriculum.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

Students should apply for admission into the Accelerated Master's Degree Pathway (AMP) in the Rubenstein School in the Fall semester of their Junior year, but can apply on alternative timelines as well. As of 2018, the Rubenstein School no longer requires a GRE exam for admissions. Consideration for admission requires the following:

- A minimum cumulative GPA of 3.00.
- Identification of a RSENR graduate faculty research advisor.
- Completion of the Graduate College Application form:
  - Three letters of recommendation from UVM faculty members, or other academic/professional references: one letter may be from the proposed MS advisor in the Rubenstein School, one may be from another UVM faculty member, and one may be from the program director.
- Address the work to be conducted as part of your statement of purpose to the Graduate College

Students must be admitted through the Graduate College before taking any courses that will count toward their MS degree requirements. AMP students will be eligible to take 5000- or 6000-level courses. Students are expected to start their M.S. research in the summer/semester following their undergraduate graduation. Students who graduate in January (and not May) can begin their Master's research in the Spring semester and are expected to continue research in the summer.

#### Minimum Degree Requirements

The Master of Science requires from 15 to 24 credits of course work in related fields, at least 6 of which must be at the 6000-level or above. This includes NR 6070: Applied Ecology, Environment and Society, and NR 6060: Envisioning a Sustainable future (NR 6060 will be optional for RSENR students that completed their B.S./B.A. in RSENR). A public research seminar presented at the annual graduate student symposium, a research proposal, a comprehensive

examination, 6 to 15 credits of thesis research, and an oral defense of the thesis are also required.

### Comprehensive Examination

A written comprehensive examination is required for all master's students. Generally taken during a student's third or fourth semester, the examination will cover broad knowledge of the student's discipline. The questions and content of the examination and its form (written or oral or both depending on the requirements of each concentration) are decided upon by the Studies Committee and will be discussed with the student well in advance of the exam.

The format of the exam will be as follows:

- In no instance will the written exam period be less than 2 days or more than 7. The committee members will specify whether the student will have access to outside materials such as books, lecture notes, articles, reading notes, etc., to develop responses. In order to encourage succinct and focused writing, committee members are encouraged to specify a maximum page length for answers to each question.
- The primary advisor will collect the questions from each committee member and provide the student 1 set of questions per day (day defined as 8-12 hours). The student will send the answer(s) to the full committee at the end of each day.
- For those concentrations requiring an oral exam, the oral exam will focus on the subject areas from the written exam, particularly any weak areas. The oral exam, when applicable, will follow within 1 month of satisfactory completion of written exam. The underlying intent is an opportunity to provide clarity to weak areas of the written portion of the exam. Therefore, questions are limited to the subject areas originally designated and seek to discern if students have the knowledge that is essential to understand information in their field of study.
- The oral exam, as applicable, shall be presided over by the Chair of the Studies/Dissertation Committee. Its recommended duration is 2 hours and should not exceed 3.

#### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of any required courses, and at least 15 graded graduate credits earned in compilation of the graduate GPA. A GPA of 3.00 or greater is also required. After successfully completing both the Thesis Proposal and Written/Oral Comprehensive Examination, students will be advanced to candidacy for the M.S.

## NATURAL RESOURCES M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Master of Science in Natural Resources prepares students to pursue studies in advanced disciplinary topics. They will learn scientific and practical methods and develop technical skills for understanding ecological, physical, social, political, and economic aspects of environmental and natural resource issues.



Students choosing to pursue research in this program will take 15 to 24 credits of advanced course work and write and defend a thesis. This experience will further their knowledge and proficiency within 1 of 5 areas of concentration in natural resources:

Aquatic Ecology and Watershed Science (p. 188)

Environment, Society and Public Affairs (p. 189)

Environmental Thought and Culture (p. 189)

Forestry (p. 189)

Wildlife Biology (p. 189)

Students may elect to pursue a general degree in Natural Resources including interdisciplinary research not included in the above concentrations. Students and their graduate studies committee work closely together to design these individualized curricula, following the minimum M.S. degree requirements for course and research credits. Students are required to meet all Rubenstein School requirements, plus any additional requirements that may be determined by the Studies/Thesis Committee.

Students may also pursue a MELP/MSNR dual degree with the Vermont Law School.

Students choosing to emphasize advanced course work (27 credits) will pursue academic and work experiences leading to development of professional skills emphasizing conservation leadership, policy, ecological planning, sustainable forestry, and more. At least 3 project research credits and a defensible final project will complement the academic course work.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

Completion of the Graduate College Application form. Undergraduate degree in an appropriate field in the sciences, social sciences, or humanities/fine arts, and three letters of recommendation attesting to the candidate's academic potential for graduate work and motivation for pursuing this degree. Most successful applicants to this highly competitive program have strong academic credentials and experience in an environmental or natural resource-related job, internship, or other related activity. A potential faculty advisor holding an appointment in the Rubenstein School of Environment and Natural Resources and the Graduate College who will agree to serve as the student's primary mentor. As of 2018, the Rubenstein School no longer requires a GRE exam for admissions.

### Minimum Degree Requirements

The Master of Science requires from 15 to 27 credits of course work in related fields, at least 6 of which must be at the 6000-level or above (including NR 6070: Applied Ecology, Environment and Society, and NR 6060: Envisioning a Sustainable Future). Additional requirements include a public research seminar presented at the annual graduate student symposium, a research proposal, a comprehensive examination, and 3 to 6 credits of project research,

or 6 to 15 credits of thesis research. An oral defense of the thesis or project is required of all students.

### Comprehensive Examination

A written comprehensive examination is required for all master's students. Generally taken during a student's third or fourth semester, the examination will cover broad knowledge of the student's discipline. The questions and content of the examination and its form (written or oral or both depending on the requirements of each concentration) are determined by the Studies Committee and will be discussed with the student well in advance of the exam.

The format of the exam will be as follows:

- In no instance will the written exam period be less than 2 days or more than 7. The committee members will specify whether students will have access to outside materials such as books, lecture notes, articles, reading notes, etc., to develop responses. In order to encourage succinct and focused writing, committee members are encouraged to specify a maximum page length for answers to each question.
- A student's primary advisor will collect the questions from each committee member and provide the student 1 set of questions per day (day defined as 8-12 hours). The student will send the answer(s) to the full committee at the end of each day.
- For those concentrations requiring an oral exam, the oral exam will focus on the subject areas from the written exam, particularly any weak areas. The oral exam, when applicable, will follow within 1 month of satisfactory completion of written exam. The underlying intent is an opportunity to provide clarity to weak areas of the written portion of the exam. Therefore, questions are limited to the subject areas originally designated and seek to discern if you have the knowledge that is essential to understand information in your field of study.
- The oral exam, as applicable, shall be presided over by the Chair of the Studies/Dissertation Committee. Its recommended duration is 2 hours and should not exceed 3.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of any required courses, and at least 15 graded graduate credits earned in compilation of the graduate GPA. A GPA of 3.00 or greater is also required. After successfully completing both the Thesis/Project Proposal and Written/Oral Comprehensive Examination, students will be advanced to candidacy for the M.S.

### AQUATIC ECOLOGY AND WATERSHED SCIENCE CONCENTRATION

The Aquatic Ecology and Watershed Science concentration provides students with advanced understanding of aquatic ecosystems and their watersheds, and the skills and methodologies required to analyze and solve technical problems concerning the effects of human activities on these systems. Current areas of research emphasis include watershed processes and management; stream and lake ecology; fish ecology and fisheries management; aquatic



ecotoxicology; pollutant studies; biogeochemical dynamics, and the modeling of aquatic systems, processes and populations.

#### Minimum Degree Requirements

In addition to the general M.S. in Natural Resources requirements, this concentration requires at least 12 credits of course work in the aquatic and watershed sciences, or supportive fields (approved by the student's graduate studies committee). Students in this concentration pursue a thesis and must complete a minimum of 6 thesis research credits.

### ENVIRONMENT, SOCIETY AND PUBLIC AFFAIRS CONCENTRATION

Through the M.S. concentration in Environment, Society and Public Affairs, graduate students build theoretical understanding, analytical skills, and applied knowledge in the social dimensions of environmental and natural resource issues. Specific areas in which students may build understanding, skills, and knowledge include:

- environmental policy and planning
- community studies, human behavior, and environmental sociology
- ecological economics
- park and wilderness management
- public participation, conflict resolution, and decision making
- geospatial analysis

#### Minimum Degree Requirements

In addition to the general M.S. in Natural Resources requirements, this concentration requires 21 to 24 credits of advanced courses (including 1 methods course, 1 ecology course, 3 courses reflecting this concentration's emphases including Natural Resources, Environmental Studies, or Parks, Recreation and Tourism), and 3 to 6 credits of project research or 6 credits of thesis research. Students pursue a project or thesis. An oral defense of the thesis or project is required of all students.

### ENVIRONMENTAL THOUGHT AND CULTURE CONCENTRATION

In this concentration graduate students build interdisciplinary analytical skills and theoretical understanding of environmental and natural resource issues, with a focus on their human, ethical, and cultural dimensions. Specific areas include: environmental communication and cultural studies; environmental education and interpretation; environmental ethics and philosophy; environment, development, peace, and global justice studies; environmental politics and advocacy; religion and environment; sustainability; and sustainable development.

#### Minimum Degree Requirements

In addition to the general M.S. in Natural Resources requirements, this concentration requires 18 to 21 credits of advanced courses and 15 credits in a conceptually integrated curriculum of course work with specialization within environmental thought and culture, plus 6 credits of project research or 6 to 9 credits of thesis research. Students pursue a thesis or project.

### FORESTRY CONCENTRATION

The goal of this Master of Science concentration is to provide graduate students with advanced training in forest science and the opportunity to further their knowledge and proficiency in some specialized aspect of forestry. The faculty has research interests which span the broad areas of ecology, management, pathology, physiological ecology, sustainable forestry, and community forestry.

#### Minimum Degree Requirements

In addition to the general M.S. in Natural Resources requirements, this concentration requires 18 to 21 credits of advanced forestry and related courses, a comprehensive examination with both a written and oral component, and 6 credits of project research or 6 to 9 credits of thesis research. Students pursue a thesis or project.

### WILDLIFE BIOLOGY CONCENTRATION

This Master of Science concentration is designed to provide a vehicle for a wildlife biologist to develop research abilities and pursue a specialized course of study. Current areas of research emphasis include applied avian ecology, behavioral ecology, game management, nongame wildlife populations, reserve design, and landscape ecology.

#### Minimum Degree Requirements

In addition to the general M.S. in Natural Resources requirements, the Wildlife Biology concentration requires 18 to 21 credits of course work in wildlife and related fields, a comprehensive examination with both a written and oral component, and 3 to 6 credits of project research or 6 to 9 credits of thesis research. Students pursue a thesis or project.

## LEADERSHIP FOR SUSTAINABILITY M.P.S.

All students must meet the Requirements for the Master of Professional Studies Degree (p. 272)

### OVERVIEW

The Masters of Professional Studies in Leadership for Sustainability is a 2-year online graduate program designed for diverse leaders across a wide array of fields and sectors. This program is rooted in leadership practices that are inspired by the wisdom of nature and challenge forces of domination and oppression. Offering an innovative blend of remote learning intensives, interactive online courses and coaching, this program is anchored by an incredible network of faculty and professional affiliates. At its heart is the dedication to cultivate a non-extractive, reciprocal and solidarity-based learning ecosystem rooted in love and relationship.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Professional studies

Requirements for Admission to Graduate Studies for the Degree of Master of Professional Studies

- A sound academic record and professional leadership experience; as demonstrated by a resume and baccalaureate degree from

an accredited undergraduate institution; and/or description of approved professional certificate and a leadership portfolio

- 3 letters of recommendation attesting to the candidate's academic and professional potential for graduate work.
- A personal statement articulating motivation for participating in this program.
- For international students whose native language is not English or who have not completed undergraduate degrees in English, Test of English as a Foreign Language (TOEFL) scores must be submitted.

### Minimum Degree Requirements

Successful completion of 30 credits, including:

NR 6110	Leadership for Sustainability	3
NR 6120	Power Privilege & Catalyz Change	3
NR 6880	Ecological Leadership Seminar (fall/spring)	6
NR 6890	Ecological Leadership Practicum	3
NR 6392	Master's Project Research	6
Total		21
An approved set of courses that fulfill track specialization or a suite of elective courses based on student interests.		9

### CAPSTONE PROJECT

The Capstone is designed to provide MLS students with an applied leadership experience that integrates core program-level learning outcomes while addressing pressing challenges/opportunities in their own home community/organization. The project process is supported through a combination of online modules, professional affiliate coaching, and faculty mentorship, feedback and assessment.

Students are required to develop and defend a project proposal; implement project activities and methods; complete a culminating final report; and present their Capstone project at the annual Leadership for Sustainability Summit.

### Comprehensive Examination

The written comprehensive exam will take place during the second year of the MLS Program. The exam will require students to demonstrate competency in the MLS programmatic learning outcomes. Each student's comprehensive exam will be administered and assessed by a team of MLS faculty members and professional affiliates.

### Requirements for Advancement to Candidacy for the Degree of Master of Professional Studies

Advancement requires:

- Completion of the 30 academic credit sequence described above.
- Completion of the Capstone Project and Comprehensive Exam.
- Presentation at the annual Leadership for Sustainability Summit.

## NATURAL RESOURCES: MASTER OF ENVIRONMENTAL LAW AND POLICY/ MASTER OF SCIENCE IN NATURAL RESOURCES (MELP/MSNR)

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

#### Dual Degree Program with Vermont Law and graduate school

The Master of Environmental Law and Policy (MELP)/Master of Science in Natural Resources (MSNR) Dual Degree Program offered by Vermont Law and Graduate School's Environmental Law Center and the University of Vermont's Rubenstein School of Environment and Natural Resources gives students an opportunity to deepen their graduate education by integrating significant aspects of the complementary disciplines of environmental law, policy, and science.

Each school applies its own grading system to students in the program. Students must be in good academic standing at both schools to remain in the program. Each school issues its own transcript.

After completing the requirements for either degree, students will receive a diploma from the appropriate school and may attend graduation.

For more information about this program, visit the MELP/MSNR Program website.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science at the University of Vermont

Undergraduate degree in an appropriate field in the sciences, social sciences, or humanities/fine arts, and three letters of recommendation attesting to the candidate's academic potential for graduate work and motivation for pursuing this degree. Most successful applicants to this highly competitive program have strong academic credentials and experience in an environmental or natural resource-related job, internship, or other related activity.

Students interested in the Dual Degree Program are required to apply separately to each school. Each school admits students according to its own criteria for admission. Dual Degree applicants may be interviewed by admissions officials at both schools, when appropriate. Students may apply for admission to the Dual Degree Program at any time prior to the awarding of the degrees. As of 2018, the Rubenstein School no longer requires a GRE exam for admissions.

Students admitted to the Dual Degree Program will have academic advisors in each school. These advisors assist with curriculum planning, program requirements, and similar matters. Advisors are faculty members familiar with the course requirements for UVM.

### Minimum Degree Requirements at the University of Vermont

Students in the Dual Degree Program may earn both degrees with a total of 42 credits, of which at least 6 coursework credits must be at the 6000-level. Students must meet each school's degree requirements, including required courses and thesis preparation. Students take a minimum of 21 credits at VLGS toward the M.E.L.P. degree and a minimum of 21 credits at UVM toward the M.S. (Natural Resources) degree. Students may transfer a maximum of 9 credits between the 2 programs. Courses to be transferred must meet the requirements of the Dual Degree Program. Transferred credits may be applied toward both degrees.

Students have a maximum of 5 years to complete the Dual Degree Program. Course credits to be transferred must be taken within that 5-year period.

The master of science requires from 15 to 27 credits of course work in related fields (including NR 6070 Applied Ecology, Environment and Society, and NR 6060 Envisioning a Sustainable Future), a public research seminar presented at the annual graduate student symposium, a research proposal, a comprehensive examination, and 3 to 6 credits of project research, or 6 to 15 credits of thesis research. An oral defense of the thesis or project is required of all students.

### Comprehensive Examination at the University of Vermont

A written comprehensive examination is required for all Master's students. Generally taken during a student's third or fourth semester, the examination will cover broad knowledge of the student's discipline. The questions and content of the examination and its form (written or oral or both depending on the requirements of each concentration) are decided upon by the Studies Committee and will be discussed with the student well in advance of the exam.

The format of this exam will be as follows:

- In no instance will the written exam period be less than 2 days or more than 7. The committee members will specify whether students will have access to outside materials such as books, lecture notes, articles, reading notes, etc., to develop responses. In order to encourage succinct and focused writing, committee members are encouraged to specify a maximum page length for answers to each question.
- The primary advisor will collect the questions from each committee member and provide the student 1 set of questions per day (day defined as 8-12 hours). The student will send the answer(s) to the full committee at the end of each day.
- For those concentrations requiring an oral exam, the oral exam will focus on the subject areas from the written exam, particularly any weak areas. The oral exam, when applicable, will follow within 1 month of satisfactory completion of written exam. The underlying intent is an opportunity to provide clarity to weak areas of the written portion of the exam. Therefore, questions are limited to the subject areas originally designated and seek

to discern if students have the knowledge that is essential to understand information in their field of study.

- The oral exam, as applicable, shall be presided over by the Chair of the Studies Committee. Its recommended duration is 2 hours and should not exceed 3.

### Requirements for Advancement to Candidacy for the Degree of Master of Science at the University of Vermont

Successful completion of any required courses, and at least 15 graded graduate credits earned at UVM in compilation of the graduate GPA. A GPA of 3.00 or greater is also required. After successfully completing both the Thesis/Project Proposal and Written/Oral Comprehensive Examination, students will be advanced to candidacy for the M.S.

## NATURAL RESOURCES PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

The Ph.D. program provides the opportunity for focused, in-depth research in any of the specialties of the school, while fostering an interdisciplinary appreciation and perspective through course work and interactions with ecological, physical, and social scientists in an integrated academic setting. Students can develop programs in areas such as pollution ecology, recreation and tourism, conservation biology, and environmental policy, as well as any of the traditional natural resource disciplines featured in the master's program. In addition, formal course work and practical experience in college-level teaching are an important component of the doctoral curriculum.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

Completion of the Graduate College Application form. A potential faculty advisor holding an appointment in the Rubenstein School of Environment and Natural Resources and the Graduate College who will agree to serve as the student's primary mentor. Applicants with a Master of Science degree are preferred. As of 2018, the Rubenstein School no longer requires a GRE exam for admissions.

#### Minimum Degree Requirements

The Doctor of Philosophy requires 75 total credits (including NR 6070 Applied Ecology, Environment and Society, and NR 6060: Envisioning a Sustainable Future). For students entering the program with a completed Master's Degree, 15 total graded course credits are required. For students entering the program without a Master's Degree, 30 total graded credits are required. Credits must include no less than 20 and no more than 45 credits of dissertation research. In addition, students must complete a public proposal defense, an approved research proposal, a written and oral comprehensive examination, and a teaching/professional skills requirement. An oral defense of the dissertation is required of all students.



## Comprehensive Examination

Both a written and oral comprehensive examination are required for all Ph.D. students. The examination will cover broad knowledge of the student's discipline. The exams should be taken and passed during the second year of matriculation. The Graduate College requirement stipulates that the examination must occur at least six months before the dissertation is submitted.

The format of the exam will be as follows:

- In no instance will the written exam period be less than 2 days or more than 7. The committee members will specify whether students will have access to outside materials such as books, lecture notes, articles, reading notes, etc., to develop responses. In order to encourage succinct and focused writing, committee members are encouraged to specify a maximum page length for answers to each question.
- A student's primary advisor will collect the questions from each committee member and provide the student 1 set of questions per day (day defined as 8-12 hours). The student will send the answer(s) to the full committee at the end of each day.
- The written exam should include questions that probe four areas: a) the philosophy of science; b) theory in the student's area of specialization; c) methods in the student's area of specialization; and d) integration of social and natural science dimensions of the environment and natural resources.
- The oral exam will focus on the subject areas from the written exam, particularly any weak areas. The oral exam will follow within 1 month of satisfactory completion of written exam. The underlying intent is to examine the student's ability to think and express themselves extemporaneously. Therefore, questions need not be limited to the subject areas originally designated, but rather may seek to discern if students have the knowledge that is essential to understand information in their field of study.
- The oral exam shall be presided over by the Chair of the Studies Committee. Its recommended duration is 2 hours and should not exceed 3.

## Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

It is ordinarily expected that a student will complete the following requirements for advancement to candidacy prior to the end of the second year in the program:

- Successful completion of any required courses, and at least 15 - 30, as required, graded graduate credits acceptable to the student's graduate studies committee
- A GPA of 3.00 or greater is required
- Satisfactory performance on a comprehensive examination;
- Delivery of a public proposal seminar; and
- A dissertation proposal accepted by the student's graduate studies committee.

## NEUROSCIENCE

<http://www.uvm.edu/neurosciencegrad>

## OVERVIEW

The Neuroscience Graduate Program is a university-wide, multidisciplinary, Ph.D. granting program that has more than 50 faculty mentors across 13 departments and 5 colleges. This program emphasizes rigorous training in neuroscience-related research, educates students about human health, and encourages interdisciplinary research projects.

## DEGREES

Neuroscience M.S. (p. 193)

Neuroscience Ph.D. (p. 193)

## FACULTY

**Althoff, Robert;** Associate Professor, Department of Psychiatry; PHD, University of Illinois Urbana-Champaign

**Ballif, Bryan A.;** Professor, Department of Biology; PHD, Harvard University

**Barry, Jeremy;** Assistant Professor, Department of Neurological Sciences; PHD, SUNY Downstate

**Berger, Christopher Lewis;** Professor, Department of Molecular Physiology and Biophysics; PHD, University of Minnesota Twin Cities

**Bongard, Joshua C.;** Professor, Department of Computer Science; PHD, University of Zurich

**Bouton, Mark Earhart;** Professor, Department of Psychological Science; PHD, University of Washington

**Brewer, Matthias;** Professor, Department of Chemistry; PHD, University of Wisconsin-Madison

**Brieant, Alexis;** Assistant Professor, Department of Psychological Science; PHD, Virginia Tech

**Cannizzaro, Michael S.;** Associate Professor, Department of Communication Sciences and Disorders; PHD, University of Connecticut

**Cipolla, Marilyn Jo;** Professor, Department of Neurological Sciences; PHD, University of Vermont

**Coderre, Emily;** Assistant Professor; Department of Communication Sciences and Disorders; PHD, University of Nottingham

**Dostmann, Wolfgang R. G.;** Professor, Department of Pharmacology; PHD, University of Bremen, MD, University of Munich

**Dumas, Julie Anna;** Associate Professor, Department of Psychiatry; PHD, University of North Carolina

**Ebert, Alicia;** Associate Professor, Department of Biology; PHD, Colorado State University

**Erdos, Benedek;** Assistant Professor, Department of Pharmacology; MD, PHD, Semmelweis University, School of Medicine, Budapest, Hungary

**Falls, William A.;** Dean, College of Arts and Science, Professor, Department of Psychological Science; PHD, Yale University

**Forehand, Cynthia Jean;** Dean Emerita, Graduate College, Professor, Department of Neurological Sciences; PHD, University of North Carolina Chapel Hill

**Francklyn, Christopher Steward;** Professor, Department of Biochemistry; PHD, University of California Santa Barbara



**Freeman, Kalev;** Assistant Professor, Department of Surgery; MD, PHD, University of Colorado Boulder

**Green, John Thomas;** Professor, Department of Psychological Science; PHD, Temple University

**Hammack, Sayamwong E;** Professor, Department of Psychological Science; PHD, University of Colorado

**Harraz, Osama F.;** Assistant Professor, Department of Pharmacology; PHD, University of Calgary

**Herrera, Gerald M.;** Assistant Professor, Department of Pharmacology; PHD, University of Vermont

**Higgins, Stephen Thomas;** Professor, Department of Psychiatry; PHD, University of Kansas

**Holmes, Gregory;** Professor, Department of Neurological Sciences; MD, University of Virginia

**Howe, Alan K.;** Associate Professor, Department of Pharmacology; PHD, Northwestern University

**Hudziak, James Joseph;** Professor, Department of Psychiatry; MD, University of Minnesota Twin Cities

**Jangraw, David;** Assistant Professor, Department of Biomedical Engineering, PHD, Columbia University

**Koide, Masayo;** Research Assistant Professor, Department of Pharmacology; PHD (medicine) University of Hamamatsu School of Medicine; PHD (pharmacology), University of Shizuoka

**Krementsov, Dimitry;** Assistant Professor; Department of Biomedical and Health Sciences; PHD University of Vermont

**Lavoie, Brigitte;** Assistant Research Professor, Department of Neurological Sciences; PHD, Université Laval

**Lounsbury, Karen M.;** Professor, Department of Pharmacology; PHD, University of Pennsylvania

**May, Victor;** Professor, Department of Neurological Sciences; PHD, Northwestern University

**Morelli, Kathryn;** Assistant Professor, Department of Neurological Sciences; PHD, The Jackson Laboratory & University of Maine

**Morielli, Anthony D.;** Associate Professor, Department of Pharmacology; PHD, University of California Santa Cruz

**Mughal, Amreen;** Assistant Professor, Department of Pharmacology; PHD, North Dakota State University

**Nelson, Mark;** Professor, Department of Pharmacology; PHD, Washington University in St Louis

**Ou, Yangguang;** Assistant Professor, Department of Chemistry; PHD, University of Pittsburgh

**Peters, Denise;** Assistant Professor; Department of Rehabilitation and Movement Science; PHD, DPT, University of South Carolina

**Potter, Alexandra S.;** Associate Professor, Department of Psychiatry; PHD, University of Vermont

**Prelock, Patricia;** Provost and Senior Vice President; Professor, Department of Communication Sciences; Professor, Department of Medicine-Pediatrics; PHD, University of Pittsburgh

**Quénet, Delphine;** Assistant Professor, Department of Biochemistry, PHD; University of Strasbourg, France

**Ricci, Anna;** Assistant Professor, Department of Neurological Sciences; PHD, Penn State College of Medicine

**Salogiannis, John;** Assistant Professor, Department of Molecular Physiology and Biophysics; PHD, Harvard University

**Schermerhorn, Alice C.;** Associate Professor, Department of Psychological Science; PHD, University of Notre Dame

**Sibold, Jeremy S.;** Associate Professor, Department of Rehabilitation and Movement Science; EDD, West Virginia University

**Spees, Jeffrey;** Professor, Department of Medicine-Cardiovascular; PHD, University of California Davis

**Stafford, James;** Assistant Professor; Department of Neurological Sciences; PHD Oregon Health and Science University

**Stanley, Molly;** Assistant Professor, Department of Biology; PHD, Washington University

**Teuscher, Cory;** Professor, Department of Medicine-Immunobiology; PHD, University of New Mexico

**Thraikill, Eric A.;** Research Assistant Professor, Department of Psychological Science; PHD, Utah State University

**Todd, Travis;** Research Assistant Professor, Department of Psychological Science, PHD, University of Vermont

**Toufexis, Donna J.;** Associate Professor, Department of Psychological Science; PHD, McGill University

**Vizzard, Margaret A.;** Professor, Department of Neurological Sciences; PHD, Thomas Jefferson University

**Wellman, George C.;** Professor, Department of Pharmacology; PHD, University of Vermont

**Whitaker, Emmett;** Assistant Professor; Department of Anesthesiology; MD, University of Rochester School of Medicine and Dentistry

**White, Sheryl Lynne;** Assistant Professor, Department of Neurological Sciences; PHD, University of Vermont

## NEUROSCIENCE M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Neuroscience Graduate Program awards M.S. degrees only to students who have matriculated into the Ph.D. program but whose academic and research progress is deemed by their advisory committee to be suitable for a M.S. rather than a Ph.D. degree, or to students requesting to leave the program prior to completion of the Ph.D. degree. In either case, terminal M.S. degrees are not automatically offered to students leaving the program prematurely. Students must be recommended for the M.S. degree by their advisory committee and are required to complete the minimum course and research requirements for the M.S. as defined by the Graduate College and the Neuroscience Graduate Program.

## NEUROSCIENCE PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

The Neuroscience Graduate Program is a university-wide, multidisciplinary, Ph.D. granting program that has more than 50 faculty mentors across 13 departments and 5 colleges. This program emphasizes rigorous training in neuroscience-related research, educates students about human health, and encourages interdisciplinary research projects.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

It is recommended that an incoming student have a Bachelor's and/or Master's Degree in a biological science, neuroscience, chemistry, physics, engineering, psychology, mathematics, communication sciences or computer science. Research experience is strongly recommended.

Applicants whose native language is not English must submit scores from Test of English as a Foreign Language (TOEFL), the International English Language Testing System (IELTS), or Duolingo.

3 letters of reference are required. Letters from research advisors or supervisors are highly desirable attesting to applicant's abilities to work independently in an academic setting.

### Minimum Degree Requirements

Students can choose between the standard track and biobehavioral track within the NGP curriculum.

### STANDARD CURRICULUM TRACK

MPBP 6010	Human Physiology & Pharm I	4
NSCI 6030	Human Gross and Microanatomy	3
NSCI 6270	Resp Conduct in Biomed Rsch	1
NSCI 6820	Seminar in Neuroscience (Yearly)	1
NSCI 7491	Doctoral Dissertation Research (Minimum of 20 required total)	1-18
NSCI 6071	Medical Neuroscience Part 1	3
NSCI 6072	Medical Neuroscience Part 2	3
PSYS 6000	Adv Statistical Methods I	3
PSYS 6400	Biobehavioral Proseminar	3
Advanced Neuroscience Selectives (minimum of 2 courses)		6

### BIOBEHAVIORAL CURRICULUM TRACK

This track provides an alternate curriculum for students interested in working in Department of Psychological Science labs.

MPBP 6010	Human Physiology & Pharm I	4
NSCI 6030	Human Gross and Microanatomy	3
NSCI 6270	Resp Conduct in Biomed Rsch	1
NSCI 6820	Seminar in Neuroscience	1
NSCI 6071	Medical Neuroscience Part 1	3
NSCI 6072	Medical Neuroscience Part 2	3
NSCI 7491	Doctoral Dissertation Research	1-18
PSYS 6000	Adv Statistical Methods I	3

PSYS 6400	Biobehavioral Proseminar	3
Approved course in Biobehavioral Cluster		1
Advanced Neuroscience Selectives (minimum 2 courses)		6

### APPROVED COURSES FOR GRADUATE CREDIT

Below is a list of approved selectives. A student, in conjunction with their advisor, may request courses not on this list to fulfill the selective requirement. The request will need to be approved by the NGP Director.

BIOC 6001	General Biochemistry I	3
CSD 6450	Neurogenic Comm. Disorders 2	3
MPBP 6100	Molecular Control of the Cell	3
MPBP 6300	Biomedical Grantsmanship	2
NSCI 5230	Neurochemistry	3
NSCI 5300	Gr Comparative Neurobiology	3
PATH 6280	Techniques in Microscopy	3
PBIO 5940	Ecological Modeling	3
PBIO 6940	Data Modeling for Envir Scienc	3
PHRM 5720	Gr Toxicology	3
PHRM 5900	Gr Adv Pharmacology Topics	3
PSYS 6415	Neurobio of Learning & Memory	3

### Comprehensive Examination

The qualifying examination for advancement to candidacy for a Ph.D. in Neuroscience should be taken prior to the end of the 1<sup>st</sup> semester of the 2<sup>nd</sup> year. The exam has both a written and oral component, both of which must be completed successfully. The exam committee will consist of at least 3 members of the NGP faculty. Should the student fail the examination, only 1 re-examination is allowed.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Satisfactory completion of required courses and research rotations. Approval of the written and oral portions of the qualifying comprehensive examination.

## NURSING

<http://www.uvm.edu/~cnhs/nursing/>

**The Nursing Accelerated Master's Program is not currently accepting applications.**

**The Master of Science in Nursing - Clinical Nurse Leader (CNL) is not currently accepting applications.**

**The Direct Entry- Clinical Nurse Leader (DCNL) is not currently accepting applications.**

## OVERVIEW

The Department of Nursing offers graduate programs which prepare nurses to assume leadership roles within health care systems in a variety of settings, to expand knowledge of the discipline of nursing, and to acquire the foundation for doctoral study and continued professional development. The ability to work collaboratively on an interdisciplinary team, provide patient-centered care, employ evidence-based practice, access information technology, and apply quality improvement strategies are basic competencies expected of all graduates of these programs.

### Master of Science in Nursing - Clinical Nurse Leader (CNL)

The Master of Science degree program for the Clinical Nurse Leader (CNL) prepares nurses for leadership positions through which evidenced-based care for groups of patients will be managed.

### Direct Entry Clinical Nurse Leader (DCNL)

The Direct Entry into Clinical Nurse Leader (DCNL) is an accelerated, alternative-entry program for those who have not graduated from a nursing program, and who hold a baccalaureate or higher degree in another field. The program prepares the student to progress into the MS-CNL track. It is not a stand-alone accelerated RN program. The program begins with 36.5 credits and includes 810 clinical hours of full-time, year-round coursework to prepare for the NCLEX-RN exam and gain registered nurse licensure in the State of Vermont.

### Master of Science in Nursing

The Master of Science in Nursing prepares nurses with advanced nursing knowledge and specialized expertise through an innovative curriculum that includes a 9-credit concentration in various healthcare domains. Direct Entry Program in Nursing – Master of Science Entry (MEPN) year-round coursework to prepare for the NCLEX-RN exam and gain registered nurse licensure in the State of Vermont.

### Direct Entry Program in Nursing (DEPN/MEPN)

The Direct Entry Program in Nursing (DEPN/MEPN) is an accelerated, alternative-entry program for those who have not graduated from a nursing program, and who hold a baccalaureate or higher degree in another field. The program prepares the student to progress into the DNP-Primary Care NP track (DEPN) or the Master of Science in Nursing (MEPN). The program begins with full-time, year-round coursework to prepare for the NCLEX-RN exam and gain registered nurse licensure in the State of Vermont, then proceeds into the MS or DNP program for degree completion.

### Doctor of Nursing Practice (DNP)

The Doctor of Nursing Practice (DNP) degree program has two entry options; one for registered nurses with a baccalaureate or higher degree (in nursing or another field) who wish to practice as a nurse practitioner in Primary Care, and another for post master's degree in nursing applicants who wish to pursue the DNP.

### Post-Master's Doctor of Nursing Practice (DNP)

For candidates who have earned a MS degree in nursing and wish to pursue a DNP. Within the Post Master's DNP there are two tracks: Primary Care DNP and Executive Nurse Leader DNP.

CNHS graduate nursing students are required to complete the CNHS mandatories prior to matriculating into the program. Students must keep these requirements current throughout their program: Immunizations, CPR, HIPPA/OSHA training, annual PPD, and RN License. A Criminal Background check is completed prior to participating in clinical courses/experiences. Complete details on CNHS Mandatories are available on the College website.

## DEGREES

Nursing AMP (p. 195)

Nursing M.S. (p. 196)

Nursing Practice DNP (p. 197)

## FACULTY

**Dale, Rosemary Louise;** Clinical Professor, Department of Nursing; EDD, Ball State University

**Garbarino, Jason;** Clinical Assistant Professor, Department of Nursing; DNP, University of Vermont

**Keiffer, Melanie;** Assistant Professor, Department of Graduate Nursing, DNP, Vanderbilt University

**Laurent, Jennifer S.;** Associate Professor, Department of Nursing; PHD, Duquesne University

**Lewis, Laura Foran;** Assistant Professor, Department of Nursing; PHD, University of Connecticut

**Martin, Lili;** Clinical Assistant Professor, Department of Nursing; DNP, University of Vermont

**Nagle, Rebecca;** Clinical Assistant Professor, Department of Nursing; DNP, University of Vermont

**Palumbo, Mary Val;** Professor, Department of Nursing; DNP, Rush Medical College

**Pelski, Jean;** Clinical Associate Professor, Department of Nursing; PHD, University of Massachusetts, Amherst

**Whitcomb, Holly Thomas;** Clinical Assistant Professor, Department of Nursing; DNP, University of Vermont

## NURSING AMP

**This program is not currently accepting students.**

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

## OVERVIEW

The Accelerated Master's Degree Entry Pathway (AMP) is designed to offer select UVM undergraduate nursing students the opportunity to obtain both their bachelor's degree and master's degree in nursing in a total of 6 years of study. Students apply to the pathway in the spring of their junior year, and MS-CNL courses begin during the student's senior year. Students enrolled in this pathway can have up to 9 credits of graduate level courses taken during their senior

undergraduate year count towards both a bachelor's degree and the master's in nursing degree.

The Department of Nursing offers a graduate program leading to a Master of Science degree. The Clinical Nurse Leader program (CNL) prepares nurses to assume leadership roles within health care systems in a variety of settings, to expand knowledge of the discipline of nursing, and to acquire the foundation for graduate study and continued professional development. The ability to work collaboratively on an interdisciplinary team, provide patient-centered care, employ evidence-based practice, access information technology, and apply quality improvement strategies are basic competencies expected of all graduates of this program.

The M.S. graduate curriculum includes 6 core courses essential for all students that address the theoretical basis of nursing care; professional issues and role development of CNLs, research utilization and evidence-based practice, quality and ethics of health care delivery, health policy and finance, biostatistics and epidemiology. Students apply core content to their Clinical Nurse Leader program. Upon successful completion of program requirements students are eligible to complete a national CNL certification exam.

As a CNHS graduate nursing student, you are required to complete the CNHS Mandatories prior to matriculating into your program. Students must keep these requirements current throughout their program: Immunizations, CPR, HIPPA/OSHA training, annual PPD, and RN License. Some clinical sites require a Criminal Background check as well. It is a program requirement to be compliant with this process to participate in clinical courses/experiences. Complete details on CNHS Mandatories are available on the college website.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of science for Accelerated Students

The following criteria must be met to be considered for admission into the pathway:

- Minimum cumulative grade point average of 3.00
- Enrollment and good standing in the UVM undergraduate nursing program and at the junior level of the program
- Completion of the Graduate College Application Form, which must include 3 letters of recommendation, including one from a UVM nursing clinical instructor highlighting the candidate's clinical performance
- Current resume
- Students must be admitted through the Graduate College before taking any courses that will be applied to the master's degree requirements. Students will continue master's degree coursework in the summer following their undergraduate graduation
- GRE scores are not an admission requirement for application to the AMP in Nursing

### Minimum Degree Requirements for the Degree of Master of science

The following criteria must be met to complete your minimum degree requirements:

- Core, track, and elective courses
- Successful completion of comprehensive examination
- Grade point average of 3.00 or higher
- Completion and implementation of CNL Project

### Comprehensive Examination

The Comprehensive Examination is conducted by the Graduate Program in the Department of Nursing. The examination is designed to allow the student to demonstrate analysis and synthesis of knowledge gained through the program. The examination must be completed prior to the final track courses and practicums, and students may take it any time after the majority of core courses have been successfully completed. Students will be expected to orally present their CNL Project proposal, clearly articulating, synthesizing, and applying the MS Essentials and the CNL competencies and core content addressed throughout the program of study as they relate to their CNL Project.

The Comprehensive Examination is rated on a satisfactory/unsatisfactory basis. In the event that the student does not achieve a satisfactory on the oral comprehensive exam, one opportunity to provide written evidence of satisfactory achievement of the goal of the comprehensive exam will be allowed.

### Requirements for Advancement to Candidacy for the Degree of Master of science

Meet all of the above criteria.

## NURSING M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

The Department of Nursing offers a graduate program leading to a Master of Science degree. The Master of Science in nursing is an innovative graduate program that prepares nurses with a comprehensive and cohesive body of knowledge and skills essential for nursing practice at an advanced level. The program provides nurses with advanced specialization to expand their practice of nursing and to acquire additional expertise through a 9-credit core concentration or micro-certificate of graduate study.

The M.S. graduate curriculum includes 7 core courses essential for all students that address the theoretical basis of nursing care; professional issues and role development, research utilization and evidence-based practice, quality and informatics, leadership, planetary health, and biostatistics and epidemiology. Students select additional course work in a chosen area of specialization.

As a CNHS graduate nursing student, you are required to complete the CNHS Mandatories prior to matriculating into your program. Students must keep these requirements current throughout their



program: Immunizations, CPR, HIPPA/OSHA training, annual PPD, and RN License. A Criminal Background check is completed prior to participating in clinical courses/experiences. Complete details on CNHS Mandatories are available on the college website.

### Direct Entry Program in Nursing (MEPN)

The Direct Entry Program in Nursing (MEPN) is an accelerated, alternative-entry program is for those who have not graduated from a nursing program, and who hold a baccalaureate or higher degree in another field. Upon successful completion of the accelerated pre-RN licensure year, students complete the national examination for RN licensure (NCLEX) and continue into the Master of Science program. A certificate of completion is awarded for the successful completion of the pre-licensure year. A BS degree is not conferred. It is not a stand-alone accelerated RN program. Year 1 includes 34.25 credits and 675 clinical hours of full-time, year-round coursework to prepare for the NCLEX-RN exam.

### MASTER OF SCIENCE IN NURSING - CLINICAL NURSE LEADER (CNL)

The Master of Science in Nursing - Clinical Nurse Leader (CNL) is not currently accepting applications.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

The following criteria must be met to be considered for admission into the program:

- Bachelor's Degree in nursing or another field of study
- Eligibility for licensure as an RN in Vermont
- College grade point average of 3.00 or higher
- Undergraduate statistics course
- Previous undergraduate level physical assessment course
- 3 letters of recommendation

#### Minimum Degree Requirements

The following criteria must be met to complete your minimum degree requirements:

- Core, track, and elective courses
- Grade point average of 3.00 or higher
- Successful completion of comprehensive examination
- Successful completion of a Master's thesis or Master's project

#### Comprehensive Examination

The Comprehensive Examination is conducted by the Graduate Faculty in the Department of Nursing. The examination is designed to allow the student to demonstrate analysis and synthesis of knowledge gained through the program. The examination must be completed prior to the Master's thesis or project. The Comprehensive Examination is rated on a satisfactory/unsatisfactory basis. In the event that the student does not achieve a satisfactory on the oral comprehensive exam, one opportunity to provide written

evidence of satisfactory achievement of the goal of the comprehensive exam will be allowed.

#### Requirements for Advancement to Candidacy for the Degree of Master of Science

Meet all of the above criteria.

## NURSING PRACTICE DNP

### OVERVIEW

The Department of Nursing offers a graduate program leading to a Doctor of Nursing Practice (DNP) degree. The program prepares nurses to assume leadership roles within health care systems in a variety of settings, to expand knowledge of the discipline of nursing, and to acquire the foundation for doctoral study and continued professional development. The ability to work collaboratively on an interdisciplinary team, provide patient-centered care, employ evidence-based practice, access information technology, and apply quality improvement strategies are basic competencies expected of all graduates of this program. The DNP program prepares graduates to provide primary care as advanced practice registered nurses (APRNs) in one of two tracks: Adult-Gerontology Nurse Practitioner (AGNP), or Family Nurse Practitioner (FNP). Additionally, the program offers nurses with an earned Master's Degree in nursing the opportunity to complete a post-MS DNP degree, either in primary care or as an executive nurse leader.

The DNP graduate curriculum includes 9 core courses essential for all students that address the theoretical foundation of nursing care, professional issues and role development of APRNs, evidence-based research utilization and practice, health policy and finance, ethics, health care informatics, quality of health care delivery, leadership of health care systems, population-based health, biostatistics and epidemiology. Students apply core content to their DNP Program. Upon successful completion of program requirements APRN students are eligible to complete a national certification exam as either FNP or AGNP.

As a CNHS graduate nursing student, students are required to complete the CNHS mandatories prior to matriculating into the program. Students must keep these requirements current throughout their program: Immunizations, CPR, HIPPA/OSHA training, annual PPD, and RN License. Some clinical sites require a criminal background check as well. It is essential to be compliant with this process to participate in clinical courses/experiences. Complete details on CNHS Mandatories are available on the college website.

The following Doctor of Nursing Practice programs are offered:

#### Direct Entry Program in Nursing (DEPN)

The Direct Entry Program in Nursing (DEPN) is an accelerated, alternative-entry program is for those who have not graduated from a nursing program, and who hold a baccalaureate or higher degree in another field. Upon successful completion of the accelerated pre-RN licensure year, students complete the national examination for RN licensure (NCLEX) and continue into the MS- CNL or the DNP-Primary Care Nurse Practitioner track. A certificate of completion is awarded for the successful completion of the pre-licensure year.

A BS degree is not conferred. It is not a stand-alone accelerated RN program. Year 1 includes 36.5 credits and 810 clinical hours of full-time, year-round coursework to prepare for the NCLEX-RN exam and gain registered nurse licensure in the State of Vermont.

### Doctor of Nursing Practice (DNP)

The Doctor of Nursing Practice (DNP) degree program offers 2 entry options; 1 for registered nurses with a baccalaureate or higher degree (in nursing or another field), and another for post-MS applicants who wish to pursue the DNP.

### Post-Master's Doctor of Nursing Practice (DNP)

For candidates who have earned a MS degree or higher in Nursing and wish to pursue a DNP. Within the Post Master DNP there are 2 tracks: Primary Care DNP and Executive Nurse Leader DNP.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Nursing Practice

The following criteria must be met to be considered for admission into the program:

- Bachelor's Degree in Nursing, or Bachelor's Degree in another field for the Direct Entry into Professional Nursing Program (DEPN), or Associate Degree in Nursing with a Baccalaureate Degree in another field
- Eligibility for licensure as an RN in Vermont
- Graduate Record Examination (GRE) scores are optional but not required
- College grade point average of 3.00 or higher
- Undergraduate statistics course
- Previous basic physical assessment course
- 3 letters of recommendation

### Minimum Degree Requirements for the Degree of Doctor of Nursing Practice

The following criteria complete the minimum degree requirements:

- Completion of core, track, and elective courses
- Completion of Comprehensive Examination
- Grade point average of 3.00 or higher
- Completion and implementation of DNP Project

### Requirements for Admission to Graduate Studies for the Degree of Post Master's DNP primary care and Post Master's DNP Executive Nurse Leader

- Master's Degree or higher in Nursing
- Eligibility for licensure as an RN in Vermont
- College grade point average of 3.00 or higher
- 3 letters of recommendation
- Practice experience preferred
- An interview may be requested by the faculty

### Minimum Degree Requirements for the Degree of Post Master's DNP Primary care and Post Master's DNP Executive Nurse Leader

- Successful completion of core, track, and elective courses
- Grade point average of 3.00 or higher
- Completion of a DNP Project

### DNP Project

The project option is a scholarly academic experience of the graduate program where students develop and conduct an innovative project/production relevant to advanced nursing practice with faculty supervision. It is anticipated that the DNP project will result in innovative practices that will improve health care delivery and patient outcomes. Students are required to present and defend the project orally upon its completion.

To register for the project, the student must have successfully completed the GRNS core courses, completed a Project Completion Form and be enrolled in DNP Project Seminar I. The project development and implementation will be completed over three semesters, with evaluation and dissemination completed in the final semester of the program.

### Comprehensive Examination

The Comprehensive Examination is conducted by the Graduate Program in the Department of Nursing. The examination is designed to allow the student to demonstrate analysis and synthesis of knowledge gained through the program. Students may take the examination any time after the majority of the core courses have been successfully completed, and must be completed prior to the final track courses and practicums. Students will be expected to orally present their DNP Project proposal, clearly articulating, synthesizing, and applying the DNP Essentials and the NP competencies and core content addressed throughout the program of study as they relate to their DNP Project.

The Comprehensive Examination is rated on a satisfactory/unsatisfactory basis. In the event that the student does not achieve a satisfactory on the oral comprehensive exam, one opportunity to provide written evidence of satisfactory achievement of the goal of the comprehensive exam will be allowed and is to be submitted by 2 weeks following the oral attempt.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Nursing Practice, Post Master's DNP Nurse Practitioner, and Post Master's DNP Executive Nurse Leader

Meet all of the above criteria.

## NUTRITION AND FOOD SCIENCES

<http://www.uvm.edu/nfs/>

### OVERVIEW

The mission of the Nutrition and Food Science department is to foster the intellectual and professional growth of our students through engaged teaching, innovative instruction, and community-

based applied learning opportunities. We conduct research that contributes to the public good by advancing knowledge in weight inclusive nutrition; safe and innovative foods; food security and food agency; and sustainable food systems.

## DEGREES

Nutrition and Food Sciences AMP (p. 199)

Nutrition and Food Sciences M.S. (p. 200)

## FACULTY

**Belarmino Morgan, Emily;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, London School of Hygiene and Tropical Medicine

**Bertmann, Farryl;** Senior Lecturer, Department of Nutrition and Food Sciences; PHD, Arizona State University

**Bhurosy, Trishnee;** Assistant Professor, Department of Nutrition and Food Science; PhD, Indiana University School of Public Health-Bloomington

**Etter, Andrea J.;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, Purdue University

**Niles, Meredith;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, University of California-Davis

**Pope, Lizzy;** Assistant Professor, Department of Nutrition and Food Sciences; PHD, University of Vermont

**Skinner, R. Chris;** Assistant Professor, Department of Nutrition and Food Science; PhD, West Virginia University

**Trubek, Amy B.;** Professor, Department of Nutrition and Food Sciences; PHD, University of Pennsylvania

## NUTRITION AND FOOD SCIENCES AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

The Accelerated Nutrition and Food Sciences Master's degree entry pathway (ANFSMS) is designed to offer UVM Nutrition and Food Sciences (NFS) students an opportunity to earn both the bachelor's degree and the M.S. in Nutrition and Food Sciences in 5 years. Students entering the M.S. as accelerated students are only eligible to complete the non-thesis option of the M.S.

This is a 30-credit M.S. degree. Following formal admission by the Graduate College to the Accelerated Master's Pathway, students may count up to 9 graduate-level credits toward both the B.A./B.S. and M.S. The remaining 21 credits will be taken in the 5th year of study. Full-time graduate student status will begin the summer after undergraduate graduation and be maintained until completion of the M.S. in NFS.

The program is designed as a steppingstone to the pursuit of clinical or community practice opportunities in nutrition and dietetics or professional opportunities in the food industry.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students

Students apply for admission to the Nutrition and Food Sciences AMP program during the regular application cycle. Admission is restricted to students that are either entering the spring term of their Junior year and or have yet to start the Fall semester of their Senior year.

Admission to the accelerated program requires the following:

- A declared major in NFS
- A minimum of 3.0 cumulative GPA is required; a GPA of 3.3 or higher is preferred
- Completion of a college-level statistics course
- Completion of the Graduate College application form and 3 letters of recommendation
- A letter of support from a faculty member who is willing to serve as primary mentor during enrollment in the M.S. in NFS program. This may serve as the 3rd letter of recommendation
- Completion of the UVM Accelerated Entry into Master's Degree Permission Form (attached to the online application)

Students in the accelerated M.S. program have the option of taking courses for graduate credit before all requirements for the B.S./B.A. degree have been satisfied. However, these courses can only be double-counted if taken the semester following admittance to the ANFSMS (Students must be admitted through the Graduate College before taking any courses that will be applied toward the M.S. requirements).

A maximum of 9 credit hours may be counted for both the B.S. and M.S. degrees and courses are limited to those approved for graduate credit. You will be asked to list at least 2 of these courses on the UVM Accelerated Entry into Master's Degree Permission Form. The courses listed as approved for graduate credit are subject to change, and research credits, internships, independent study and practicum cannot be counted toward the 9 credits.

### Minimum Degree Requirements for the Degree of Master of Science

Students must complete 30 credits, including a 6-credit final project under the direction of their graduate faculty mentor (this is a non-thesis track MS degree). At least 6 course credits must be at the 6000-level or above.

COURSE REQUIREMENTS		
NFS 6362	Intro to Research Methods	3
NFS 6392	Master's Project Research	6
Statistics course approved by faculty advisor		3
2 credits of NFS Seminar (NFS 6350)		2
Electives approved by faculty advisor		16

## Comprehensive Examination

Non-Thesis M.S. candidates will present an oral presentation on their final project by the end of the semester for which the final project credits have been assigned. The oral presentation will be attended by the Faculty Mentor and at least 2 additional members of the NFS Graduate Program. These 3 people form the student's Faculty Project Review Committee. One Graduate College faculty member from another department can substitute for one NFS faculty member. The student must create a flyer announcing the oral presentation 2 weeks before the presentation date and send it to their committee and to the NFS administrator for distribution. The following information should be included: project title, student's name and degree program, presentation date, time and location, and project description. This oral presentation and the Faculty Project Review Committee meeting that follows will constitute the student's M.S. Comprehensive Examination.

## Requirements for Advancement to Candidacy for the Degree of Master of Science

Advancement to the candidacy requires satisfactory completion of the comprehensive exam.

## NUTRITION AND FOOD SCIENCES M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The mission of the Nutrition and Food Science department is to foster the intellectual and professional growth of our students through engaged teaching, innovative instruction, and community-based applied learning opportunities. We conduct research that contributes to the public good by advancing knowledge in weight inclusive nutrition; safe and innovative foods; food security and food agency; and sustainable food systems.

The Department of Nutrition and Food Sciences offers a thesis-based or non-thesis-based Master of Science degree, as well as an Accelerated Master's Pathway (AMP) for students currently enrolled as undergraduates in NFS at the University of Vermont. The thesis-based M.S. degree, which requires the writing and defending of a thesis, is a course and research based program with 15-24 credits in course work and 6-15 credits of research. The minimum number of credits required is 30. A non-thesis M.S. degree also requires 30 credits: 24-27 credits in course work, and in consultation with their faculty mentor, the student chooses their final project for 3-6 credits toward the completion of a final project.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

An undergraduate major in nutrition, dietetics, food science or a science-related field. A minimum undergraduate GPA of 3.0 is recommended. Students need to complete the Graduate College Application form that must include three letters of recommendation. Students must be admitted through the Graduate College before

taking any courses that will be applied to the master's degree requirements.

#### Minimum Degree Requirements for the Degree of Master of Science

A minimum of 30 credits and successful completion of a written comprehensive exam are required for completion of a Master's Degree in Nutrition and Food Sciences. At least 6 credits must be at the 6000-level or above. Students enrolled in the thesis-based program must also write, present and successfully defend their research thesis.

Students must meet the UVM Graduate College Requirements for the Master's Degree. A minimum of 15 graded credits must be taken after matriculation into the graduate program. Required courses for both the thesis and non-thesis M.S. are as follows:

THESIS		
Statistics course approved by faculty advisor		3
2 credits of Nutrition & Food Science Seminar (NFS 6350)		2
NFS 6362	Intro to Research Methods	3
NFS 6391	Master's Thesis Research	6-15
Electives approved by faculty advisor		7-16
AMP and NON-THESIS		
Statistics course approved by faculty advisor		3
2 credits of Nutrition & Food Science Seminar (NFS 6350)		2
NFS 6362	Intro to Research Methods	3
NFS 6392	Master's Project Research	6
Electives approved by faculty advisor		16

Remaining elective courses for both the thesis and non-thesis courses should be chosen in consultation with the student's advisor and must be approved for graduate credit.

#### Comprehensive Examination

Thesis M.S. candidates will present a seminar before the end of the second semester of the degree program. This seminar will focus on the background to the proposed M.S. thesis research and experimental design. The abstract (electronic version) must be submitted to the course instructor no later than one week prior to the seminar date. The course instructor will distribute the abstract and link to the NFS faculty and students. Within 2 weeks following the seminar date, the candidate will meet with their thesis defense committee to discuss the student's performance with the seminar and provide feedback. This seminar and the committee meeting that follows will constitute the student's M.S. Comprehensive Examination.

Non-Thesis M.S. candidates will present an oral presentation on their final project by the end of the semester for which the final project credits have been assigned. The oral presentation will be attended by the Faculty Mentor and at least 2 additional members from the



NFS Graduate Program. These 3 people form the student's Faculty Project Review Committee. One Graduate College faculty member from another department can substitute for one NFS faculty member. The student must create a flyer announcing the oral presentation 2 weeks before the presentation date and send it to their committee and to the NFS administrator for distribution. The following information should be included: project title, student's name and degree program, presentation date, time and location, and project description. This oral presentation and the Faculty Project Review Committee meeting that follows will constitute the student's M.S. Comprehensive Examination.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Advancement to candidacy requires satisfactory completion of the comprehensive exam.

## OCCUPATIONAL THERAPY

### OVERVIEW

The entry-level Occupational Therapy Doctorate Degree is designed to prepare students to become Occupational Therapy practitioners.

Graduates will learn how to help people attain their desired level of participation in life regardless of age, race, ethnicity, culture, or socioeconomic background. They will learn Occupational Therapy practice across the lifespan and across practice settings. They will become scholarly and innovative thinkers, and will articulate clearly through written and verbal communication the value of the profession.

In addition to the graduate faculty, the faculty members in the program are:

**Feretti, Ann Marie;** Clinical Assistant Professor, Department of Rehabilitation & Movement Science; Ed.D., University of St. Augustine

**Hawko, Nicola;** Clinical Assistant Professor, Department of Rehabilitation & Movement Science; OTD, University of Alabama at Birmingham

**Maynard, Margaret;** Clinical Assistant Professor, Capstone Coordinator, Department of Rehabilitation & Movement Science; OTD, Boston University

### DEGREES

Occupational Therapy O.T.D. (p. 201)

### FACULTY

**Krebs, Kimberly;** Clinical Assistant Professor, Academic Fieldwork Coordinator, Department of Rehabilitation & Movement Science; OTD, University of Southern California

**Priganc, Victoria;** Associate Professor, Program Director, Department of Rehabilitation and Movement Science; PHD, Nova Southeastern University

## OCCUPATIONAL THERAPY O.T.D.

All students must meet the requirements for the Doctor of Occupational Therapy Degree (p. 275).

### OVERVIEW

The entry-level Occupational Therapy Doctorate Degree is designed to prepare students to become Occupational Therapy practitioners.

Graduates will learn how to help people attain their desired level of participation in life regardless of age, race, ethnicity, culture, or socioeconomic background. They will learn Occupational Therapy practice across the lifespan and across practice settings. They will become scholarly and innovative thinkers, and will articulate clearly through written and verbal communication the value of the profession.

The University of Vermont's entry-level occupational therapy doctoral degree program has applied for accreditation and has been granted Candidacy Status by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA), located at 6116 Executive Boulevard, Suite 200, North Bethesda, MD 20852-4929. ACOTE's telephone number c/o AOTA is (301) 652-AOTA (2682) and its web address is [www.acoteonline.org](http://www.acoteonline.org). The program must have a preaccreditation review, complete an on-site evaluation, and be granted Accreditation Status before its graduates will be eligible to sit for the national certification examination for the occupational therapist administered by the National Board for Certification in Occupational Therapy (NBCOT). After successful completion of this exam, the individual will be an Occupational Therapist, Registered (OTR). In addition, all states require licensure in order to practice; however, state licenses are usually based on the results of the NBCOT Certification Examination. Note that a felony conviction may affect a graduate's ability to sit for the NBCOT certification examination or attain state licensure.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to the entry-level doctor of occupational therapy program

#### ADMISSION REQUIREMENTS

- Bachelor or master degree from an accredited university
- Minimum cumulative GPA 3.0/4.0
- Minimum prerequisite GPA 3.2/4.0
- English proficiency exam (Duolingo, IELTS or TOEFL), if applicable
- 3 letters of recommendation (1 academic letter; 2 professional letters, 1 of which is preferably by an occupational therapist)
- Transcripts
- Phone/virtual/face-to-face interview
- An interview for students who pass through the first stage of the admissions process

**PREREQUISITE COURSE REQUIREMENTS**

All applicants must complete the following prerequisite courses from an accredited institution, with a cumulative GPA of 3.2 or greater prior to entry into the program:

General Psychology (one semester/3 credits)

Abnormal Psychology (one semester/3 credits)

Human Development (one semester/3 credits)

Statistics (one semester/3 credits)

Biology (one semester/3 credits)

Human Anatomy with lab (one semester/4 credits)

Human Physiology with lab (one semester/4 credits)

Social Sciences (Anthropology, Humanities, Philosophy, Sociology; 2 semesters/6 credits)

A Medical Terminology course (appearing on transcript). If taken online a certificate of completion must be sent to the UVM Graduate College Admissions office.

**Minimum Degree Requirements**

The entry-level Doctorate of Occupational Therapy degree requires successful completion of the following 98 graduate credits:

YEAR 1		
FALL		
OT 7100	Foundations for OT Practice	2
OT 7110	Functional Anatomy	4
OT 7120	Mvt and Occup Performance	3
OT 7130	Dev of Humans as Occ Beings	2
OT 7140	Psych & MH Influence on Occup	3
OT 7180	Analyze Activity & Performance	2
SPRING		
OT 7250	Older Adults as Occup Beings	6
OT 7200	Therapeutic Interventions	3
NSCI 6020	Neuroscience	3
OT 7240	Vis&Cog-Percep Infl Occupation	3
NH 6899	Fundamentals Critical Inquiry	3
SUMMER		
Fieldwork - Level I		2
OT 7350	Cultural Immersion	2
OT 7600	Cap I: Prof Scholar & Explor	2
OT 7370	Research I: Identifying Gaps	2

YEAR 2		
FALL		
OT 7450	Young Adults as Occup Beings	6
OT 7480	Designing Creative Ther Interv	2
OT 7400	Teaching and Advocacy	2
OT 7470	Research II: Implementing	2
OT 7490	OT Practice Management	3
OT 7610	Cap II: Devel & Support Evide	1
SPRING		
OT 7550	Children as Occup Beings	6
OT 7590	Becoming Life Long Pract	3
OT 7560	Living Life to the Fullest	3
OT 7570	Research III: Disseminating	2
OT 7620	Capstone III: Proposal Defense	1
SUMMER		
Fieldwork - Level II		9
YEAR 3		
FALL		
Fieldwork - Level II		9
SPRING		
OT 7630	Capstone IV: Capstone Experien	7
<b>Total Credits</b>		<b>98</b>

Following successful completion of all didactic coursework, fieldwork, and the capstone project and experience, students will be eligible to sit for the National Board for Certification in Occupational Therapy (NBCOT). A felony conviction may affect a graduate’s ability to sit for the NBCOT certification examination or attain state licensure.

**Comprehensive Examination**

Successful completion of the capstone project and experience.

**Requirements for Advancement to Candidacy for the occupational therapy doctorate**

Successful completion of the capstone project and experience.

**PATHOLOGY**

<http://www.med.uvm.edu/pathology>

**OVERVIEW**

The Department of Pathology is actively engaged in both undergraduate and graduate courses focusing on general and systemic pathology as well as mechanisms of environmental disease.

Opportunities include courses on special techniques of translational pathology as well as molecular mechanisms of environmental disease. Numerous research opportunities are available in collaboration with the dynamic and engaged faculty.

## DEGREES

Pathology M.S. (p. 203)

## FACULTY

**Chang, Martin;** Professor, Department of Pathology and Laboratory Medicine; MD, PHD, University of Toronto

**Conant, Joanna;** Assistant Professor, Department of Pathology and Laboratory Medicine; MD, University of Vermont

**Crothers, Jessica;** Assistant Professor, Department of Pathology and Laboratory Medicine; MD, University of Vermont

**Cunniff, Brian;** Assistant Professor, Department of Pathology and Laboratory Medicine; PHD, University of Vermont

**DeWitt, John;** Associate Professor, Department of Pathology and Laboratory Medicine; MD, PHD, University of Vermont

**Doyle, Margaret;** Associate Professor, Department of Pathology and Laboratory Medicine; PHD, Oklahoma State University

**Fung, Mark K.;** Professor, Department of Pathology and Laboratory Medicine; MD, PHD, University of Alabama School of Medicine

**Gibson, Pamela;** Professor, Department of Pathology and Laboratory Medicine; MD, University of Vermont

**Harm, Sarah;** Associate Professor, Department of Pathology and Laboratory Medicine, MD, Jefferson Medical College

**Nowak, Sarah;** Associate Professor, Department of Pathology and Laboratory Medicine; PHD University of California Los Angeles

**Seward, David;** Assistant Professor, Department of Pathology and Laboratory Medicine; MD, PHD, University of Colorado Anschutz Medical Campus

**Shukla, Arti;** Associate Professor, Department of Pathology and Laboratory Medicine; PHD, Banares Hindu University

**Stowman, Anne;** Assistant Professor, Department of Pathology and Laboratory Medicine, MD, University of Minnesota

**Taatjes, Douglas Joseph;** Professor, Department of Pathology and Laboratory Medicine; PHD, University of Basel

**Volaric, Ashley;** Assistant Professor, Department of Pathology and Laboratory Medicine; MD, University of Virginia School of Medicine

**Wilcox, Rebecca;** Professor, Department of Pathology and Laboratory Medicine, MD, Oregon Health Sciences University

**Wildin, Robert;** Associate Professor, Department of Pathology and Laboratory Medicine, Department of Pediatrics; MD, University of California San Francisco

**Wojewoda, Christina;** Professor, Department of Pathology and Laboratory Medicine; MD, University of Illinois

**Zhang, Bei;** Associate Professor, Department of Pathology and Laboratory Medicine; MD, Shandong University School of Medicine; PHD, Southern Illinois University School of Medicine; MLS, Thomas University

## PATHOLOGY M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

The Department of Pathology offers both a thesis and non-thesis based Master of Science degree. The thesis-based M.S. is a course and research-based program, with 24 credits in coursework, and a minimum of 6 credits of research culminating in a written thesis and defense. It is available to all applicants. A non-thesis M.S. requires 30 credits in coursework but does not require a thesis or thesis defense. The non-thesis M.S. is available only to University of Vermont medical students in the Vermont Integrated Curriculum (VIC). Research interests in the Department of Pathology are diverse, with special emphasis on Environmental Pathology, Pulmonary Diseases, and Cardiovascular Molecular Epidemiology.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

Students should apply for admission into the M.S. in pathology program by June 1. Admission into this program requires the following:

#### Thesis Track

- Satisfactory undergraduate or graduate coursework in chemistry, organic chemistry, and the biological sciences
- Satisfactory scores on the Graduate Record Examination (GRE) general exam or the Medical College Admission Test (MCAT); candidates with at least 2 years of clinical or other scientific laboratory experience will be considered without GRE or MCAT scores
- Completion of the UVM Graduate College application
- 3 letters of recommendation that attest to the student's intellectual maturity, oral and verbal communication skills, and their aptitude for studies towards an advanced degree in this area

#### Non-Thesis Track

UVM medical students are eligible for selection to the program after the completion of the Foundations portion of the VIC.

- A detailed letter of intent and curriculum vitae are required for application.
- A grade of 80 or better in the Foundations of Clinical Science (FoCS) OR the combination of: Cardiovascular, Respiratory and Renal (CRR), Human Development and Reproductive Health (HDRH), Medical Neuroscience (MedNeuro) and Connections courses in Foundations.
- Completion of the UVM Graduate College application

Chosen applicants will be interviewed by selected faculty members.

Preference will be given to students with outstanding academic records who are highly motivated.

## Program Learning Outcomes for Students in Both Tracks

- Obtain, analyze and evaluate information from a variety of sources
- Synthesize and apply knowledge to solve problems in ethical ways
- Evaluate the credibility and validity of research methods and clinical testing
- Defend the rigor, or lack of, when evaluating an experimental design including the inclusion or exclusion of crucial biological variables (e.g., sex, age, weight)
- Recognize vital biologic or chemical resources used in both research studies and clinical decision making for patients
- Identify effective communication strategies and engage in effective communication practices as team players
- Serve as an advocate for rigor and reproducibility when faced with proposed research questions
- Reflect on experiences and identify areas of improvement as life-long learners

## Minimum Degree Requirements

A minimum of 30 credits, with at least 6 at the 6000-level and a minimum GPA of 3.00 are required for a M.S. in pathology, at least 6 credits of coursework must be at the 6000-level plus successful completion of an oral presentation at Pathology Grand Rounds covering a capstone or paper research project for non-thesis track students, or successful defense of a research thesis for thesis track students. Students must also meet the Graduate College requirements for the Master's Degree.

Non-Thesis Track (Core curriculum - 30 credit hrs)		
PATH 6300	Pathology Rotations	3-9
PATH 6000	Biomedical Research Design	1
PATH 6080	Pathology Journal Club	1
PATH 6090	Pathology Grand Rounds	1
PATH 6100	Genomic Med & Cytogenetics	2
NSCI 6270	Resp Conduct in Biomed Rsch	1
Additional approved courses		7

Thesis Track (Core curriculum- 30 credit hours)		
BIOC 6001	General Biochemistry I	3
CLBI 6010	Cell Biology	3
CLBI 6020	Science Communication	3
NSCI 6270	Resp Conduct in Biomed Rsch	1
PATH 6000	Biomedical Research Design	1
PATH 6070	Molecular Pathology	3
PATH 6080	Pathology Journal Club	1
PATH 6090	Pathology Grand Rounds	1
PATH 6280	Techniques in Microscopy	3

PATH 6300	Pathology Rotations	3-9
PATH 6310	Pathology Clinical Practice	1
PATH 6391	Master's Thesis Research	6-15
Additional approved elective courses		8

## Comprehensive Examination

The comprehensive examination is fulfilled in the non-thesis track through an anatomic/clinical pathology competency exam and a graded grand rounds presentation covering a capstone or a paper research project. Preparation and defense of a thesis proposal fulfills the comprehensive examination for the thesis track.

## Requirements for Advancement to Candidacy for the Degree of Master of Science

Completion of core curriculum and passing the comprehensive examination.

## PHARMACOLOGY

<http://www.med.uvm.edu/pharmacology>

## OVERVIEW

The objective of the Department of Pharmacology Master's Programs is to provide a broad knowledge base of pharmacological concepts, preparing students for careers in Pharmaceutical, biotechnology and related industries; or to increase their competitiveness to pursue additional graduate or professional degrees.

Research interests in the Department of Pharmacology are diverse, with special emphasis on cardiovascular and cerebrovascular pharmacology, physiology, neurovascular coupling, signal transduction, and medicinal chemistry/cancer chemotherapy.

The Department of Pharmacology offers thesis-based and non-thesis Master of Science degrees. The non-thesis M.S. degree involves taking 30 credits of required and elective Pharmacology or Pharmacology-approved courses and does not require a thesis or thesis defense. The thesis-based M.S. degree is a course and research-based program, with 15 credits in coursework and a maximum of 15 credits of research. Students may choose thesis advisors from within the Department of Pharmacology, or with approval from the Program Director, may choose faculty from outside of the Department. This gives students a wide range of options for selecting thesis advisors conducting pharmacology research. Students in the thesis-based track will write and defend a thesis.

Students can enter the thesis or non-thesis Pharmacology Master's programs by 1 of 2 mechanisms: 1<sup>st</sup> is the Traditional Master's Degree Program involving an approximately 2-year program of study. This program is available to all applicants. 2<sup>nd</sup> is the Accelerated Entry Master's Degree Program (AMP). This program is available exclusively to UVM undergraduate students with Senior standing and allows initiation of their Master's Degree studies prior to completion of their undergraduate degree and is designed to provide the opportunity to initiate their Master's Degree. Students entering the AMP can share up to 9 credits between their graduate and



undergraduate degrees, thereby decreasing both the time and cost of completing the Master's Degree.

In addition to the Pharmacology M.S. and Accelerated Master's Program (AMP), the Pharmacology faculty participate in interdisciplinary doctoral programs in Neuroscience, and Cellular, Molecular, and Biomedical Sciences found elsewhere in this Catalogue.

## DEGREES

Pharmacology AMP (p. 205)

Pharmacology M.S. (p. 206)

## FACULTY

**Carr, Frances Eileen;** Professor, Department of Pharmacology; PHD, University of Illinois Chicago

**Dostmann, Wolfgang R. G.;** Professor, Department of Pharmacology; PHD, University of Bremen; MD, University of Munich

**Erdos, Benedek;** Associate Professor, Department of Pharmacology; MD, PHD, Semmelweis University, School of Medicine, Budapest, Hungary

**Glass, Karen C.;** Associate Professor, Department of Pharmacology; PHD, University of Vermont

**Harraz, Osama F.;** Assistant Professor, Department of Pharmacology; PHD, University of Calgary

**Herrera, Gerald M.;** Assistant Professor, Department of Pharmacology; PHD, University of Vermont

**Howe, Alan K.;** Professor, Department of Pharmacology; PHD, Northwestern University

**Lounsbury, Karen M.;** Professor, Department of Pharmacology; PHD, University of Pennsylvania

**Morielli, Anthony D.;** Associate Professor, Department of Pharmacology; PHD, University of California Santa Cruz

**Nelson, Mark;** Professor, Department of Pharmacology; PHD, Washington University in St Louis

**Wellman, George C.;** Professor, Department of Pharmacology; PHD, University of Vermont

## PHARMACOLOGY AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

## OVERVIEW

The objective of the Department of Pharmacology Master's Program is to provide a broad knowledge base of pharmacological concepts, preparing students for careers in pharmaceutical, biotechnology and related industries or to increase their competitiveness to pursue additional graduate or professional degrees. Research interests in the Department of Pharmacology are diverse, with special emphasis on cardiovascular and cerebrovascular pharmacology, physiology, neurovascular coupling, signal transduction, and medicinal chemistry/cancer chemotherapy.

This Accelerated Master's Degree Entry Pathway (AMP) is designed to offer select UVM undergraduate science majors the opportunity

to obtain both their B.A./B.S. and a M.S. in Pharmacology in a total of 5 years of study. Following acceptance by the Graduate College, students enrolled in this pathway can take up to 9 credits of graduate-level courses that will count towards both a Bachelor's Degree and the Master's in pharmacology degree. Students would then be expected to complete all remaining M.S. requirements during a 5<sup>th</sup> year of study. Full-time graduate student status will start the summer after their undergraduate graduation. All other aspects and requirements of the AMP are identical to the traditional (non-AMP) Master's program.

The Department of Pharmacology offers thesis-based and non-thesis Master of Science degrees in the AMP. The non-thesis M.S. degree involves taking 30 credits of required and elective Pharmacology or Pharmacology-approved courses and does not require a thesis or thesis defense. The thesis-based M.S. degree is a course and research-based program, with 21 credits in coursework and 9 credits of research. Students may choose thesis advisors from within the Department of Pharmacology, or with approval from the Program Director, may choose faculty from outside of the Department. This gives students a wide range of options for selecting thesis advisors conducting pharmacology research. Students in the thesis-based track will write and defend a thesis.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

A course background in the sciences (biology, chemistry, physics, etc.) is recommended. Graduate Record Examination (GRE) scores are not required.

Admission to the program requires the following:

- A minimum cumulative grade point average of 3.00 is recommended.
- Completion of the Graduate College Application form that must include at least 3 letters of recommendation.

Students MUST be admitted through the Graduate College before taking any courses that will be applied to the Master's degree requirements.

### MINIMUM DEGREE REQUIREMENTS

All students must meet the UVM Graduate College Requirements for the Master's degree. A minimum of 30 credits and successful completion of a written comprehensive exam are required for completion of the Master's degree in Pharmacology. At least 15 coursework credits must be graded, 6 of which must be at the 6000-level. Students enrolled in the thesis-based program must also write, present and successfully defend their research thesis. Courses should be selected from the following lists or from pharmacology-related courses offered by other departments at UVM as approved by the program lists or from Pharmacology-related courses offered by other departments at UVM as approved by the Program Director to complete the 30 credit requirement. Please contact the Program Director for a current list of courses approved for the Pharmacology M.S.

Required courses:		
PHRM 5400	Molecules & Medicine	3
PHRM 5900	Gr Adv Pharmacology Topics	3
PHRM 6010	Applied Systems Pharmacology	3
PHRM 6080	Integrative Physiol. & Pharm.	3
PHRM 6810	Seminar	1
Required for thesis Master's:		
PHRM 6391	Master's Thesis Research	9
Additional courses may be selected from the following or by approval of the Program Director:		
PHRM 5720	Gr Toxicology	
PHRM 6020	Pharmacological Techniques	
PHRM 6050	Milestones in Pharmacology	
PHRM 6730	Readings in Pharmacology	
BIOC 6001	General Biochemistry I	
BIOC 6002	General Biochemistry II	
MPBP 6010	Human Physiology & Pharm I	

### Comprehensive Examination

Students are required to pass a written comprehensive exam. The format is a take-home written exam. The questions are based on the required courses, which are common to the thesis and non-thesis tracks. Grading is on a 1-10 scale for each question. An average score of 7 or better is required to pass. If a passing grade is not obtained, 1 re-take is permitted.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Advancement to candidacy requires satisfactory completion of the comprehensive exam.

## PHARMACOLOGY M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The objective of the Department of Pharmacology Master's Programs is to provide a broad knowledge base of pharmacological concepts, preparing students for careers in pharmaceutical, biotechnology and related industries or to increase their competitiveness to pursue additional graduate degrees. Research interests in the Department of Pharmacology are diverse, with special emphasis on cardiovascular and cerebrovascular pharmacology, physiology, neurovascular coupling, signal transduction, and medicinal chemistry/cancer chemotherapy.

The Department of Pharmacology offers thesis-based and non-thesis Master of Science degrees. The non-thesis M.S. degree

involves taking 30 credits of required and elective Pharmacology or Pharmacology approved courses and does not require a thesis or thesis defense. The thesis-based M.S. degree is a course and research-based program, with a minimum of 15 course credits and 9-15 credits research credits (PHRM 6391). Students may choose thesis advisors from within the Department of Pharmacology, or with approval from the Program Director may choose faculty from outside of the Department. This gives students a wide range of options for selecting thesis advisors conducting pharmacology research. Students in the thesis-based track will write and defend a thesis.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

A course background in the sciences (biology, chemistry, physics, etc.) is recommended. Graduate Record Examination (GRE) scores are not required.

Admission to the program requires the following:

- A minimum cumulative grade point average of 3.00 is recommended.
- Completion of the Graduate College Application form that must include at least 3 letters of recommendation.

### MINIMUM DEGREE REQUIREMENTS

All students must meet the UVM Graduate College Requirements for the Master's degree. A minimum of 30 credits and successful completion of a written comprehensive exam are required for completion of the Master's degree in Pharmacology. At least 15 coursework credits must be graded, 6 of which must be at the 6000-level. Students enrolled in the thesis-based program must also write, present and successfully defend their research thesis. Courses should be selected from the following lists or from pharmacology-related courses offered by other departments at UVM as approved by the Program Director to complete the 30 credit requirement. Please contact the Program Director for a current list of courses approved for the Pharmacology M.S.

Required Courses:		
PHRM 5400	Molecules & Medicine	3
PHRM 5900	Gr Adv Pharmacology Topics	3
PHRM 6010	Applied Systems Pharmacology	3
PHRM 6080	Integrative Physiol. & Pharm.	3
PHRM 6810	Seminar	1
Required for thesis master's:		
PHRM 6391	Master's Thesis Research	1-12
Additional courses may be selected from the following or by approval of the Program Director:		
PHRM 5720	Gr Toxicology	
PHRM 6020	Pharmacological Techniques	

PHRM 6050	Milestones in Pharmacology	
PHRM 6730	Readings in Pharmacology	
BIOC 6001	General Biochemistry I	
BIOC 6002	General Biochemistry II	
MPBP 6010	Human Physiology & Pharm I	

### Comprehensive Examination

Students are required to pass a written comprehensive exam. The format is a take-home written exam. The questions are based on the required courses, which are common to the thesis and non-thesis tracks. Grading is on a 1-10 scale for each question. An average score of 7 or better is required to pass. If a passing grade is not obtained, 1 re-take is permitted.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Advancement to candidacy requires satisfactory completion of the comprehensive exam.

## PHYSICAL ACTIVITY AND WELLNESS SCIENCE

<https://www.uvm.edu/cnhs/rms/master-science-physical-activity-and-wellness-science-0>

### OVERVIEW

The Master's program in Physical Activity and Wellness Science provides the competencies necessary to promote health and wellness, assist in reducing health risks, and improve quality of life for individuals and communities. The curriculum examines the science underlying the relationship between physical (in)activity and chronic disease and emphasizes health interventions based on scientific data and established behavioral and learning theories. The program offers a cohesive set of courses pertaining to the planning, development, evaluation and dissemination of evidence-based, physical activity and wellness programming that prepares the student to become a health educator and physical activity practitioner in communities, workplaces, healthcare, and/or public health settings.

### DEGREES

Physical Activity and Wellness Science M.S. (p. 207)

### FACULTY

**Angelopoulos, Theodore J.;** Professor, Department of Rehabilitation and Movement Science; PHD, University of Pittsburgh

**Gell, Nancy M.;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, Auburn University

**Kasser, Susan;** Professor, Department of Rehabilitation and Movement Science; PHD, Oregon State University

**Tompkins, Connie L.;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, University of New Orleans

**Tourville, Timothy;** Associate Professor, Department of Rehabilitation and Movement Science, PHD; University of Vermont

## PHYSICAL ACTIVITY AND WELLNESS SCIENCE M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Master's program in Physical Activity and Wellness Science provides the competencies necessary to promote health and wellness, assist in reducing health risks, and improve quality of life for individuals and communities. The curriculum examines the science underlying the relationship between physical (in)activity and chronic disease and emphasizes health interventions based on scientific data and established behavioral and learning theories. The program offers a cohesive set of courses pertaining to the planning, development, evaluation and dissemination of evidence-based, physical activity and wellness programming that prepares the student to become a health educator and physical activity practitioner in communities, workplaces, healthcare, and/or public health settings.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

- UVM Graduate Application Form
- Undergraduate degree from an accredited college or university
- Minimum overall GPA of 3.0
- Undergraduate transcripts
- Recommended coursework: Research Methods
- TOEFL scores (international students; minimum of 90)
- Statement of Career Interests
- 3 letters of recommendation

#### Minimum Degree Requirements

UVM's Master's Degree in Physical Activity and Wellness Science is a 30-credit, non-thesis graduate program. At least 6 of the 30 must be course credits at the 6000-level or above. With the prior approval of their program and the Graduate College, students may apply one 3000- or 4000-level course toward their graduate program. The program can be completed in 1 or 2 academic years (2 or 4 semesters, respectively). The curriculum includes coursework in exercise programming, physical activity epidemiology, research methods, exercise and energy balance, chronic disease and exercise, health and wellness promotion, and behavior change and theory.

A maximum of 9 credits may be transferred into the program. Transfer credit may be completed prior to admission to the program provided that the credit is approved by the student's graduate studies committee, course(s) content overlaps with program curriculum content, and the credit conforms to all other Graduate College requirements.

## Comprehensive Examination

Students must complete a comprehensive exam, integrating their knowledge of core course material in a written paper and/or oral format, by the end of their final semester in the program.

## Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of all required courses and the comprehensive examination.

## PHYSICAL THERAPY

<http://www.uvm.edu/~cnhs/rms/>

### OVERVIEW

The UVM Doctor of Physical Therapy (DPT) program's mission is to prepare graduates to lead and collaborate in the quest of promoting the health of individuals, communities and society through movement and exercise in order to optimize function, activity, and participation across environments. UVM graduates provide ethical, evidence-based, client-centered services in a culturally sensitive manner as they serve society to enhance quality of life. Graduates are decision-makers in the primary care team who have a clear understanding of the importance of lifelong learning that will support their client, patient, and professional needs. Faculty model and support student learning of these expected educational outcomes.

The program's vision is to be recognized for leadership in its contribution to the creation, advancement, and dissemination of translational research while striving toward excellence to educate DPT scholars who collaborate to "transform society by optimizing movement," for the promotion of individual and population health of our communities and society.

### DEGREES

Physical Therapy D.P.T. (p. 208)

### FACULTY

**Escorpizo, Reuben;** Clinical Professor, Department of Rehabilitation and Movement Science; DPT, Des Moines University

**Failla, Matthew;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, University of Delaware

**Ouellette-Morton, Rebecca;** Clinical Associate Professor, Department of Rehabilitation and Movement Science; DPT, University of New England

**Peters, Denise;** Associate Professor, Department of Rehabilitation and Movement Science; PHD, DPT, University of South Carolina

**Smith, Paula;** Clinical Assistant Professor, Department of Rehabilitation and Movement Science; PHD, Virginia Commonwealth University

## PHYSICAL THERAPY D.P.T.

### OVERVIEW

The Doctor of Physical Therapy (D.P.T.) program at the University of Vermont (UVM) consists of 102 graduate credits offered in

a 2.5-year full-time program format, over 8 semesters inclusive of summers, that leads to a Doctor of Physical Therapy degree. The program is well recognized for preparing D.P.T graduates as primary care movement system experts who translate evidence into contemporary best practice. Graduates advocate to improve health outcomes and well-being at the individual and community level.

The movement system is the foundation of the curriculum design. Organized in a systems-based model, the curriculum integrates the basic and clinical sciences across the musculoskeletal, nervous, cardiovascular/pulmonary, integumentary and endocrine systems to facilitate student ability to develop as movement system experts. Additionally, the study of evidenced based practice, leadership and professional formation, health policy, business management, and social responsibility shape the students' professional role and identity as a Doctor of Physical Therapy.

Students engage in an array of active learning experiences with multiple opportunities for interprofessional education and community engagement. Integrated clinical experiences and 32 weeks of full time clinical internships broaden student professional preparation. Internships are offered throughout the U.S. in a variety of specialty areas and settings and assignments are based on students' educational needs and clinical site availability. Students are responsible for all costs associated with clinical internships.

Exceptional faculty role model clinical and research expertise across each of the specialty areas of physical therapist practice to facilitate student development as movement system experts.

### Program Mission and Vision

The UVM DPT program mission is to prepare D.P.T. graduates to lead and collaborate in the quest of promoting the health of individuals, communities and society through movement and exercise in order to optimize function, activity, and participation across environments. UVM graduates are movement system experts who provide ethical, evidence-based, client-centered services in a culturally sensitive manner as they serve society to enhance quality of life. Graduates are decision makers in the primary care team who have a clear understanding of the importance of lifelong learning that will support their client, patient and professional needs. The program's vision is to be recognized for leadership in its contribution to the creation, advancement, and dissemination of translational research while striving toward excellence to educate D.P.T. scholars who collaborate to "transform society by optimizing movement," and promote individual and population health of our communities and society.

### Professional Licensure

Upon successful completion of the program, graduates are eligible to sit for the national licensure examination administered through the Federation of State Boards of Physical Therapy.

### Accreditation

The DPT program at UVM is accredited by the Commission on Accreditation in Physical Therapy Education, 1111 North Fairfax Street, Alexandria, VA, 22314.



## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Physical Therapy

Applicants must complete the prerequisite course requirements and a baccalaureate degree in any major from UVM or any accredited institution. Applicants with a baccalaureate degree from institutions outside the U.S. will also be considered.

Applicants to the D.P.T. program must have a cumulative GPA of 3.00 or higher in their undergraduate studies. All applicants must complete the following prerequisite courses with a cumulative GPA of 3.30 or higher prior to entry into the DPT program:

- 2 semesters of anatomy/physiology with labs
- 2 semesters of college chemistry with labs
- 2 semesters of physics with labs
- 2 semesters of biology (not botany or zoology)
- 1 semester of psychology
- 1 semester of statistics

### APPLICATION PROCESS

All Applicants must complete the Common Application through the Physical Therapist Centralized Application Service (PTCAS), a division of the American Physical Therapy Association. Follow all instructions on the site. Application materials should be submitted directly to PTCAS and must include:

- 3 letters of recommendation, one of which must come from an academic faculty member
- Official Transcript(s) from all U.S. and Canadian schools attended. PTCAS and the UVM D.P.T. program accept prerequisite credits from accredited institutions only. For international applicants, transcripts must be translated and evaluated by an official service

Complete the supplemental UVM Graduate College Application form. Include the following information:

- In the Statement of Purpose section, upload a document that reads: "See essay on the PTCAS application"
- Application Fee
- Note: No transcripts, letters of recommendation or other materials submitted in the PTCAS application need to be submitted to the University of Vermont.
- If applying to the combined DPT/PhD in Neuroscience program select the DPT/NGP option on the supplemental application. See website for details.

### Minimum Degree Requirements

The UVM D.P.T. program requires successful completion of 102 graduate credits.

Curriculum for Class of 2027:

YEAR ONE		
SUMMER		
ANNB 6000	Human Gross Anatomy	6
FALL		
DPT 7050	Clinical Medicine	4
DPT 7060	Exercise Science	3
DPT 7100	Fundamentals of Clinical Pract	3
DPT 7110	Movement System I	3
DPT 7140	Clinical Reasoning	2
DPT 7150	Psychsoc Aspects Hlth Wellbeing	3
SPRING		
NSCI 6020	Neuroscience	3
DPT 7070	Pharmacology and Nutrition	2
DPT 7080	Fundamentals Critical Inquiry	3
DPT 7090	Foundations of Imaging for PT	1
DPT 7120	Movement System II	3
DPT 7200	Musculoskeletal Management I	4
DPT 7500	Professional Form/Leadershp I	2
DPT 7090	Foundations of Imaging for PT	1
YEAR TWO		
SUMMER		
DPT 7210	Musculoskeletal Management II	4
DPT 7230	Neurological Management I	3
DPT 7260	Cardiovasc and Pulmonary Mgt	4
DPT 7930	Doctoral Research Project I	2
FALL		
DPT 7220	Musculoskeletal Management III	4
DPT 7240	Neurological Management II	3
DPT 7270	Integmnt, Endocrine, Multi Sys	3
DPT 7510	Prof Formation/Leadrshp II-ICE	2
DPT 7600	Clinical Edu Experience I	3
SPRING		
DPT 7030	Health Policy & Business Mgmt	3
DPT 7040	Health Sys IV-Health Promotion	3
DPT 7160	Rehabilitation Technology	3
DPT 7250	Neurological Management III	4

DPT 7520	Prof Formatn/Leadrshp III-ICE	2
YEAR THREE		
SUMMER		
DPT 7130	Movement System III	3
DPT 7610	Clinical Edu Experience IIA	3
DPT 7990	Special Topics	2
Comprehensive Exam		
FALL		
DPT 7620	Clinical Edu Experience IIB	3
DPT 7630	Clinical Edu Experience III	6

Students must also:

- Pass all clinical internships and clinical education coursework expectations during their clinical experience and receive no more than one U grade in a clinical education course (that was successfully retaken for a S grade)
- Illustrate evidence of professional behaviors commensurate with professional doctoral practice in physical therapy

### LIMITED WAIVER OPTION

The DPT program faculty, under special circumstances, may allow a waiver of up to 6 credits based on prior knowledge. A course waiver form inclusive of prior knowledge supporting documentation must be submitted to the Chair of the DPT Curriculum Committee and Program Director (PD) at least 2 weeks prior to the semester where the potentially waived course is offered. The DPT Curriculum Committee will review all requests for recommendation to the PD.

Students will receive notification of decision in writing and the Graduate College will be notified when a waiver has been approved. The student assumes responsibility for all content of any approved course waiver.

### Comprehensive Examination

Students must successfully pass a comprehensive examination as part of their graduate program upon the conclusion of the didactic coursework. The comprehensive examination for the DPT program will consist of a multiple-choice exam and focuses on the student's mastery of foundational knowledge, clinical applicability, and practice. Should students not pass the comprehensive examination, they will have 1 additional opportunity to remediate and provide evidence of achievement of the learning outcomes of the comprehensive examination prior to being able to graduate from the program.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Physical Therapy

Successful completion of all graded graduate credits with a 3.00 GPA or better, received no more than 2 passing course grades below a B, and passed the comprehensive examination.

## PHYSICS

<http://www.uvm.edu/~physics/>

### OVERVIEW

The Department of Physics offers research opportunities in theoretical and experimental condensed matter physics, astronomy and astrophysics, and soft condensed matter physics and biophysics.

Research in theoretical condensed matter physics focuses on the dynamics of quantum systems with application to electronic, magnetic, optical, structural, and thermal properties of nanomaterials including fullerene-derived solids (buckyballs) and carbon nanotubes. Basic research also includes the investigation of low energy scattering of atoms and molecules from surfaces and systems with many internal degrees of freedom, and the development of new methods for studying quantum many-body systems, such as new extensions of density functional theory to van der Waals systems. In addition, high performance computational techniques including quantum Monte Carlo and exact diagonalization are used to study strongly-interacting quantum systems with a focus on the types of emergent phenomena that are ubiquitous in complex systems. This includes investigations of entanglement in quantum fluids and gases in the presence of confinement, disorder, and dissipation.

The physics of recently discovered Graphene and its derivatives is another major direction of theoretical research. These materials exhibit unconventional electronic, magnetic, mechanical, and transport properties, and efforts are under way to understand the role of quantum many-body effects both from fundamental standpoint and in relation to nanodevice applications.

Additional theoretical studies include strongly-correlated electron systems, such as complex oxides and cuprates and high-temperature superconductors. Of particular interest are frustrated quantum magnets with novel ground states, as well as conducting cuprates which exhibit complex interplay of charge and spin phenomena. Such systems also tend to undergo quantum phase transitions, and the study of quantum critical phenomena is a major research direction.

Theoretical studies of the optical properties of materials include the electronic structure of defect complexes in ionic crystals, the application of subtracted dispersion relations to optical data analysis, and the separation of inter- and intra-band effects in the infrared spectra of metals. Related studies are concerned with theories of X-ray scattering, of X-ray optical properties, and of X-ray optical elements.

Research in materials physics includes studies of the kinetics of thin film growth and surface processing, applied to materials with interesting and useful physical properties such as organic semiconductors and magnetic materials. Many of the research projects involve real-time X-ray or electron diffraction structural studies of surface phenomena, combined with computer simulation of relevant surface processes. Available is an ultra-high vacuum thin-film deposition laboratory dedicated to these studies, and regular use is made of synchrotron X-ray facilities in the U.S.

Additional research in materials physics includes studies of fundamental magnetic and spin-dependent electronic properties of semiconductor nanostructures that employ high magnetic field optical spectroscopy imaging techniques. The physics department hosts 1 of the few laboratories in New England where time-resolved, spin-dependent spectroscopy imaging at magnetic fields as high as 5 Tesla may be carried out.

Astrophysical research centers on experimental radio astronomy, with particular emphasis on pulsars and the interstellar medium. Observations are carried out using major instruments of the U.S. National Observatories and generally involve computer analysis and interpretation.

Research in biophysical ultrasound is directed toward an understanding of the physical principles involved when ultrasound interacts with living systems. This often involves collaboration with the College of Medicine. Acoustical and optical tweezers permit manipulating single cells without touching them. New forms of ultrasonic transducers and biosensors are being developed in collaboration with the Department of Electrical Engineering, as part of the Materials Science program. Biophysical research includes studies on the development and employment of novel uses of in situ atomic force microscopy for biological applications, specifically high-resolution structural studies of membrane proteins, investigation of the packing of genetic materials on bilayer membranes, and studies on how DNA-bilayer interactions affect the use of cationic lipids as gene-delivery means. Other research in biological physics and protein dynamics involves combining the detail of atomic-resolution X-ray crystallography with the sensitivity of optical and IR spectroscopy. The department has access to a state-of-the-art protein crystallography diffractometer and organizes regular trips to synchrotrons in the U.S. and Europe.

Opportunities for collaborative research with other university departments and groups include those with Chemistry, the Materials Science program, Molecular Physiology and Biophysics, the Cellular, Molecular and Biomedical Sciences program, Computer Science, Electrical Engineering, Civil and Environmental Engineering, Mechanical Engineering, Medical Radiology, and Geology.

The department participates in a doctoral program in Materials Science.

## DEGREES

Physics AMP (p. 211)

Physics M.S. (p. 212)

Physics Ph.D. (p. 214)

## FACULTY

**Clougherty, Dennis Paul;** Professor, Department of Physics; PHD, Massachusetts Institute of Technology

**Del Maestro, Adrian G.;** Adjunct Professor, Department of Physics; PHD, Harvard University

**Furis, Madalina Ioana;** Associate Professor, Department of Physics; PHD, University of Buffalo

**Headrick, Randall L.;** Professor, Department of Physics; PHD, University of Pennsylvania

**Kotov, Valeri N.;** Associate Professor, Department of Physics; PHD, Clarkson University

**Vanegas, Juan;** Assistant Professor, Department of Physics; PHD; University of California Davis

**White, Matthew S.;** Assistant Professor, Department of Physics; PHD; University of Colorado Boulder

**Wu, Junru;** Professor Emeritus, Department of Physics; PHD, University of California Los Angeles

**Yang, Jie;** Associate Professor, Department of Physics; PHD, Princeton University

## PHYSICS AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

## OVERVIEW

The Department of Physics offers research opportunities in Theoretical and Experimental Condensed Matter physics, Astronomy and Astrophysics, and Soft Condensed Matter Physics and Biophysics.

Research in theoretical condensed matter physics focuses on the dynamics of quantum systems with application to electronic, magnetic, optical, structural, and thermal properties of nanomaterials including fullerene-derived solids (buckyballs) and carbon nanotubes. Basic research also includes the investigation of low energy scattering of atoms and molecules from surfaces and systems with many internal degrees of freedom and the development of new methods for studying quantum many-body systems, such as new extensions of density functional theory to van der Waals systems. In addition, high performance computational techniques including quantum Monte Carlo and exact diagonalization are used to study strongly interacting quantum systems with a focus on the types of emergent phenomena that are ubiquitous in complex systems. This includes investigations of entanglement in quantum fluids and gases in the presence of confinement, disorder and dissipation.

The physics of recently discovered Graphene and its derivatives is another major direction of theoretical research. These materials exhibit unconventional electronic, magnetic, mechanical, and transport properties, and efforts are under way to understand the role of quantum many-body effects both from fundamental standpoint and in relation to nanodevice applications.

Additional theoretical studies include strongly-correlated electron systems, such as complex oxides and cuprates and high-temperature superconductors. Of particular interest are frustrated quantum magnets with novel ground states, as well as conducting cuprates which exhibit complex interplay of charge and spin phenomena. Such systems also tend to undergo quantum phase transitions, and the study of quantum critical phenomena is a major research direction.

Theoretical studies of the optical properties of materials include the electronic structure of defect complexes in ionic crystals, the application of subtracted dispersion relations to optical data analysis,

and the separation of inter- and intra-band effects in the infrared spectra of metals. Related studies are concerned with theories of X-ray scattering, of X-ray optical properties, and of X-ray optical elements.

Research in materials physics includes studies of the kinetics of thin film growth and surface processing, applied to materials with interesting and useful physical properties such as organic semiconductors and magnetic materials. Many of the research projects involve real-time X-ray or electron diffraction structural studies of surface phenomena, combined with computer simulation of relevant surface processes. Available is an ultra-high vacuum thin-film deposition laboratory dedicated to these studies, and regular use is made of synchrotron X-ray facilities in the U.S.

Additional research in materials physics includes studies of fundamental magnetic and spin-dependent electronic properties of semiconductor nanostructures that employ high magnetic field optical spectroscopy imaging techniques. The physics department hosts 1 of the few laboratories in New England where time-resolved, spin-dependent spectroscopy imaging at magnetic fields as high as 5 Tesla may be carried out.

Astrophysical research centers on experimental radio astronomy, with particular emphasis on pulsars and the interstellar medium. Observations are carried out using major instruments of the U.S. National Observatories and generally involve computer analysis and interpretation.

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Opportunities for collaborative research with other university departments and groups include those with Chemistry, the Materials Science Program, Molecular Physiology and Biophysics, the Cellular, Molecular and Biomedical Sciences Program, Computer Science, Electrical Engineering, Civil and Environmental Engineering, Mechanical Engineering, Medical Radiology, and Geology.

The department participates in a doctoral program in Materials Science.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students

Students must apply for the Accelerated Master's Entry Pathway (AMP) during Spring semester of their Junior year. Students interested in the AMP can request information in writing from the Physics Department. Recommendation for admission will be based upon the student's prior academic record with particular attention paid to performance in upper-division 3000- or 4000-level physics courses. Following formal Graduate College admission to the Accelerated Master's Program, up to 9 credits of approved graduate course work may be taken that may be counted toward both the undergraduate and graduate degree requirements. The graduate credits taken prior to completion of the bachelor's must be in graded coursework only; independent study, research credits, internships and practica will not count towards the master's degree. In addition, the courses taken must be approved by the student's graduate advisor.

### Minimum Degree Requirements for the Degree of Master of Science

A total of 30 credits including 15 credits of graded course work, at least 6 of which must be at the 6000-level, and:

A minimum of 6 credits of thesis research	6
At least 9 credits of physics courses at the 5000-level or above	9

### Comprehensive Examination

At the start of their second semester at UVM, students are expected to sit for the written part of the Comprehensive Exam which covers Classical mechanics, Quantum Mechanics, Electricity and Magnetism, as well as Thermal Physics and Mathematical Physics.

Students are given 2 opportunities to pass the comprehensive exam. In addition to the written portion, there is also an oral portion that consists of a Master's thesis proposal given after the start of a thesis research project.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of all required courses and the comprehensive exam.

## PHYSICS M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

The Department of Physics offers research opportunities in theoretical and experimental condensed matter physics, astronomy and astrophysics, and soft condensed matter physics and biophysics.

Research in theoretical condensed matter physics focuses on the dynamics of quantum systems with application to electronic, magnetic, optical, structural, and thermal properties of nanomaterials



including fullerene-derived solids (buckyballs) and carbon nanotubes. Basic research also includes the investigation of low energy scattering of atoms and molecules from surfaces and systems with many internal degrees of freedom, and the development of new methods for studying quantum many-body systems, such as new extensions of density functional theory to van der Waals systems. In addition, high performance computational techniques including quantum Monte Carlo and exact diagonalization are used to study strongly-interacting quantum systems with a focus on the types of emergent phenomena that are ubiquitous in complex systems. This includes investigations of entanglement in quantum fluids and gases in the presence of confinement, disorder, and dissipation.

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National Observatories and generally involve computer analysis and interpretation.

Research in biophysical ultrasound is directed toward an understanding of the physical principles involved when ultrasound interacts with living systems. This often involves collaboration with the College of Medicine. Acoustical and optical tweezers permit manipulating single cells without touching them. New forms of ultrasonic transducers and biosensors are being developed in collaboration with the Department of Electrical Engineering, as part of the Materials Science program. Biophysical research includes studies on the development and employment of novel uses of in situ atomic force microscopy for biological applications, specifically high-resolution structural studies of membrane proteins, investigation of the packing of genetic materials on bilayer membranes, and studies on how DNA-bilayer interactions affect the use of cationic lipids as gene-delivery means. Other research in biological physics and protein dynamics involves combining the detail of atomic-resolution X-ray crystallography with the sensitivity of optical and IR spectroscopy. The department has access to a state-of-the-art protein crystallography diffractometer and organizes regular trips to synchrotrons in the U.S. and Europe.

Opportunities for collaborative research with other university departments and groups include those with Chemistry, the Materials Science program, Molecular Physiology and Biophysics, the Cellular, Molecular and Biomedical Sciences program, Computer Science, Electrical Engineering, Civil and Environmental Engineering, Mechanical Engineering, Medical Radiology, and Geology.

The department participates in a doctoral program in Materials Science.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Science

Undergraduate majors in science, engineering, or mathematics are considered for admission to the program. Satisfactory scores on the Graduate Record Examination (general) are required.

### Minimum Degree Requirements for the Degree of Master of Science

A total of 30 credits including at least 15 credits of graded coursework, at least 6 of which must be at 6000-level, and:

A minimum of 6 credits of thesis research	6
At least 9 credits of physics courses at the 5000-level or above	9

### Comprehensive Examination

At the start of their second semester at UVM, students are expected to sit for the written part of the Comprehensive Exam which covers classical mechanics, quantum mechanics, electricity and magnetism, as well as thermal physics and mathematical physics.

Students are given 2 opportunities to pass the comprehensive exam. In addition to the written portion, there is also an oral portion that

consists of a master's thesis proposal given after the start of a thesis research project.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of all required courses and the comprehensive exam.

## PHYSICS PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275).

### OVERVIEW

The Department of Physics offers research opportunities in theoretical and experimental condensed matter physics, astronomy and astrophysics, and soft condensed matter physics and biophysics.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

Undergraduate majors in physics are considered for admission to the program. Satisfactory scores on the Graduate Record Examination (general) are required.

#### Minimum Degree Requirements

75 credits, of which 15 graded coursework credits must be taken after matriculation and 9 of which must be at 6000- or 7000-level, and including:

5 Core Graduate Courses		
PHYS 5125	Mathematical Physics	3
PHYS 5200	Advanced Dynamics	3
PHYS 5300	Electromagnetic Theory	3
PHYS 5500	Quantum Mechanics II	3
PHYS 5400	Statistical Mechanics	3
All of these courses must be completed with a grade B or better within the first 2 years of graduate study.		
To accommodate the needs of the specific subfields in physics such as astrophysics, biological physics, condensed-matter physics and materials physics, 3 elective courses (9 credits) have to be chosen to fulfill the breadth requirement with a grade of B or higher. Elective courses must be completed within the first 3 years of the program, as the fourth year (and beyond if needed) should be dedicated to progress towards the Ph.D. dissertation.		
A minimum of 20 credits of Doctoral Dissertation Research (PHYS 7491)		20
A minimum of 3 credits of Teaching College Physics (PHYS 6000)		3

### Comprehensive Examination

At the start of their second semester at UVM, students are expected to sit for the written part of the Comprehensive Exam which covers

classical mechanics, quantum mechanics, electricity and magnetism, as well as thermal physics and mathematical physics.

Students are given 2 opportunities to pass the comprehensive exam. In addition to the written portion, there is also an oral portion that consists of a Ph.D. dissertation proposal given after the start of a dissertation research project.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Successful completion of all required courses and the comprehensive exam.

## PLANT AND SOIL SCIENCE

<http://www.uvm.edu/cals/pss>

### OVERVIEW

The mission of the Department of Agriculture, Landscape, and Environment (formerly Plant and Soil Science) is to expand, integrate, and extend the knowledge of agricultural systems and environmental quality in plant/soil ecosystems affecting the people of Vermont, the region, and the world. The department will provide excellence in education, research, and extension that will foster environmentally, economically, and socially sound practices.

The department offers a Master of Science (M.S.) degree in all fields in plant science and soil science and a Doctor of Philosophy (Ph.D.) degree in plant science and soil science. A thesis, based on original research, is required for the M.S. degree, and completion of the requirements normally takes 2.5 years. A dissertation, based on original research, is required for the Ph.D. degree, and completion of the requirements typically takes 3 to 4 years.

The department is comprised of faculty representing the disciplines of agroecology, agronomy, entomology, horticulture, landscape design, plant pathology, and soil science. Research faculty are involved in studying plant, soil or insect interactions within environments managed for food, fiber, waste utilization, or for landscape purposes. The objectives of these studies are: (1) to develop fundamental knowledge of environmental impacts and interactions and (2) to apply knowledge to better manage systems and promote environmental health. Specifically, departmental projects have included:

- Biological control of insect pests – entomopathogenic fungi
- Integrated pest management (IPM) in greenhouse and field situations
- Agro-ecological practices in Vermont and international communities
- Ecological landscape design
- Green stormwater infrastructure for improving water quality
- Design and analysis of experiments and surveys
- Field and forage crop management and utilization, forage quality, pasture and grazing management, and pest/weed management
- Analytical procedures for testing soils and environmental samples

- Effects of nitrogen (from acid rain) on forest soils and bog ecosystems
- Interaction between soil manganese oxides and heavy metals
- Nutrient dynamics and management in agricultural systems
- Invasive earthworms
- Nematodes and microarthropods as environmental indicators for terrestrial and wetland soils
- Development of sustainable apple production systems
- Evaluation and identification of woody and herbaceous landscape plants adapted to environmental conditions in Vermont/New England
- Diversified horticulture which involves the planning, production, handling, and marketing of horticultural crops with emphasis on multiple, diverse crops produced with environmentally and economically sound techniques.

## DEGREES

Plant and Soil Science M.S. (p. 215)

Plant and Soil Science Ph.D. (p. 216)

## FACULTY

**Anderson, Collin;** Associate Research Professor, Department of Agriculture, Landscape, and Environment; PHD, University of Manitoba

**Bishop-von Wettberg, Eric;** Assistant Professor, Department of Agriculture, Landscape, and Environment; PHD, Brown University

**Bradshaw, Terence;** Research Assistant Professor, Department of Agriculture, Landscape, and Environment; PHD, University of Vermont

**Chen, Yolanda H.;** Associate Professor, Department of Agriculture, Landscape, and Environment; PHD, University of California Berkeley

**Darby, Heather Marie;** Extension Professor, Department of Extension - Programming and Faculty Support; PHD, Oregon State University

**Faulkner, Joshua;** Research Assistant Prof, Department of Extension - Programming and Faculty Support; PHD, Cornell University

**Gorres, Josef H.;** Associate Professor, Department of Agriculture, Landscape, and Environment; PHD, University of Manchester

**Grubinger, Vernon;** Extension Professor, Department of Extension - Programming and Faculty Support; PHD; Cornell University

**Hazelrigg, Ann;** Extension Assistant Professor, Department of Extension; PHD, University of Vermont; MS, Cornell University

**Hurley, Stephanie E.;** Associate Professor, Department of Agriculture, Landscape, and Environment; DDES, Harvard University

**Izzo, Victor;** Senior Lecturer, Department of Agriculture, Landscape, and Environment; PHD, University of Vermont

**Mendez, Victor E.;** Professor, Department of Agriculture, Landscape, and Environment; PHD, University of California Santa Cruz

**Merrill, Scott;** Research Assistant Professor, Department of Agriculture, Landscape, and Environment; PHD, Colorado State University

**Neher, Deborah;** Professor Emerita, Department of Agriculture, Landscape, and Environment; PHD, University of California Davis

**Parker, Bruce Lawrence;** Professor Emeritus, Department of Agriculture, Landscape, and Environment; PHD, Cornell University

**Skinner, Margaret;** Research Professor, Department of Agriculture, Landscape, and Environment; PHD, University of Vermont

**Starrett, Mark C.;** Associate Professor, Department of Agriculture, Landscape, and Environment; PHD, North Carolina State University-Raleigh

## PLANT AND SOIL SCIENCE M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The mission of the Department of Agriculture, Landscape, and Environment (formerly Plant and Soil Science) is to expand, integrate, and extend the knowledge of agricultural systems and environmental quality in plant/soil ecosystems affecting the people of Vermont, the region, and the world. The department will provide excellence in education, research, and extension that will foster environmentally, economically, and socially sound practices.

The department offers graduate programs leading to the Master of Science (M.S.) degree in all fields in plant science and soil science. A thesis, based on original research, is required for this degree. Completion of the requirements normally takes 2.5 years for the M.S. degree.

The department is composed of faculty representing the disciplines of agroecology, agronomy, entomology, horticulture, landscape design, plant pathology, and soil science. Research faculty are involved in studying plant, soil or insect interactions within environments managed for food, fiber, waste utilization, or for landscape purposes. The objectives of these studies are: (1) to develop fundamental knowledge of environmental impacts and interactions and (2) to apply knowledge to better manage systems and promote environmental health. Specifically, departmental projects have included:

- Biological control of insect pests – entomopathogenic fungi
- Integrated pest management (IPM) in greenhouse and field situations
- Agroecological practices in Vermont and international communities
- Ecological landscape design
- Green stormwater infrastructure for improving water quality
- Design and analysis of experiments and surveys
- Field and forage crop management and utilization, forage quality, pasture and grazing management, and pest/weed management
- Analytical procedures for testing soils and environmental samples

- Effects of nitrogen (from acid rain) on forest soils and bog ecosystems
- Interaction between soil manganese oxides and heavy metals
- Nutrient dynamics and management in agricultural systems
- Invasive earthworms
- Nematodes and microarthropods as environmental indicators for terrestrial and wetland soils
- Development of sustainable apple production systems
- Evaluation and identification of woody and herbaceous landscape plants adapted to environmental conditions in Vermont/New England
- Diversified horticulture which involves the planning, production, handling, and marketing of horticultural crops with emphasis on multiple, diverse crops produced with environmentally and economically sound techniques

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Science**

An undergraduate major in an appropriate agricultural, environmental, biological, or physical science. GREs are recommended but not required.

**Minimum Degree Requirements for the Degree of Master of Science**

Total Minimum Requirements	30
Up to 9 credits of graduate-level coursework may be eligible for transfer to meet the credit requirements	
A minimum of 15 credits in graded coursework in Agriculture, Landscape, and Environment and closely related fields, of which a minimum of 6 must be at the 6000-level	15-24
Remainder of credits in thesis research and seminar	6-15
Enrollment and satisfactory participation in 1 semester of departmental seminar	1
All master's students must take part in the department's undergraduate teaching program	

Students are required to engage in hypothesis driven scientific research. They are expected to document their research efforts in a thesis. They are expected to defend their research. The defense comprises a seminar open to members of the University community and an oral exam conducted by a committee of faculty.

**Comprehensive Examination**

Comprehensive examinations are typically taken after 1 year in residence. The decision on the type of comprehensive exam (written or oral) will be made by the major professor after consultation with the student. The comprehensive examination is not the same as an oral thesis defense and must be satisfactorily passed before defending the thesis.

**Requirements for Advancement to Candidacy for the Degree of Master of Science**

Satisfactory completion of 1 academic year of graduate study in the Department of Agriculture, Landscape, and Environment and a written or oral comprehensive examination.

**PLANT AND SOIL SCIENCE PH.D.**

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

**OVERVIEW**

The mission of the Department of Agriculture, Landscape, and Environment (formerly Plant and Soil Science) is to expand, integrate, and extend the knowledge of agricultural systems and environmental quality in plant/soil ecosystems affecting the people of Vermont, the region, and the world. The department will provide excellence in education, research, and extension that will foster environmentally, economically, and socially sound practices.

The department offers graduate programs leading to the Doctor of Philosophy (Ph.D.) in all fields in plant science and soil science. A dissertation, based on original research, is required for this degree. Completion of the requirements normally takes 3 to 4 years for the Ph.D. degree.

The Department is comprised of faculty representing the disciplines of agroecology, agronomy, entomology, horticulture, landscape design, plant pathology, and soil science. Research faculty are involved in studying plant, soil or insect interactions within environments managed for food, fiber, waste utilization, or for landscape purposes. The objectives of these studies are: (1) to develop fundamental knowledge of environmental impacts and interactions and (2) to apply knowledge to better manage systems and promote environmental health. Specifically, departmental projects have included:

- Biological control of insect pests – entomopathogenic fungi
- Integrated pest management (IPM) in greenhouse and field situations
- Agroecological practices in Vermont and international communities
- Ecological landscape design
- Green stormwater infrastructure for improving water quality
- Design and analysis of experiments and surveys
- Field and forage crop management and utilization, forage quality, pasture and grazing management, and pest/weed management
- Analytical procedures for testing soils and environmental samples
- Effects of nitrogen (from acid rain) on forest soils and bog ecosystems
- Interaction between soil manganese oxides and heavy metals
- Nutrient dynamics and management in agricultural systems
- Invasive earthworms
- Nematodes and microarthropods as environmental indicators for terrestrial and wetland soils



- Development of sustainable apple production systems
- Evaluation and identification of woody and herbaceous landscape plants adapted to environmental conditions in Vermont/New England
- Diversified horticulture which involves the planning, production, handling, and marketing of horticultural crops with emphasis on multiple, diverse crops produced with environmentally and economically sound techniques.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A Master of Science degree in an appropriate agricultural, environmental, biological, or physical science. GREs are recommended but not required.

Students admitted into Master of Science program in the Department may transfer to a Ph.D. program after 1 year. Students petition the Department's Graduate committee.

### Minimum Degree Requirements for the Degree of Doctor of Philosophy

Credit hours to be earned in partial fulfillment of the Ph.D. requirements	75
Up to 24 credits of graduate-level coursework may be eligible for transfer to meet the credit requirements	
Minimum graded course work credits in Agriculture, Landscape, and Environment and closely related disciplines (e.g. botany, chemistry, forestry, microbiology, biochemistry or geology); at least 9 credits must be at the 6000- or 7000-level.	30
Remainder in research credits and seminars	Variable
Satisfactory participation in department seminars during residency is required. Ph.D. students are required to enroll in at least 2 ALE seminar courses (non-graded) during their tenure at UVM.	2
Doctoral students must take part in the department's undergraduate teaching program and in outreach activities related to their research efforts. They are expected to teach for 2 semesters and conduct outreach for 2 semesters	

### Comprehensive Examination

Comprehensive examinations are typically taken after completion of the majority of all coursework. A written AND oral comprehensive examination must be passed by the candidate at least 6 months before the dissertation is submitted. It is the student's responsibility to schedule an examination time that is satisfactory for all committee members. The written comprehensive examination is taken first followed by the oral examination. The comprehensive examination is not the same as an oral dissertation defense and must be satisfactorily passed before defending the dissertation. A unanimous vote of approval by the members of the Studies Committee is required for the student to pass the preliminary oral examination. Approval may be conditional, depending upon completion of specified additional work. If the oral and or written comprehensive examination is not passed, the student is permitted to retake the examination once.

Failure to pass the second examination will result in dismissal from the graduate program.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Satisfactory completion of Comprehensive Examination and Dissertation Proposal.

## PLANT BIOLOGY

<https://www.uvm.edu/cals/plantbiology>

### OVERVIEW

The Plant Biology Department offers a Ph.D. that provides training in basic scientific research in diverse aspects of plant biology. These include physiology, developmental genetics, molecular regulation of gene expression, cell biology, plant-microbe interactions, ecological genomics, systematics and biogeography, and ecology of plant population and community dynamics. Information on specific faculty research programs may be found on the department's web page. The department also offers the project-based Field Naturalist M.S., which is a unique field-based experience that develops the potential of tomorrow's conservation leaders by emphasizing scientific integration, oral and written communication, and environmental problem solving.

### DEGREES

Field Naturalist (Plant Biology) M.S. (p. 147)

Plant Biology M.S. (p. 218) (Not currently accepting students)

Plant Biology Ph.D. (p. 218)

### FACULTY

**Barrington, David Stanley;** Professor Emeritus, Department of Plant Biology; PHD, Harvard University

**Beckage, Brian;** Professor, Department of Plant Biology; PHD, Duke University

**Delaney, Terrence Patrick;** Associate Professor, Department of Plant Biology; PHD, University of Washington Seattle

**Harris, Jeanne M.;** Professor, Department of Plant Biology; PHD, University of California San Francisco

**Keller, Stephen Robert;** Associate Professor, Department of Plant Biology; PHD, University of Virginia

**Lintilhac, Philip;** Research Associate Professor, Department of Plant Biology; PHD, University of California Berkeley

**Molofsky, Jane;** Professor, Department of Plant Biology; PHD, Duke University

**Paris, Catherine Ann;** Senior Lecturer Emerita, Department of Plant Biology; PHD, University of Vermont

**Preston, Jill C.;** Professor, Department of Plant Biology; PHD, University of Missouri

**Stratton, Donald Arthur;** Senior Lecturer, Department of Plant Biology; PHD, SUNY Stony Brook

**Testo, Weston;** Assistant Professor, Department of Plant Biology; PhD, University of Vermont

**Tierney, Mary Lauletta**; Associate Professor, Department of Plant Biology; PHD, Michigan State University

## FIELD NATURALIST (PLANT BIOLOGY) M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Field Naturalist Program is a unique field-based experience that develops the potential of future conservation leaders by emphasizing scientific integration, oral and written communication, and environmental problem solving. Students receive a solid grounding in field-related sciences and are trained to integrate scientific disciplines into a coherent whole at the landscape level. Students also develop competence in evaluating field sites from a number of perspectives and/or criteria, translating scientific insights into ecologically sound decisions, and communicating effectively to a wide range of audiences.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science, Field Naturalist Option

- Sustained interest and engagement in the environment
- A track record of academic and professional achievement in science or environment
- At least some coursework in the natural sciences
- At least 3 years of job, professional, or life experience after college

#### Minimum Degree Requirements

All students must successfully complete a total of 30 credit hours including a set of core courses in the field sciences and professional writing as well as elective courses in the life sciences, earth sciences, and ecology, to be chosen in consultation with the program director and studies committee. At least 6 credits must be at the 6000-level or above. Satisfactory completion of an oral comprehensive examination is required. A Field Naturalist student's degree culminates in satisfactory completion of a field project for a sponsoring organization that includes a professional report, a literature review, two oral presentations, and a journal publication or a popular article for a general audience.

#### Comprehensive Examination

An oral examination takes place in the student's second year. During this examination the student identifies, inventories and assesses the pieces, patterns, and processes of a previously unvisited field site, then presents findings in a manner that would be meaningful to staff, officers, and scientists of a professional conservation organization.

#### Requirements for Advancement to Candidacy for the Degree of Master of Science

Satisfactory completion of an oral comprehensive examination.

## PLANT BIOLOGY M.S.

The Plant Biology department is not currently accepting students into the M.S. degree program.

## PLANT BIOLOGY PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

Ph.D. students in the Department of Plant Biology have the opportunity to join research programs covering a diverse set of disciplines including physiology, developmental genetics, molecular regulation of gene expression, cell biology, plant-microbe interactions, ecological genomics, systematics and biogeography, and ecology of plant population and community dynamics. Graduate students become members of a collegial academic community where they are trained to become cutting-edge researchers and effective educators in the plant sciences. In addition, the University of Vermont has a vigorous research community in the life sciences, allowing students to interact and collaborate with colleagues across campus.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A bachelor's or master's degree in Biology, Chemistry, or a related field

Some research experience

Clarity of goals for graduate school

#### Minimum Degree Requirements

All students must successfully complete a total of 75 credits, including a minimum of 30 credits of program-related coursework and 20 credits of dissertation research. At least 9 credits of coursework must be at the 6000-level or above. First-year students participate in at least two rotations in research laboratories before committing to one laboratory for completion of dissertation research. Satisfactory completion of the written and oral components of a comprehensive examination are required for advancement to candidacy. A student's Ph.D. degree is culminated by satisfactory completion of a dissertation, a public seminar, and a private defense with their studies committee. In addition to research, all students must participate in a minimum of two courses of supervised teaching.

#### Comprehensive Examination

A written and oral examination is completed by end of the student's second year in the program. The examination requirements can be met in two different ways:

1. The written exam consists of questions from each of the student's committee members, and after successful completion an oral exam is scheduled.

2. The written exam takes the form of a grant proposal; the oral exam starts out focusing on the proposal and then broadens out to be more comprehensive.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

Satisfactory completion of the written and oral components of a comprehensive examination are required for advancement to candidacy.

## PSYCHOLOGY

<http://www.uvm.edu/~psych/>

### OVERVIEW

The Master of Arts in Experimental or Clinical Psychology is aimed at students who wish to pursue a doctorate and want to strengthen their credentials to be competitive for doctoral programs, students who wish to pursue careers that require research skills, or students who wish to gain an understanding of research as it pertains to intervention and prevention.

The Ph.D. program in Experimental Psychology admits students in 4 broad areas of concentration ("clusters"): Biobehavioral Psychology; Developmental Psychology; Social Psychology; and Behavioral Psychopharmacology.

The Ph.D. program in Clinical Psychology places equal emphasis on research and clinical training. The Clinical Psychology program is fully accredited by the American Psychological Association.

The Ph.D. program in Clinical/Developmental Psychology provides students with training in the area of developmental psychopathology. Students completing the Clinical/Developmental degree meet the requirements of the Clinical program and those of the Developmental cluster in the Experimental program.

Further information about graduate programs can be obtained electronically from the Department of Psychological Science website, which contains details of requirements, funding opportunities, clinical and research facilities, specialty areas, ongoing research, and faculty.

### DEGREES

Psychology AMP (p. 220)

Psychology M.A. (p. 221)

Psychology Ph.D. (p. 223)

### FACULTY

**Abaied, Jamie L.;** Associate Professor, Department of Psychological Science; PHD, University of Illinois Urbana-Champaign

**Achenbach, Thomas Max;** Professor, Department of Psychiatry; PHD, University of Minnesota Twin Cities

**Althoff, Robert;** Associate Professor, Department of Psychiatry; PHD, University of Illinois Urbana-Champaign

**Bouton, Mark Earhart;** Professor, Department of Psychological Science; PHD, University of Washington

**Brieant, Alexis;** Assistant Professor, Department of Psychological Science; PhD, Virginia Tech

**Burt, Keith B.;** Associate Professor, Department of Psychological Science; PHD, University of Minnesota Twin Cities

**Cepeda-Benito, Antonio;** Professor, Department of Psychological Science; PHD, Purdue University

**Dumas, Julie Anna;** Professor, Department of Psychiatry; PHD, University of North Carolina

**Falls, William A.;** Dean, College of Arts and Sciences, Professor, Department of Psychological Science; PHD, Yale University

**Gaalema, Diann E.;** Assistant Professor, Department of Psychiatry; PHD, Georgia Institute of Technology

**Garavan, Hugh P.;** Professor, Department of Psychiatry; PHD, Bowling Green State University

**Green, John Thomas;** Professor, Department of Psychological Science; PHD, Temple University

**Hammack, Sayamwong E.;** Professor, Department of Psychological Science; PHD, University of Colorado

**Harder, Valerie Susan;** Assistant Professor, Department of Pediatrics; PHD, Johns Hopkins University

**Heil, Sarah H.;** Professor, Department of Psychiatry; PHD, Dartmouth College

**Higgins, Stephen Thomas;** Professor, Department of Psychiatry; PHD, University of Kansas

**Hoza, Betsy;** Professor, Department of Psychological Science; PHD, University of Maine

**Hughes Lansing, Amy;** Assistant Professor, Department of Psychological Science, PHD, University of Utah

**Kennedy, Kathleen B.;** Clinical Associate Professor, Department of Psychological Science; PHD, University of Vermont

**Klemperer, Elias;** Assistant Professor, Department of Psychiatry, PHD, University of Vermont

**Lafko Breslend, Nicole;** Research Assistant Professor, Department of Psychological Science; PHD, University of Vermont

**Murray-Close, Dianna Katharine;** Professor, Department of Psychological Science; PHD, University of Minnesota Twin Cities

**Peck, Kelly;** Assistant Professor, Department of Psychiatry; PHD, University of Mississippi

**Pinel, Elizabeth C.;** Professor, Department of Psychological Science; PHD, University of Texas Austin

**Potter, Alexandra S.;** Associate Professor, Department of Psychiatry; PHD, University of Vermont

**Price, Matthew;** Professor, Department of Psychological Science; PHD, Georgia State University

**Rawson, Richard;** Research Professor, Department of Psychiatry; PHD, University of Vermont

**Rellini, Alessandra;** Associate Professor, Department of Psychological Science; PHD, University of Texas Austin

**Rohan, Kelly Joanna;** Professor, Department of Psychological Science; PHD, University of Maine

**Schermerhorn, Alice C.;** Associate Professor, Department of Psychological Science; PHD, University of Notre Dame

**Shoulberg, Erin K.;** Research Assistant Professor, Department of Psychological Science; PHD, University of Vermont

**Sigmon, Stacey C.;** Associate Professor, Department of Psychiatry; PHD, University of Vermont



**Stickle, Timothy R.;** Associate Professor, Department of Psychological Science; PHD, University of Arizona  
**Thraillkill, Eric A.;** Research Assistant Professor, Department of Psychological Science; PHD, Utah State University  
**Todd, Travis;** Research Assistant Professor, Department of Psychological Science, PHD, University of Vermont  
**Toufexis, Donna J.;** Associate Professor, Department of Psychological Science; PHD, McGill University  
**Wood, Helen;** Clinical Associate Professor, Department of Psychological Sciences; Doctorate in Clinical Psychology, Canterbury Christ Church University

**PSYCHOLOGY AMP**

All students must meet the Requirements for the Accelerated Master’s Degree Pathway (p. 269)

**OVERVIEW**

The Accelerated Master’s Degree Pathway in Psychology can be earned in one additional year after the Bachelor’s degree. Students apply to the Accelerated Master’s Entry Pathway in Psychology in their junior year and are accepted prior to their senior year. A thesis-based and a non-thesis based option is offered. For students who wish to pursue research-related careers and/or increase their competitiveness for Ph.D. programs, the thesis option is recommended. For students who need a M.A. for a non-research related career, for example in education, law, or business, the non-thesis option is recommended.

For the thesis-based option, applicants are required to identify a thesis mentor among the faculty in the Department of Psychological Science, and to complete 3 or more undergraduate research credits with the prospective mentor prior to application.

Following formal admission to the Accelerated Master’s Entry Pathway, up to 9 credits of subsequent Psychology (PSYS) coursework approved for graduate credit can be taken in the senior year and counted towards both the B.A./B.S. and the M.A. (see course requirements for the M.A. in Experimental Psychology and for the M.A. in Clinical Psychology).

Learning goals for Accelerated Master’s Pathway in Psychology students are:

- Development of a foundational understanding in the area of research specialization.
- Development of effective skills in communicating Psychological Science.
- Thesis option: Development of strong research skills

**NOTE:** Our goal is not to train licensed therapists pursuing a career in clinical practice. Hence, this program’s curriculum does not provide any supervised practicum or internship hours necessary for licensure. Students interested in a career as a licensed therapist should pursue that goal via the Master’s program in Counseling through the College of Education and Social Services.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of MASTER OF SCIENCE FOR ACCELERATED MASTER'S STUDENTS**

A major or its equivalent in undergraduate psychology is recommended, with a recommended minimum overall GPA of 3.3 and a GPA of 3.5 in the major. For the thesis-based option, applicants to the concentration in Experimental Psychology should have coursework in experimental psychology, and applicants to the concentration in Clinical Psychology should have completed abnormal psychology (psychopathology). 3 letters of recommendation are required, and letter-writers should comment on the readiness of the applicant for a graduate program. For the thesis-based option, one of the 3 letters of recommendation must be from the prospective faculty mentor and there must be completion of 3 or more undergraduate research credits with the prospective mentor prior to admission. The Graduate Record Examination is not required.

While students are in the undergraduate phase of their AMP, the graduate curriculum is listed as a secondary curriculum in their student record. After graduation with the B.A. or B.S. degree, the M.A. curriculum becomes the primary curriculum. No more than 9 credits of graduate coursework taken prior to completion of the B.A./B.S. will count towards the graduate degree. No exceptions are made.

**Minimum Degree Requirements**

Students pursue the thesis-based option with either a Experimental Psychology or Clinical Psychology concentration. The non-thesis based option does not have a concentration. For students pursuing the thesis-based option in Experimental Psychology, 9-15 credits must be accumulated in Master’s Thesis research, in addition to successful defense of an empirical Master’s Thesis. For students pursuing the thesis-based option in Clinical Psychology, 9 credits must be accumulated in Master’s Thesis research, in addition to successful defense of an empirical Master’s Thesis. Detailed information on courses of study is available on the department website.

**THESIS-BASED OPTION: EXPERIMENTAL PSYCHOLOGY CONCENTRATION**

CATEGORY A: RESEARCH (6 credits)		
1 of the following combinations:		
PSYS 6000 & PSYS 6005	Adv Statistical Methods I and Adv Statistical Methods II	
PSYS 6010 & PSYS 6000	Seminar in Psyc Research Meth and Adv Statistical Methods I	
CATEGORY B: EXPERIMENTAL (minimum of 6 credits)		
At least 2 of the following:		
PSYS 6400	Biobehavioral Proseminar	
PSYS 6500	Proseminar in Exp Social Psych	
PSYS 6600	Developmental Proseminar	



CATEGORY C: ELECTIVES (minimum of 3 credits)		
At least 1 additional 6000-level Psychology course.		
CATEGORY D: MASTER'S THESIS RESEARCH		
PSYS 6391	Master's Thesis Research	9-15

**THESIS-BASED OPTION: CLINICAL PSYCHOLOGY CONCENTRATION**

CATEGORY A: RESEARCH (6 credits)		
1 of the following combinations:		
PSYS 6000 & PSYS 6005	Adv Statistical Methods I and Adv Statistical Methods II	
PSYS 6010 & PSYS 6000	Seminar in Psyc Research Meth and Adv Statistical Methods I	
CATEGORY B: CLINICAL (minimum of 9 credits)		
At least 1 course from each pair below is required		
PSYS 6705	Child Psychopathology	3
or PSYS 6720	Adult Psychopathology	
PSYS 6715	Behavior Therapy: Children	3
or PSYS 6730	Adult Cognitive & Behav Thrpy	
PSYS 6710	Child & Adolescent Psyc Assess	3
or PSYS 6725	Adult Psychological Assessment	
CATEGORY C: ELECTIVES (6 credits)		
2 additional 6000-level Psychology courses.		6
Students may substitute 1 of the following 2 courses for 1 of the additional 6000-level Psychology courses:		
PSYS 6990	Special Topics (Advanced Fit Kids)	
PSYS 6990	Special Topics (Advanced Fit Kids: Special Populations)	
CATEGORY D: MASTER'S THESIS RESEARCH		
PSYS 6391	Master's Thesis Research	6-9

**NON-THESIS OPTION**

CATEGORY A: STATISTICS AND RESEARCH METHODS (6 CREDITS)		
1 of the following combinations:		
PSYS 6000 & PSYS 6005	Adv Statistical Methods I and Adv Statistical Methods II	
PSYS 6010 & PSYS 6000	Seminar in Psyc Research Meth and Adv Statistical Methods I	
CATEGORY B: ELECTIVES (24 CREDITS)		
8 additional 6000-level Psychology courses		

**Comprehensive Examination**

For the thesis-based option, a written thesis proposal and an oral examination serves as the comprehensive examination. For the non-thesis option, a written examination based on coursework serves as the comprehensive examination. The Comprehensive Examination requirement should be completed by the end of the first semester following completion of the bachelor's degree.

**Requirements for Advancement to Candidacy for the Degree of (name of degree here)**

Satisfactory completion of the comprehensive examination.

**PSYCHOLOGY M.A.**

All Experimental and Clinical PHD students must meet the Requirements for the Master's Degree (p. 270) prior to advancement to candidacy for the degree of Doctor of Philosophy.

**OVERVIEW**

The terminal Master of Arts in Experimental or Clinical Psychology is aimed at students who wish to pursue a doctorate and want to strengthen their credentials to be competitive for doctoral programs, students who wish to pursue careers that require research skills, or students who wish to gain an understanding of research as it pertains to intervention and prevention. A thesis-based and a non-thesis based option is offered. For students who wish to pursue research-related careers and/or increase their competitiveness for PhD programs, the thesis option is recommended. For students who need a Master's degree for a non-research related career, for example in education, law, or business, the non-thesis option is recommended.

For the thesis-based option, applicants are required to identify a thesis mentor among the faculty in the Department of Psychological Science.

Learning goals for Master of Arts in Psychology students are:

- Development of a foundational understanding in the area of research specialization.
- Development of effective skills in communicating Psychological Science.
- Thesis option: Development of strong research skills

NOTE: It is not the program's goal to train licensed therapists pursuing a career in clinical practice. Hence, this program's curriculum does not provide any supervised practicum or internship hours necessary for licensure. Students interested in a career as a licensed therapist should pursue that goal via the Master's program in Counseling through the College of Education and Social Services.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Arts**

A major or its equivalent in undergraduate psychology is recommended, with a recommended minimum overall GPA of 3.3 and a GPA of 3.5 in the major. For the thesis-based option, applicants to the concentration in Experimental Psychology should

have coursework in experimental psychology, and applicants to the concentration in Clinical Psychology should have completed abnormal psychology. 3 letters of recommendation are required, and letter-writers should comment on the readiness of the applicant for a graduate program. For the thesis-based option, 1 of the 3 letters of recommendation must be from the prospective faculty mentor and there must be completion of 3 or more undergraduate research credits with the prospective mentor prior to admission. Satisfactory scores on the Graduate Record Examination are required. Subject scores (Psychology) are not required but are strongly recommended for students applying without a psychology major. An interview is required of top applicants.

**Minimum Degree Requirements**

Students pursue the thesis-based option with either a Experimental Psychology or Clinical Psychology concentration. The non-thesis based option does not have a concentration. For students pursuing the thesis-based option in Experimental Psychology, 9-15 credits must be accumulated in Master’s Thesis research, in addition to successful defense of an empirical Master’s Thesis. For students pursuing the concentration in Clinical Psychology, 9 credits must be accumulated in Master’s Thesis research, in addition to successful defense of an empirical Master’s Thesis. Detailed information on courses of study is available on the department website.

**THESIS-BASED OPTION: EXPERIMENTAL PSYCHOLOGY CONCENTRATION**

CATEGORY A: RESEARCH (6 credits)		
1 of the following combinations:		
PSYS 6000 & PSYS 6005	Adv Statistical Methods I and Adv Statistical Methods II	
PSYS 6010 & PSYS 6000	Seminar in Psyc Research Meth and Adv Statistical Methods I	
CATEGORY B: EXPERIMENTAL (minimum of 6 credits)		
At least 2 of the following:		
PSYS 6400	Biobehavioral Proseminar	
PSYS 6500	Proseminar in Exp Social Psych	
PSYS 6600	Developmental Proseminar	
CATEGORY C: ELECTIVES (minimum of 3 credits)		
At least 1 additional 6000-level Psychology course		3
CATEGORY D: MASTER'S THESIS RESEARCH		
PSYS 6391	Master's Thesis Research	9-15

**THESIS-BASED OPTION: CLINICAL PSYCHOLOGY CONCENTRATION**

CATEGORY A: RESEARCH (6 credits)		
1 of the following combinations:		
PSYS 6000 & PSYS 6005	Adv Statistical Methods I and Adv Statistical Methods II	

PSYS 6010 & PSYS 6000	Seminar in Psyc Research Meth and Adv Statistical Methods I	
CATEGORY B: CLINICAL (minimum of 9 credits)		
At least 1 course from each pair below is required:		
PSYS 6705	Child Psychopathology	3
or PSYS 6720	Adult Psychopathology	
PSYS 6715	Behavior Therapy: Children	3
or PSYS 6730	Adult Cognitive & Behav Thrpy	
PSYS 6710	Child & Adolescent Psyc Assess	3
or PSYS 6725	Adult Psychological Assessment	
CATEGORY C: ELECTIVES (6 credits)		
2 additional 6000-level Psychology courses.		6
Students may substitute 1 of the following 2 courses for 1 of the additional 6000-level Psychology courses:		
PSYS 6990	Special Topics (Advanced Fit Kids: Applied Res)	
PSYS 6990	Special Topics (Advanced Fit Kids: Special Populations)	
CATEGORY D: MASTER'S THESIS RESEARCH		
PSYS 6391	Master's Thesis Research	6-9

**NON-THESIS OPTION**

CATEGORY A: STATISTICS AND RESEARCH METHODS (6 credits)		
1 of the following combinations:		
PSYS 6000 & PSYS 6005	Adv Statistical Methods I and Adv Statistical Methods II	
PSYS 6010 & PSYS 6000	Seminar in Psyc Research Meth and Adv Statistical Methods I	
CATEGORY B: ELECTIVES (24 credits)		
8 additional 6000-level Psychology courses		

**Comprehensive Examination**

For the thesis-based option, a written thesis proposal and an oral examination serves as the comprehensive examination. For the non-thesis option, a written examination based on coursework serves as the comprehensive examination. The Comprehensive Examination requirement should be completed by the end of the first semester of the second year in the program.

**Requirements for Advancement to Candidacy for the Degree of Master of Arts**

Satisfactory completion of the comprehensive examination.

## PSYCHOLOGY PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275).

### OVERVIEW

The Ph.D. program in Experimental Psychology admits students in 4 broad areas of concentration ("clusters"): Biobehavioral Psychology; Developmental Psychology; Social Psychology; and Behavioral Psychopharmacology.

The Ph.D. program in Clinical Psychology places equal emphasis on research and clinical training. The Clinical Psychology program is fully accredited by the American Psychological Association.

The Ph.D. program in Clinical/Developmental Psychology provides students with training in the area of developmental psychopathology. Students completing the Clinical/Developmental degree meet the requirements of the Clinical program and those of the Developmental cluster in the Experimental program.

Additional clinical, research, and adjunct faculty supervise students in clinical and research placements.

Further information about graduate programs can be obtained electronically from the Department of Psychological Science website, which contains details of requirements, specialty areas, ongoing research, and faculty.

Applicants interested in the Ph.D. must apply for the Ph.D. degree only. Students whose goal is a terminal master's degree should apply through the M.A. program.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

A major or its equivalent in undergraduate psychology is recommended. All applicants must have completed coursework including introductory psychology, statistics, and research methods. Applicants to the Experimental program should have coursework in experimental psychology, and applicants to the Clinical program should have completed abnormal psychology. The Graduate Record Examination is not required or accepted. Applicants must submit a writing sample of a research project or paper on which they were the primary author. An interview is required of top applicants.

#### Minimum Degree Requirements for the Degree of Doctor of Philosophy

The Experimental program requires 75 credits and the Clinical program requires a minimum of 80 credits. A minimum of 20 credits must be accumulated in dissertation research and the remainder in 6000-level course credits from the psychology curriculum, or acceptable courses at 6000-level from other curricula. The Clinical Ph.D. program requires satisfactory completion of a 1-year pre-doctoral internship. Detailed information on courses of study is available on the department website. Satisfactory performance on the department final oral examination (dissertation defense) is required. There is no foreign language requirement. Although the

requirement differs, both programs have a required master's and a required preliminary examination.

### Comprehensive Examination

In the Experimental Psychology program, the comprehensive exam ("preliminary exam") is taken following the successful defense of a master's thesis. The examination consists of a 2-day written examination on select primary literature within the student's broad research area. The details of the examination are decided upon by a committee of faculty members within the student's research area.

In the Clinical Psychology program, the comprehensive exam is proposed following the successful defense of a master's thesis. The examination consists of either a literature review (or meta-analysis) on a topic relevant to the research program of the student or an NRSA F31 application submitted to the National Institutes of Health. Both options involve a proposal and an oral defense. Students in the Clinical/Developmental program complete the comprehensive exams for both the clinical and developmental programs.

### Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy

For the Experimental program, satisfactory completion of the minimum degree requirements for the Master of Arts degree or equivalent; for the Clinical program, satisfactory performance on the Ph.D. comprehensive examination.

## PUBLIC ADMINISTRATION

<http://www.uvm.edu/~mpa/>

### OVERVIEW

The Master of Public Administration Program at the University of Vermont joins vigorous study of the foundations of public administration with the practice of public administration in the real world. Vermont's small size, open local and state government, and wealth of nonprofit organizations make for an ideal environment in which to directly engage with the public administration field. More information on the M.P.A. program can be found on the Master of Public Administration website.

### DEGREES

Public Administration AMP (p. 224)  
Public Administration M.P.A. (p. 225)

### FACULTY

**Aiyar, Anaka**; Assistant Professor, Department of Community Development and Applied Economics; PhD, University of California-Riverside

**Ament, Joseph**; Assistant Professor, Department of Community Development and Applied Economics; PhD, University of Vermont

**Conner, David S.**; Professor, Department of Community Development and Applied Economics; PHD, Cornell University

**Farley, Joshua C.**; Professor, Department of Community Development and Applied Economics; PHD, Cornell University

**Heiss, Sarah Noel**; Associate Professor, Department of Community Development and Applied Economics; PHD, Ohio University

**Koliba, Christopher J.;** Professor Emeritus, Department of Community Development and Applied Economics; PHD, Syracuse University

**Kolodinsky, Jane Marie;** Professor Emeritus, Department of Community Development and Applied Economics; PHD, Cornell University

**Mays, Kate;** Assistant Professor, Department of Community Development and Applied Economics; PhD, Boston University

**McMahon, Edward;** Adjunct Associate Professor, Department of Community Development and Applied Economics; EDD, University of Vermont

**McRae, Glenn;** Adjunct Lecturer, Department of Community Development and Applied Economics; PHD, The Union Institute & University

**Reynolds, Travis;** Associate Professor, Department of Community Development and Applied Economics, PHD, University of Washington

**Shrum, Trisha R.;** Assistant Professor; Department of Community Development and Applied Economics; PHD, Harvard University – John F. Kennedy School of Government

**Tobin, Daniel;** Associate Professor, Department of Community Development and Applied Economics; PHD, Pennsylvania State University

**Zia, Asim;** Professor, Department of Community Development and Applied Economics; PHD, Georgia Institute of Technology

## PUBLIC ADMINISTRATION AMP

All students must meet the Requirements for the Accelerated Master’s Degree Pathway (p. 269)

### OVERVIEW

The Accelerated Master’s Pathway in Public Administration (AMP-PA) offers University of Vermont students the opportunity to secure a sound undergraduate and graduate program of study in five rather than a minimum of six years. The program closely integrates both programs of study, and enhances competitiveness in a marketplace stressing broad undergraduate and focused professional graduate education. The AMP-PA welcomes students majoring in administrative, behavioral, health, environmental, organizational, social science and related disciplines requiring graduate work in administration, or planning and policy capacities in the public service. Application to the program is typically made during a student's junior year. More information on the AMP-PA can be found on the Master of Public Administration website. Inquiries can be made through email [mpa@uvm.edu](mailto:mpa@uvm.edu) or by phone (802) 656-0009.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Public Administration for Accelerated Students

The Accelerated Master’s Entry Pathway requires that students fulfill the same entrance requirements as for all candidates for the Master of Public Administration (MPA) Program and be accepted in order to matriculate and advance to candidacy. The following criteria must be met to gain admission to the AMP-PA:

- A cumulative grade point average of 3.0 at the beginning of the second semester the candidate's junior year
- Three letters of recommendation attesting to the candidate’s academic performance
- A strong motivation and academic potential for graduate work articulated in a statement of purpose

Required academic prerequisites, which include course work in economics, statistics, and American government, must also be completed. These prerequisites can be completed at any accredited institution of higher education. Students must complete at least one of the prerequisites prior to enrolling in the AMP-PA. The remaining prerequisites must be completed within the first year of enrollment in the AMP-PA.

Applicants to the AMP-PA must submit the standard Graduate College Application form. Completed applications will be reviewed in the month of May and a formal decision on admission will be rendered by the PA faculty by no later than May 15 of each year to afford potential new AMP-PA students the opportunity to enroll in Summer Session.

Following formal Graduate College admission to the Accelerated Master's Pathway, up to 9 credits of approved graduate course work may be taken that may be counted toward both the undergraduate and graduate degree requirements.

#### Minimum Degree Requirements

Successful completion of 36 credits, including:

Core Courses:		
PA 6010	Foundations of Public Admin	3
PA 6020	Org Theory & Behavior	3
PA 6030	Research & Evaluation Methods	3
PA 6050	Public and Nonprofit Budgeting	3
PA 6060	Policy Systems	3
PA 6260	Community Economic Development	3
PA 6750	Public Administration Capstone	3
PA 6991	Internship	3 or 6
Total Credits		24
An approved sequence of elective courses which may include up to twelve credits of course work from approved disciplines related to public administration		12

The Capstone is designed to provide M.P.A. students with a summative experience that ties learning competencies to evidence drawn from their course of study. This is done through the development of a professional portfolio. This course is required for all M.P.A. students as it also incorporates the spirit of the Comprehensive Exam within the curriculum. Students in their final



spring semester of the program are eligible to take this. This course counts as the “comprehensive exam” for the M.P.A. at UVM.

The Internship experience is a key opportunity to put into practice the concepts and theories of public administration. It is critical in gaining experience, building credentials and networking for future professional opportunities. A three-credit internship is required of all students, and students may apply up to 6 credits of internship experience toward the degree.

A 6-credit thesis option is also available to all students and strongly recommended for students interested in continuing on to a Ph.D. A student doing a thesis selects a 3-member thesis review committee to evaluate their work. Students who would like to pursue this option should talk to their assigned advisor upon entering the program to allow plenty of time for the planning and writing of a thesis. Students who choose the thesis option are also required to complete the professional portfolio, but they are not required to enroll in the Capstone course.

### Comprehensive Examination

The Comprehensive Examination requirement is met when a student completes the Capstone during their final spring semester. The Capstone is designed to provide M.P.A. students with a summative experience that ties learning competencies to evidence drawn from their course of study.

### Requirements for Advancement to Candidacy for the Degree of Master of Public Administration

Thirty six (36) academic credits are needed (12 courses) to earn an M.P.A. degree. These eight courses are required core courses:

- PA 6010 Foundations of Public Administration
- PA 6020 Organizational Theory and Behavior
- PA 6030 Research and Evaluation Methods
- PA 6050 Public and Non-Profit Budgeting
- PA 6060 Policy Systems
- PA 6260 Community and Economic Development
- PA 6750 M.P.A. Capstone
- PA 6991 Internship

Students, with guidance from their advisor, select additional courses within the M.P.A. program or other academic units at the University of Vermont to round out their academic experience. While the M.P.A. Program at UVM does not offer explicit specializations, a student may pursue courses with a common thread or focus and can tailor their course selections to work toward that focus. Students may also choose to pursue a Certificate of Graduate Studies as an additional credential to fulfill elective requirements.

## PUBLIC ADMINISTRATION M.P.A.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

The Master of Public Administration (M.P.A.) Program at the University of Vermont joins vigorous study of the foundations of public administration with the practice of public administration in the real world. Vermont's small size, open local and state government, and wealth of nonprofit organizations make for an ideal environment in which to directly engage with the public administration field. More information on the M.P.A. program can be found on the Master of Public Administration website. Inquiries can be made through email: [mpa@uvm.edu](mailto:mpa@uvm.edu) or by phone (802) 656-0009.

### Mission

The Master of Public Administration Program is housed within the Department of Community Development and Applied Economics at the University of Vermont. The UVM M.P.A. Program inspires, equips, and elevates action-oriented leaders with the attitude, knowledge, and skills needed to foster a resilient sustainable society by drawing on the traditions and innovative spirit of Vermont communities.

### Traditions

The M.P.A. program at UVM capitalizes on these unique traditions that have direct implications to Vermont and beyond to the public administration needs of a changing nation and world.

- The recognition and importance of community building
- The tradition of grassroots democracy
- A history of strong local governance with citizen input
- A record of fiscal conservatism combined with "progressive" positive change
- A citizen legislature with limited staff support
- An emphasis on efficiency, effectiveness, accountability, and sustainability
- Administrators serving their publics as "reflective practitioners"
- A history of cooperation between private and public sectors for the public good
- A vigorous non-profit sector, supported by citizens and organizations
- A deep commitment to inclusion and cultural diversity

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Public Administration

- A sound academic record, including a baccalaureate degree from an accredited undergraduate institution
- Three letters of recommendation attesting to the candidate's academic potential for graduate work and motivation for pursuing the M.P.A.
- Resume or Curriculum Vitae
- Past experience in public service will be considered.
- Persons currently employed in administrative positions are encouraged to apply.
- Completion of these prerequisite courses: economics, American government, and statistics. Students must complete at least one of

the prerequisites prior to enrollment. The remaining prerequisites must be completed within the first semester of enrollment.

- For international students whose native language is not English or who have not completed undergraduate degrees in English, scores from the Test of English as a Foreign Language (TOEFL), the English Language Testing System (IELTS), or Duolingo must be submitted. Institution code for test scores for UVM is 3920.

**Minimum Degree Requirements**

Successful completion of 36 credits, including:

Core Courses:		
PA 6010	Foundations of Public Admin	3
PA 6020	Org Theory & Behavior	3
PA 6030	Research & Evaluation Methods	3
PA 6050	Public and Nonprofit Budgeting	3
PA 6060	Policy Systems	3
PA 6260	Community Economic Development	3
PA 6750	Public Administration Capstone	3
PA 6991	Internship	3 or 6
An approved sequence of elective courses which may include up to 12 credits of course work from approved disciplines related to public administration		12

The Capstone is designed to provide M.P.A. students with a summative experience that ties learning competencies to evidence drawn from their course of study. This is done through the development of a professional portfolio. This course is required for all M.P.A. students as it also incorporates the spirit of the Comprehensive Exam within the curriculum. Students in their final spring semester of the program are eligible to take this. This course counts as the “comprehensive exam” for the Master of Public Administration at UVM.

**INTERNSHIP**

The Internship experience is a key opportunity to put into practice the concepts and theories of public administration. It is critical in gaining experience, building credentials and networking for future professional opportunities. A 3-credit internship is required of all students, and students may apply up to 6 credits of internship experience toward the degree.

**THESIS OPTION**

A 6-credit thesis option is also available to all students and strongly recommended for students interested in continuing on to a Ph.D. A student doing a thesis selects a 3 member thesis review committee to evaluate their work. If this is an option you would like to pursue, talk to your assigned advisor upon entering the program to allow plenty of time for the planning and writing of a thesis. Students enrolled in the thesis option must take 6 credits of PA 6391, which are counted towards the 36-credit requirement. Students who choose the thesis

option are also required to complete the professional portfolio, but they are not required to enroll in the Capstone course.

**Comprehensive Examination**

The Comprehensive Examination requirement is met when a student completes the Capstone during their final spring semester. The Capstone is designed to provide M.P.A. students with a summative experience that ties learning competencies to evidence drawn from their course of study.

**Requirements for Advancement to Candidacy for the Degree of Master of Public Administration**

36 academic credits are needed (12 courses) to earn an M.P.A. degree. These 8 courses are required core courses:

- PA 6010 Foundations of Public Administration
- PA 6020 Organizational Theory and Behavior
- PA 6030 Research and Evaluation Methods
- PA 6050 Public and Non-Profit Budgeting
- PA 6060 Policy Systems
- PA 6260 Community and Economic Development
- PA 6750 M.P.A. Capstone
- PA 6991 Internship

Students, with guidance from their advisor, select additional courses within the M.P.A. program or other academic units at the University of Vermont to round out their academic experience. A full-time student will finish the M.P.A. Program course work in 2 academic years, and a part-time student, between 2 - 5 calendar years. While the M.P.A. Program at UVM does not offer explicit specializations, a student may pursue courses with a common thread or focus and can tailor their course selections to work toward that focus. Students may also choose to pursue a Certificate of Graduate Studies as an additional credential to fulfill elective requirements.

**PUBLIC HEALTH**

<https://www.uvm.edu/publichealth/>

**OVERVIEW**

The University of Vermont Program in Public Health is an innovative, online, interdisciplinary, accredited Public Health Program offering the Master of Public Health (M.P.H.) degree and Certificates of Graduate Study. The program is designed as a collaboration of disciplines, through its faculty and community of students, that is both academic and applicable to health needs of actual populations, in both health care and community settings. Graduates will experience a comprehensive foundation of population health sciences to prepare them as they enter health care fields, public health practice, or further advanced study in public health and related sciences.

The UVM public health program offers a generalist M.P.H. degree or an M.P.H. with a concentration in Global Health Leadership. All graduates, regardless of concentration, will complete sufficient course work to attain depth and breadth in the 6 core areas of public health knowledge (Public Health and Health Policy, Biostatistics,

Epidemiology, Environmental Health Sciences, Health Policy and Management, and Social and Behavioral Sciences), as well as interdisciplinary/cross-cutting areas. All graduate professional public health degree students will develop skills in basic public health concepts and demonstrate the skills and integration of knowledge, and application of these concepts through a culminating project experience.

The University of Vermont Public Health Program offers 4 online Certificates of Graduate Study (CGS): Public Health, Global and Environmental Health, Epidemiology, and Health Care Management and Policy, and 8 Micro-Certificates of Graduate Study (mCGS): Public Health, Public Health Informatics, Climate Change and Human Health, Epidemiology, Global Health, Health Care Management and Policy, Health Equity, and Health Policy and Law. Each CGS is a concise, 6-course curriculum that introduces students to the program area and each mCGS is a focused 3-course curriculum. Completing any CGS or mCGS will provide students with competency in core areas of public health as well as 9 to 18 applicable credits for which the grade received was a B or higher should they decide to pursue the M.P.H. degree at UVM.

After successful completion students will be prepared to:

1. Practice in a changing health care environment that requires accountability for the health of entire populations and skills to prevent illness and promote health.
2. Engage in public health practice, with knowledge and skills needed for effective participation in work of government public health agencies or non-profit health-related organizations.
3. Apply knowledge and skills from a strong foundation of population health sciences in preparation for further graduate study at the doctoral level in public health and related fields.

## DEGREES

Public Health AMP (p. 227)

Public Health CGS (p. 228)

Public Health mCGS (p. 229)

Public Health M.P.H (p. 230).

Public Health Informatics mCGS (p. 231)

Climate Change and Human Health mCGS (p. 232)

Epidemiology CGS (p. 233)

Epidemiology mCGS (p. 234)

Global and Environmental Health CGS (p. 235)

Global Health mCGS (p. 235)

Health Care Management and Policy CGS (p. 236)

Health Care Management and Policy mCGS (p. 237)

Health Equity mCGS (p. 238)

Health Policy and Law mCGS (p. 238)

## FACULTY

**Carney, Jan Kirk**; Professor, Department of Medicine-Pulmonary; MD, University of Cincinnati; MPH, Harvard University

**de Jager, Elzerie**; Assistant Professor, Department of Medicine; MD, PHD, James Cook University, Australia

**Delaney, Thomas**; Associate Professor, Department of Pediatrics; PHD, University of Denver

**Khan, Shamima**; Assistant Professor, Department of Medicine; PHD, University of Louisiana

## PUBLIC HEALTH AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

## OVERVIEW

Qualified undergraduate students who plan to earn a Master of Public Health (M.P.H.) degree may enroll in the Accelerated Master's Entry Pathway (AMP), which enables students to begin working on the M.P.H. while still an undergraduate. This online degree is designed for highly motivated UVM undergraduate students wishing to complete both their undergraduate degree and M.P.H. degree in 5 years.

Students apply to the program in the 2<sup>nd</sup> semester of their Junior year and no later than June 1 before the start of their Senior year. Following acceptance by the Graduate College, students enrolled in the program apply 9 public health graduate credits during their senior year toward both the undergraduate degree and the M.P.H. These credits must be earned after the student has been accepted into the Graduate College and are subject to approval of the student's academic advisor.

Following the completion of their Bachelor's Degree, students typically take the additional credits required to complete the M.P.H. during a 5<sup>th</sup> year of study, including the Summer session.

## SPECIFIC REQUIREMENTS

### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE ACCELERATED Master's Degree Pathway

Student applications must take place during the Spring of their Junior year, no later than June 1 before the start of their Senior year. Requirements for admission to the program include:

- A minimum GPA of 3.00
- One semester of college biology or other science course
- One semester of algebra, statistics, or a more advanced math course
- AMP Permission form, signed by the student's undergraduate advisor and the M.P.H. Program Director
- Completion of the Graduate College Application form that must include at least one letter of recommendation from a UVM faculty member

**MINIMUM DEGREE REQUIREMENTS**

The M.P.H. degree requires 42 total credits and includes 18 credits of core courses (6 courses), 9 required advanced course credits (3 courses), 9 elective credits (3 courses), and a required culminating project experience of 6 credits. Students will need to maintain a 3.00 grade point average in order to complete the program.

18 Credits in National Competency Core Courses (6 Courses):		
PH 6010	Public Health & Health Policy	3
PH 6020	Epidemiology I	3
PH 6030	Biostatistics I:App Rsch in PH	3
PH 6040	Environmental Public Health	3
PH 6170	Mgmt in Hlth Services&Med Care	3
PH 6060	Social&Behavioral Public Hlth	3
9 credits in required advanced core courses (3 courses):		
PH 6070	Epidemiology 2	3
PH 6080	Environmental Public Health 2	3
PH 6100	Public Health Law and Ethics	3
6 credits of required culminating project experience:		6
PH 6920	Culminating Project Experience	6
9 elective course credits (3 courses) from the approved list, including but not limited to:		9
PH 5000	Controversies in Public Health	
PH 6090	Public Health Biostatistics II	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	

PH 6300	Exploring Healthcare Systems	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

**COMPREHENSIVE EXAMINATION**

The program requires a comprehensive assessment of students' understanding of public health and ability to synthesize and apply knowledge learned through the program of study. This requirement is fulfilled by the M.P.H. Culminating Project Experience. This experience includes the Applied Practice Experience (APE) and the Integrative Learning Experience (ILE), each with specific objectives and competencies measured by faculty assessment.

The APE is assessed by the faculty and the site preceptor at the agency or organization where the student experience takes place. The ILE includes self, peer, and mentor evaluations. Course faculty determine whether a students' overall culminating project experience meets objectives and requirements, and achieves a passing grade.

**REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF MASTER OF Public Health**

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all core courses.

**PUBLIC HEALTH CGS**

All students must meet the Requirements for the Certificate of Graduate Study (CGS) (p. 269)

**OVERVIEW**

Public health is a dynamic and challenging, multidisciplinary field blending public policy, research, and population health sciences. The focus of public health is on promoting healthy practices and preventing disease among entire populations, rather than on treating individual illness.

The University of Vermont's online Certificate of Graduate Study in Public Health enables students to explore current public health and health policy issues while gaining a strong foundation in population health sciences including epidemiology, biostatistics, and environmental health. The program is designed for medical and graduate students, health practitioners, public health professionals, researchers and others who wish to increase their knowledge in the vital field of public health. It also prepares graduates for advanced study at the master's and doctoral levels.



### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Certificate of Graduate Study

Students are required to have a Bachelor’s Degree from an accredited college or university, and have completed 1 college-level course in mathematics and 1 college-level course in science.

#### Minimum Degree Requirements

The Certificate of Graduate Study in Public Health requires 18 credits including 5 courses (15 credits) from 5 core content areas and 1 elective course (3 credits).

5 required core competency courses (15 credits):		
PH 6010	Public Health & Health Policy	3
PH 6020	Epidemiology I	3
PH 6030	Biostatistics I:App Rsch in PH	3
PH 6040	Environmental Public Health	3
PH 6170	Mgmt in Hlth Services&Med Care	3
Choose 1 elective (3 credits) from a list of approved elective courses, including but not limited to:		3
PH 5000	Controversies in Public Health	
PH 6060	Social&Behavioral Public Hlth	
PH 6070	Epidemiology 2	
PH 6080	Environmental Public Health 2	
PH 6090	Public Health Biostatistics II	
PH 6100	Public Health Law and Ethics	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	

PH 6300	Exploring Healthcare Systems	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

More information on the Certificate of Graduate Study in Public Health is available on the College of Medicine website.

### PUBLIC HEALTH MCGS

All students must meet the Requirements for the micro-Certificate of Graduate Study. (p. 269)

#### OVERVIEW

Public health is a dynamic and challenging, multidisciplinary field blending public policy, research, and population health sciences. The focus of public health is on promoting healthy practices and preventing disease among entire populations, rather than on treating individual illness.

This University of Vermont’s online micro-Certificate of Graduate Study in Public Health is a 9-credit certificate (3 courses) that provides a graduate-level introduction to this field, encouraging students to explore current public health and health policy issues while gaining a foundation in epidemiology, one the foundation science of public health.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY

Students are required to have a bachelor’s degree from an accredited college or university, and have completed 1 college-level course in mathematics and 1 college-level course in science

#### MINIMUM DEGREE REQUIREMENTS

The Graduate Micro-Certificate in Public Health requires 9 credits including 2 courses (6 credits) from 2 core content areas and 1 elective course (3 credits) from an approved list of electives.

2 required core competency courses (6 credits):		
PH 6010	Public Health & Health Policy	3
PH 6020	Epidemiology I	3
Choose 1 elective (3 credits) from a list of approved elective courses, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6030	Biostatistics I:App Rsch in PH	
PH 6040	Environmental Public Health	
PH 6060	Social&Behavioral Public Hlth	

PH 6070	Epidemiology 2	
PH 6080	Environmental Public Health 2	
PH 6090	Public Health Biostatistics II	
PH 6100	Public Health Law and Ethics	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6170	Mgmt in Hlth Services&Med Care	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

## PUBLIC HEALTH M.P.H.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The UVM online public health program offers a generalist M.P.H. degree or an M.P.H. with a concentration in Global Health Leadership. All graduates, regardless of concentration, will complete sufficient course work to attain depth and breadth in the 6 core areas of public health knowledge (Public Health and Health Policy, Biostatistics, Epidemiology, Environmental Health Sciences, Health Policy and Management, and Social and Behavioral Sciences), as well as interdisciplinary/cross-cutting areas. All graduate professional public health degree students will develop skills in basic public health concepts and demonstrate the skills and integration of knowledge, and application of these concepts through a practice and a culminating project experience.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Public Health

Students are required to have a Bachelor's Degree from an accredited college or university, 1 semester of college biology or other science course, and 1 course in college algebra, statistics, or a more advanced math course, and submit a resume or CV and statement of experiences and goals. TOEFL will be required for international applicants.

### UVM PUBLIC HEALTH CERTIFICATE/MICRO-CERTIFICATE GRADUATE:

If you completed the Certificate of Graduate Study in Public Health, the Certificate of Graduate Study in Global and Environmental Health, the

Certificate of Graduate Study in Epidemiology, or the Certificate of Graduate Study in Healthcare Management & Policy at UVM, then all 18 credits for which the grade received was a B or higher can be applied toward the M.P.H. Students who choose this option may not transfer additional courses from UVM or other universities. If you completed 1 of the 8 micro-Certificates of Graduate Study in Public Health at UVM, then all 9 credits for which the grade received was a B or higher can be applied toward the M.P.H. Only credits required for the Global Health Leadership Concentration can be transferred into the Concentration (electives other than PH 6110: Global Public Health, PH 6211: Global Health Leadership, PH 6270: Climate Change & Human Health, or PH 6310: Climate Change Emergencies cannot count towards the Concentration).

### GRADUATE LEVEL COURSES IN PUBLIC HEALTH:

If you completed graduate level courses in Public Health at UVM or at another University, then the traditional transfer of credit policy applies for matriculation into the M.P.H. You can transfer in 9 relevant credits from UVM or another university and an additional 6 relevant credits taken at UVM, provided the grade received for any transferred course is a B or higher. The program director will determine whether each course is relevant. The grades do not transfer.

### Minimum Degree Requirements

#### M.P.H. DEGREE

The M.P.H. degree requires 42 total credits and includes 18 credits of core courses (6 courses), 9 required advanced course credits (3 courses), 9 elective credits (3 courses), and a required culminating project experience of 6 credits. Students will need to maintain a 3.00 grade point average in order to complete the program.

18 Credits in National Competency Core Courses (6 Courses):		
PH 6010	Public Health & Health Policy	3
PH 6020	Epidemiology I	3
PH 6030	Biostatistics I:App Rsch in PH	3
PH 6040	Environmental Public Health	3
PH 6170	Mgmt in Hlth Services&Med Care	3

PH 6060	Social&Behavioral Public Hlth	3
9 credits in required advanced core courses (3 courses):		
PH 6070	Epidemiology 2	3
PH 6080	Environmental Public Health 2	3
PH 6100	Public Health Law and Ethics	3
6 credits of required culminating project experience:		
PH 6920	Culminating Project Experience	1-6
9 elective course credits (3 courses) from the approved list, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6090	Public Health Biostatistics II	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6300	Exploring Healthcare Systems	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

### M.P.H. GLOBAL HEALTH LEADERSHIP CONCENTRATION

The M.P.H. Global Health Leadership Concentration requires 42 total credits and includes 18 credits of core courses (6 courses), 9 required advanced course credits (3 courses), 9 global health credits (3 courses), and a required culminating project experience of 6 credits. Students will need to maintain a 3.00 grade point average in order to complete the program.

18 Credits in National Competency Core Courses (6 courses):		
PH 6010	Public Health & Health Policy	3
PH 6020	Epidemiology I	3
PH 6030	Biostatistics I:App Rsch in PH	3
PH 6040	Environmental Public Health	3
PH 6170	Mgmt in Hlth Services&Med Care	3
PH 6060	Social&Behavioral Public Hlth	3
9 credits required in advanced core courses (3 courses):		
PH 6070	Epidemiology 2	3
PH 6080	Environmental Public Health 2	3
PH 6100	Public Health Law and Ethics	3
6 credits of required culminating project experience:		
PH 6920	Culminating Project Experience	1-6
6 credits in global health courses (2 courses):		
PH 6110	Global Public Health	3
PH 6211	Global Health Leadership	3
3 elective credits (1 course):		
PH 6270	Climate Change & Human Health	
PH 6310	Climate Change Emergencies	

### Comprehensive Examination

The program requires a comprehensive assessment of students' understanding of public health and ability to synthesize and apply knowledge learned through the program of study. This requirement is fulfilled by the M.P.H. Culminating Project Experience. This experience includes the Applied Practice Experience (APE) and the Integrative Learning Experience (ILE), each with specific objectives and competencies measured by faculty assessment.

The APE is assessed by the faculty and the site preceptor at the agency or organization where the student experience takes place. The ILE includes self, peer, and mentor evaluations. Course faculty determine whether a students' overall culminating project experience meets objectives and requirements, and achieves a passing grade.

### Requirement for Advancement to Candidacy for the Degree of Master of Public Health

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all core courses.

### PUBLIC HEALTH INFORMATICS MCGS

All students must meet the Requirements for the micro-Certificate of Graduate Study. (p. 269)

**OVERVIEW**

Epidemiology is often called the “language” of public health, and is the foundation science of public health programs. Epidemiology has many uses and applications. The Centers for Disease Control and Prevention describes epidemiology as “the study of the origin and causes of diseases in a community. It is the scientific method of investigation problem-solving used by disease detectives: epidemiologists, laboratory scientists, statisticians, physicians and other health care providers, and public health professionals—to get to the root of health problems and outbreaks in a community.” (CDC. The Importance of Epidemiology 2011).

This micro-Certificate of Graduate Study in Public Health Informatics is an online and concise, 3-course (9 graduate credits) introduction into the field of health informatics, epidemiology, and related quantitative population health science. Completing this course of study will provide students with introductory competency in public health informatics and quantitative public health sciences.

The program is designed for medical and graduate students, health practitioners, public health professionals and researchers, and others who wish to increase their knowledge in the vital field of epidemiology. It also prepares graduates for advanced study at the master's and doctoral level.

**SPECIFIC REQUIREMENTS**

**REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY**

Students are required to have a bachelor’s degree from an accredited college or university, and have completed 1 college-level course in mathematics and 1 college-level course in science.

**MINIMUM DEGREE REQUIREMENTS**

The Graduate Micro-Certificate in Public Health Bioinformatics requires 9 credits including 2 courses (6 credits) from 2 core content areas and 1 elective course (3 credits) from an approved list of electives.

2 required core competency courses:		
PH 6020	Epidemiology I	3
PH 6240	Public Health Informatics	3
Choose 1 elective course from the list of approved electives, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6030	Biostatistics I:App Rsch in PH	
PH 6040	Environmental Public Health	
PH 6060	Social&Behavioral Public Hlth	
PH 6070	Epidemiology 2	

PH 6080	Environmental Public Health 2	
PH 6090	Public Health Biostatistics II	
PH 6100	Public Health Law and Ethics	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

**CLIMATE CHANGE AND HUMAN HEALTH MCGS**

All students must meet the Requirements for the micro-Certificate of Graduate Study. (p. 269)

**OVERVIEW**

The field of environmental health continues to become more global in response to globalization and changing public health issues. Infectious diseases are not bound by borders and are often related to environmental change. Examples like COVID-19 and Zika emphasize the local and global nature of disease, and climate change with its impact on weather, disease, food, water, vectors and emergency response.

The University of Vermont’s online Micro-Certificate of Graduate Study in Climate Change and Human Health is a 9-credit (3 course) program that gives students the opportunity to explore the human health impacts of climate change.

Specific Requirements



## REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY

Students are required to have earned a bachelor's degree from an accredited college or university and have completed 1 college-level course in mathematics and 1 college-level course in science.

### MINIMUM DEGREE REQUIREMENTS

The graduate micro-Certificate in Climate Change and Human Health requires 9 credits including 2 courses (6 credits) from 2 core content areas and 1 elective course (3 credits) from an approved list of electives.

2 Required Core Competency Courses:		
PH 6040	Environmental Public Health	3
PH 6270	Climate Change & Human Health	3
Choose 1 elective course from the list of approved courses, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6020	Epidemiology I	
PH 6030	Biostatistics I: App Rsch in PH	
PH 6060	Social&Behavioral Public Hlth	
PH 6070	Epidemiology 2	
PH 6080	Environmental Public Health 2	
PH 6090	Public Health Biostatistics II	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6280	Health in Humanitarian Crises	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	

PH 6330	Global Mental Health	
PH 6990	Special Topics	

## EPIDEMIOLOGY CGS

All students must meet the Requirements for the Certificate of Graduate Study (CGS) (p. 269)

### OVERVIEW

Epidemiology is often called the “language” of public health, and is the foundation science of public health programs. Epidemiology has many uses and applications. The Centers for Disease Control and Prevention describes epidemiology as “the study of the origin and causes of diseases in a community. It is the scientific method of investigation problem-solving used by disease detectives: epidemiologists, laboratory scientists, statisticians, physicians and other health care providers, and public health professionals—to get to the root of health problems and outbreaks in a community.” (CDC. The Importance of Epidemiology 2011).

The University of Vermont’s Certificate of Graduate Study in Epidemiology is an online and concise, 6-course (18 graduate credits) immersion into the field of epidemiology and related quantitative population health science. This certificate introduces students to the foundations and language of public health and health policy through the study of epidemiology. Completing this course of study will provide students with competency in epidemiology and quantitative public health science.

The program is designed for medical and graduate students, health practitioners, public health professionals and researchers, and others who wish to increase their knowledge in the vital field of epidemiology. It also prepares graduates for advanced study at the master's and doctoral level.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE CERTIFICATE OF GRADUATE STUDY

Students are required to have a bachelor’s degree from an accredited college or university, and have completed 1 college-level course in mathematics and 1 college-level course in science.

### MINIMUM DEGREE REQUIREMENTS

The Certificate of Graduate Study in Epidemiology requires 18 credits including 4 courses (12 credits) from 4 core content areas and 2 elective courses (6 credits) from an approved list of electives.

4 required core competency courses:		
PH 6020	Epidemiology I	3
PH 6070	Epidemiology 2	3
PH 6030	Biostatistics I: App Rsch in PH	3
PH 6090	Public Health Biostatistics II	3

Choose 2 elective courses from the list of approved electives, including but not limited to:		6
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6100	Public Health Law and Ethics	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6300	Exploring Healthcare Systems	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

## EPIDEMIOLOGY MCGS

All students must meet the Requirements for the micro-Certificate of Graduate Study. (p. 269)

### OVERVIEW

Epidemiology is often called the “language” of public health, and is the foundation science of public health programs. Epidemiology has many uses and applications. The Centers for Disease Control and Prevention describes epidemiology as “the study of the origin and causes of diseases in a community. It is the scientific method of investigation problem-solving used by disease detectives: epidemiologists, laboratory scientists, statisticians, physicians and other health care providers, and public health professionals—to get to the root of health problems and outbreaks in a community.” (CDC. The Importance of Epidemiology 2011).

This micro-Certificate of Graduate Study in Epidemiology is an online and concise, 3-course (9 graduate credits) introduction into the field of epidemiology and related quantitative population health science. Completing this course of study will provide students with introductory competency in epidemiology and quantitative public health science.

The program is designed for medical and graduate students, health practitioners, public health professionals and researchers, and others who wish to increase their knowledge in the vital field of epidemiology. It also prepares graduates for advanced study at the master’s and doctoral level.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY

Students are required to have a bachelor’s degree from an accredited college or university and have completed 1 college-level course in mathematics and 1 college-level course in science.

#### MINIMUM DEGREE REQUIREMENTS

The micro-Certificate of Graduate Study in Epidemiology requires 9 credits including 2 courses (6 credits) from 2 core content areas and 1 elective course (3 credits) from an approved list of electives.

2 required core competency courses:		
PH 6020	Epidemiology I	3
PH 6030	Biostatistics I:App Rsch in PH	3
Choose 1 elective from the list of approved electives, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6040	Environmental Public Health	
PH 6060	Social&Behavioral Public Hlth	
PH 6070	Epidemiology 2	
PH 6080	Environmental Public Health 2	
PH 6090	Public Health Biostatistics II	
PH 6100	Public Health Law and Ethics	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	

PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

## GLOBAL AND ENVIRONMENTAL HEALTH CGS

All students must meet the Requirements for the Certificate of Graduate Study (CGS) (p. 269)

### OVERVIEW

The field of environmental health continues to become more global in response to globalization and changing public health issues. Infectious diseases are not bound by borders and are often related to environmental change. Examples like COVID-19 and Zika emphasize the local and global nature of disease, and climate change with its impact on weather, disease, food, water, vectors and emergency response.

The University of Vermont's online Certificate of Graduate Study in Global and Environmental Health is an 18-credit program that gives students the opportunity to explore the global nature of environmental health issues including the built environment, infectious disease, climate change, and one health interrelationships between human and animal health. The program is designed for medical and graduate students; health practitioners; public health professionals and researchers; environmental specialists, engineers and scientists; and others who wish to increase their knowledge in global and environmental public health. It also prepares graduates for advanced study at the masters and doctoral level.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Certificate of Graduate Study

Students are required to have a Bachelor's Degree from an accredited college or university, and have completed 1 college-level course in mathematics and 1 college-level course in science.

### Minimum Degree Requirements

The Certificate of Graduate Study in Global and Environmental Health requires 18 credits including 4 courses (12 credits) from core content areas and 2 elective courses (6 credits).

4 required core competency courses:		
PH 6020	Epidemiology I	3
PH 6040	Environmental Public Health	3
PH 6080	Environmental Public Health 2	3
PH 6110	Global Public Health	3
Choose 2 elective courses from the list of approved courses, including but not limited to:		6
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6090	Public Health Biostatistics II	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6300	Exploring Healthcare Systems	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

## GLOBAL HEALTH MCGS

All students must meet the Requirements for the micro-Certificate of Graduate Study. (p. 269)

**OVERVIEW**

The field of environmental health continues to become more global in response to globalization and changing public health issues. Infectious diseases are not bound by borders and are often related to environmental change. Examples like COVID-19 and Zika emphasize the local and global nature of disease, and climate change with its impact on weather, disease, food, water, vectors and emergency response.

The University of Vermont’s online micro-Certificate of Graduate Study in Global Health is a 9-credit (3 course) program that gives students the opportunity to explore the global nature of health and disease including the environment, infectious disease, climate change, global health data, and social health determinants

Specific Requirements

**REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY**

Students are required to have a bachelor’s degree from an accredited college or university and have completed 1 college-level course in mathematics and 1 college-level course in science.

**MINIMUM DEGREE REQUIREMENTS**

The Graduate micro-Certificate in Global Health requires 9 credits including 2 courses (6 credits) from 2 core content areas and 1 elective course (3 credits) from an approved list of electives.

2 required core competency courses:		
PH 6110	Global Public Health	3
PH 6160	Social Determinants of Health	3
Choose 1 elective course from the list of approved courses, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6020	Epidemiology I	
PH 6030	Biostatistics I:App Rsch in PH	
PH 6040	Environmental Public Health	
PH 6060	Social&Behavioral Public Hlth	
PH 6070	Epidemiology 2	
PH 6080	Environmental Public Health 2	
PH 6100	Public Health Law and Ethics	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	

PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

**HEALTH CARE MANAGEMENT AND POLICY CGS**

All students must meet the Requirements for the Certificate of Graduate Study (CGS) (p. 269)

**OVERVIEW**

The Certificate of Graduate Study in Health Care Management and Policy is an online, 6-course (18 credits) program introducing students to health care management, finance, and policy. This program provides an overview of US health care policies, organizational structures, and financing systems. These concepts are examined from economic, social, legal, ethical, political, and global perspectives. Contemporary health care organizations and policies are analyzed with respect to concepts and principles of change theory, ethical decision making, and policy processes and analysis. Financing of health care systems, with emphasis on the roles of health care providers and impact on consumers, will also be examined. The distinct strategic and leadership challenges faced by managers in healthcare and public health organizations is examined through the lenses of consumers, employers, practitioners, insurers, regulators, and public policy-makers.

The program is designed for working professionals in health care and public health; nursing students, medical students and other graduate students; recent baccalaureate graduates with an interest in a non-clinical health degree; and employees and managers of healthcare-related programs and organizations.

**SPECIFIC REQUIREMENTS**

**REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE CERTIFICATE OF GRADUATE STUDY**

Students are required to have a Bachelor’s Degree from an accredited college or university, and have completed 1 college-level course in mathematics and 1 college-level course in science.



**MINIMUM DEGREE REQUIREMENTS**

The Certificate of Graduate Study in Health Care Management and Policy requires 18 credits including 3 courses (9 credits) from 3 core content areas and 3 elective courses (9 credits) from an approved list of electives.

3 required core competency courses:		
PH 6170	Mgmt in Hlth Services&Med Care	3
PH 6240	Public Health Informatics	3
PH 6260	Legal Issues in Health Care	3
Choose 3 elective courses from the list of approved electives, including but not limited to:		9
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6020	Epidemiology I	
PH 6060	Social&Behavioral Public Hlth	
PH 6090	Public Health Biostatistics II	
PH 6100	Public Health Law and Ethics	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6250	Investigating DiseaseOutbreaks	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6300	Exploring Healthcare Systems	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

**HEALTH CARE MANAGEMENT AND POLICY MCGS**

All students must meet the Requirements for the micro-Certificate of Graduate Study. (p. 269)

**OVERVIEW**

This micro-Certificate of Graduate Study in Health Services Administration is a 9-credit (3 courses) program designed for healthcare and public health professionals; students in health professions and other graduate students; and employees and managers of healthcare related programs and organizations. This certificate provides a foundation and essential skills for advanced study in public health, public health practice, or a population-health focus for healthcare disciplines.

**SPECIFIC REQUIREMENTS****REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY**

Students are required to have a bachelor's degree from an accredited college or university and have completed 1 college-level course in mathematics and 1 college-level course in science.

**MINIMUM DEGREE REQUIREMENTS**

The Graduate micro-Certificate in Health Care Services Administration requires 9 credits including 2 courses (6 credits) from 2 core content areas and 1 elective course (3 credits) from an approved list of electives.

2 required core competency courses:		
PH 6170	Mgmt in Hlth Services&Med Care	3
PH 6210	Controversies in HlthEconomics	3
Choose 1 elective course from the list of approved electives, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6020	Epidemiology I	
PH 6030	Biostatistics I:App Rsch in PH	
PH 6040	Environmental Public Health	
PH 6060	Social&Behavioral Public Hlth	
PH 6070	Epidemiology 2	
PH 6080	Environmental Public Health 2	
PH 6090	Public Health Biostatistics II	
PH 6100	Public Health Law and Ethics	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	

PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6260	Legal Issues in Health Care	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6300	Exploring Healthcare Systems	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

## HEALTH EQUITY MCGS

All students must meet the Requirements for the micro-Certificate of Graduate Study. (p. 269)

### OVERVIEW

Public health is a dynamic and challenging, multidisciplinary field blending public policy, research, and population health sciences. The focus of public health is on promoting healthy practices and preventing disease among entire populations, rather than on treating individual illness.

The University of Vermont’s online micro-Certificate of Graduate Study in Health Equity is a 9-credit certificate (3 courses) that provides a graduate-level introduction to the science and practice of public health relevant to health equity.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY

Students are required to have a bachelor’s degree from an accredited college or university and have completed 1 college-level course in mathematics and 1 college-level course in science.

#### MINIMUM DEGREE REQUIREMENTS

The Graduate micro-Certificate in Health Equity requires 9 credits including 2 courses (6 credits) from 2 core content areas and elective course (3 credits) from an approved list of electives.

2 required core competency courses (6 credits)		
PH 6010	Public Health & Health Policy	3
PH 6160	Social Determinants of Health	3
Choose 1 elective (3 credits) from a list of approved elective courses, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6020	Epidemiology I	
PH 6030	Biostatistics I:App Rsch in PH	
PH 6040	Environmental Public Health	
PH 6060	Social&Behavioral Public Hlth	
PH 6070	Epidemiology 2	
PH 6080	Environmental Public Health 2	
PH 6090	Public Health Biostatistics II	
PH 6100	Public Health Law and Ethics	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6170	Mgmt in Hlth Services&Med Care	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	
PH 6250	Investigating DiseaseOutbreaks	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

## HEALTH POLICY AND LAW MCGS

All students must meet the Requirements for the micro-Certificate of Graduate Study. (p. 269)

**OVERVIEW**

This micro-Certificate of Graduate Study in Health Policy and Law is a 9-credit (3 courses) program designed for healthcare and public health professionals, students in health professions, other graduate students, and employees and managers of healthcare related programs, and organizations. This certificate provides a foundation and essential skills for advanced study in public health, public health practice, health advocacy, or a population-health focus for healthcare disciplines.

**SPECIFIC REQUIREMENTS**

**REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY**

Students are required to have a bachelor’s degree from an accredited college or university, and have completed 1 college-level course in mathematics and 1 college-level course in science..

**MINIMUM DEGREE REQUIREMENTS**

The Graduate micro-Certificate in Health Policy and Law requires 9 credits including 2 courses (6 credits) from 2 core content areas and 1 elective course (3 credits) from an approved list of electives.

2 required core competency courses:		
PH 6100	Public Health Law and Ethics	3
PH 6260	Legal Issues in Health Care	3
Choose 1 elective course from the list of approved electives, including but not limited to:		
PH 5000	Controversies in Public Health	
PH 6010	Public Health & Health Policy	
PH 6020	Epidemiology I	
PH 6040	Environmental Public Health	
PH 6090	Public Health Biostatistics II	
PH 6110	Global Public Health	
PH 6120	Food Systems & Public Hlth	
PH 6140	Environmental Risk & Risk Comm	
PH 6150	Public Health Surveillance	
PH 6160	Social Determinants of Health	
PH 6170	Mgmt in Hlth Services&Med Care	
PH 6180	Improving Health in Population	
PH 6200	Public Health Communications	
PH 6210	Controversies in HlthEconomics	
PH 6211	Global Health Leadership	
PH 6220	One Health: Zoonoses	
PH 6240	Public Health Informatics	

PH 6250	Investigating DiseaseOutbreaks	
PH 6270	Climate Change & Human Health	
PH 6280	Health in Humanitarian Crises	
PH 6310	Climate Change Emergencies	
PH 6320	Maternal and Child Health	
PH 6330	Global Mental Health	
PH 6990	Special Topics	

**RESILIENCY-BASED APPROACHES WITH FAMILIES, SCHOOLS, AND COMMUNITIES**

<https://www.uvm.edu/cess/doe>

**OVERVIEW**

The Certificate of Graduate Study in Resiliency-Based Approaches (CGS RBA) prepares educators and health/human service professionals to address the complex challenges associated with trauma and adversity using restorative, strength-based, and collaborative approaches that build resilience, so that children, youth, and families can thrive and learn within and beyond school borders.

**DEGREES**

Resiliency-Based Approaches with Families, Schools, and Communities CGS (p. 239)

**FACULTY**

**DeMink-Carthew, Jessica;** Assistant Professor, Department of Education, PHD; University of Maryland

**Garnett, Bernice Raveche;** Associate Professor, Department of Education; SCD, Harvard University

**Haines, Shana Jackson;** Associate Professor, Department of Education; PHD, University of Kansas

**Jiron, Haley Woodside;** Associate Professor, Department of Education; PHD, SUNY Albany

**Strolin-Goltzman, Jessica S.;** Professor, Department of Education; PHD, University of Albany

**RESILIENCY-BASED APPROACHES WITH FAMILIES, SCHOOLS, AND COMMUNITIES CGS**

All students must meet the Requirements for the Certificates of Graduate Study (p. 269)

**OVERVIEW**

The program is built to address the growing need to improve workforce capacity for professionals who can successfully implement resiliency building strategies addressing the heightened incidence of trauma and adverse childhood experiences.

Students in the program gain a deep socio-ecological understanding of the structural solutions inherent in equity, culturally sustaining partnerships, and resilience; the impact of trauma and adversity; and a toolbox of skills for fostering resilience through building and restoring relationships with families, schools, and communities.

Along with core coursework, students can specialize in either of two pathways:

- Trauma-responsive and Restorative Practices (TRP)
- Family-school-community partnerships and interprofessional collaboration (FSC)

All coursework is online, though some electives may be met with on campus courses.

The CGS can stand alone as a defined certificate of graduate study or can stack into a master’s degree program in Counseling, Curriculum & Instruction, Educational Leadership, Social Work, and Special Education, or a doctoral degree in Educational Leadership and Policy Studies. To be a stackable credential, students must apply and be accepted into the CGS before the last 9 credits are taken. Students then apply to an appropriate master’s or doctoral program to use the CGS credits towards that degree.

**SPECIFIC REQUIREMENTS**

**REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE CERTIFICATE OF GRADUATE STUDY**

- Completed Bachelor’s Degree
- Official transcripts from each college or university where credit has been earned
- Three letters of recommendation
- A personal statement of purpose
- Test scores for English proficiency for applicants whose native language is not English
- Application fee of \$20

**HOW TO APPLY**

All applications and materials must be submitted through the UVM Graduate Admissions online application. Please carefully review the instructions before completing the application.

**FOR EXTERNAL APPLICANTS TO THE CERTIFICATE PROGRAM:** Applicants seeking to enroll in only a Certificate of Graduate Study program must complete the online UVM Graduate Application and all associated requirements. This application will need to include official transcripts from an accredited university as well as 3 letters of recommendation. A Bachelor’s Degree is required for admittance.

**FOR CURRENT UVM GRADUATE STUDENTS:** Students currently enrolled in a UVM Master’s or Doctoral program must complete the online UVM Graduate Application. Letters of recommendation and transcripts are not required, and an application fee waiver can be provided.

**MINIMUM DEGREE REQUIREMENTS**

To earn the certificate of graduate study, students must complete 15 credits including 6 credits of foundational courses, 6 credits of applied courses in a specialization pathway, and a 3 credit of capstone course. Students choose one of the following specialization pathways: Trauma-responsive and Restorative Practices (TRP) or Family-school-community and Interprofessional Collaboration (FSC). The capstone will apply skills and learning from earlier coursework.

Foundational Courses (2 required)		
EDSP 6300	The Trauma Lens	
EDSP 6320	Fam,Schl&Intrprof Partnerships	
EDCI 6310	Society, Stress and the Brain	
Trauma-responsive and Restorative Practices Pathway:		
EDML 6990	Special Topics (Social Justice Teaching & Advo)	3
EDSP 6330	Resilience-orient Systems Chng	3
EDSP 6340	Restorative&Trma Pract w/Child	3
Family-School-Community & Interprofessional Collaborations Pathway:		
EDSP 6130	Collaborative Consultation	3
EDSP 6320	Fam,Schl&Intrprof Partnerships (If not taken as foundations course)	3
Applied Coursework/Capstone Course		
EDSP 6330	Resilience-orient Systems Chng	3
SWSS 6160	Integrative Appr Transform SW	3
EDRM 6310	Mixed Methods Research: Adv	3
CNSL 6991	Counseling Internship	1-3
Other courses may be approved with permission of CGS core faculty		
Students must take 3 of the following courses: EDSP 6300; EDSP 6320; EDSP 6330; EDSP 6340		

**SOCIAL WORK**

<https://www.uvm.edu/cess/socialwork>

**OVERVIEW**

The Master of Social Work program at the University of Vermont prepares students for advanced social work practice with individuals, families, groups, organizations, and communities in the post-modern environment. The curriculum emphasizes strengths-oriented, relational practice guided by principles of social justice and human rights and a conceptual framework of critical social construction. The Master of Social Work program is fully accredited by the Council on Social Work Education (CSWE).

The professional foundation curriculum is designed to assist students to explore and develop generalist knowledge, values, and skills for professional practice. Students take 30 credits of foundation course



work, including 1 elective. The curriculum comprises course work in 5 areas: Human Behavior in the Social Environment (HBSE), Social Welfare Policy, Social Work Practice, Field Practica, and Research.

The concentration year curriculum is designed to extend and integrate student knowledge, values, and skills for advanced practice in a single concentration, Transformative Social Work. This is accomplished through focused study in a student-generated, individualized area of interest. All core curriculum courses in the concentration year are considered advanced practice courses in Transformative Social Work, in that all emphasize the application of complex social ideas and the production of transformative roles and methods.

Students select 4 focus courses to direct their studies toward a particular population or field of social work practice. In addition, the concentration curriculum consists of two advanced practice courses, a field practicum, an advanced research course, and a "capstone course" aimed at integrating the student's application of transformative social work in the area of interest.

## DEGREES

Social Work M.S.W. (p. 241)

## FACULTY

**Comerford, Susan Ann;** Associate Professor, Department of Social Work; PHD, Case Western Reserve University

**Melekis, Kelly;** Associate Professor, Department of Social Work; PHD, Boston University

**Solomon, Brenda M.;** Associate Professor, Department of Social Work; PHD, Syracuse University

**Velez, Christine;** Assistant Professor, Department of Social Work; PHD, Portland State University

## SOCIAL WORK M.S.W.

All students must meet the Requirements for the Master's Degree (p. 270)

## OVERVIEW

The Department of Social Work offers a full-time and part-time course of study toward the M.S.W. degree. An Advanced Standing option is also available for eligible students who have completed an undergraduate degree in social work from a bachelor's program accredited by CSWE within 7 years of admission.

To request a program bulletin or additional information, please contact the Department of Social Work at (802) 656-8800, MSWAdmit@uvm.edu, or visit the program's Master's Degree in Social Work website.

## SPECIFIC REQUIREMENTS

### Requirements for Admission to Graduate Studies for the Degree of Master of Social Work

- A baccalaureate degree completed in good standing from an accredited college or university.

- No minimum grade point average (GPA) is required; however, the applicant must show evidence of academic ability to undertake graduate study in social work. The applicant's GPA is one indicator of performance and will be considered in the review process.
- Evidence of a strong liberal arts background, with a minimum of eighteen credits in general liberal arts course work that supports graduate education in social work.
- Prior work or volunteer experience in human services is preferred.
- International students must submit TOEFL or IELTS scores (from tests taken within two years of the date of application).

## REQUIREMENTS FOR ADVANCED STANDING

- A BSW degree or a B.S. in social work, earned from a social work program accredited by the Council on Social Work Education (CSWE) within 7 years of admission to the M.S.W. program.
- Prior academic performance that supports graduate study in social work.
- Satisfactory undergraduate social work field practicum evaluations.

## HOW TO APPLY

All applications are submitted online through the Graduate College Admissions site.

The following materials are required for application:

- Completed application form (online).
- Written Statement of Purpose that describes the applicant's preparation and goals for pursuing graduate study in social work (submit online).
- Official transcripts from each college or university attended.
- Resume of work and professional experience.
- 3 letters of recommendation and completed recommender forms (recommendations from at least one academic source and one from human service related employment are strongly encouraged).
- Non-refundable application fee of \$65.00 for online application.

## Minimum Degree Requirements

The Master of Social Work degree requires 60 credits of graduate study, unless students are admitted with Advanced Standing status. Advanced Standing status is granted solely to students who have earned a bachelor's degree in a program accredited, or acknowledged as being equivalent to a bachelor's in social work, by the Council on Social Work Education, and allows for a shorter course of study at 39 credits. Both regular track and advanced standing students must complete all required and elective credits in social work courses.

The policies and standards for maintaining program accreditation do not permit the granting of academic credit toward graduation for life experience.

**REGULAR TRACK M.S.W.**

Foundation Courses		
SWSS 6120	Social Work Practice I	3
SWSS 6130	Social Work Practice II	3
SWSS 5160	Th Found of Hum Beh&Soc Envr I	3
SWSS 5170	Th Found Hum Beh&Soc Envr II	3
SWSS 5200	Soc Welfare Pol & Services I	3
SWSS 5210	Soc Welfare Pol & Services II	3
SWSS 5027	Foundations of SW Research	3
SWSS 6000	Foundation Yr Field Practicum (taken twice credits will double)	3
An approved elective (Elective and Focus courses require advanced approval of faculty advisor)		3
Concentration Year Courses		
SWSS 6140	Transformative Social Work I	3
SWSS 6150	Transformative Social Work II	3
SWSS 6160	Integrative Appr Transform SW	3
SWSS 6270	Adv Social Work Research	3
SWSS 6890	Spec Practice Field Practicum (taken twice credits will double)	3-4
Four approved focus courses (Elective and Focus courses require advanced approval of faculty advisor)		12

**ADVANCED STANDING M.S.W.**

Summer Session Courses		
SWSS 6990	Special Topics (Perspectives in Social Work)	4
1-2 approved focus courses (Elective and Focus courses require advanced approval of faculty advisor)		3-6
Concentration Year Courses		
SWSS 6140	Transformative Social Work I	3
SWSS 6150	Transformative Social Work II	3
SWSS 6160	Integrative Appr Transform SW	3
SWSS 6270	Adv Social Work Research	3
SWSS 6890	Spec Practice Field Practicum (two 4 credit courses - credit will be double)	4
3-4 approved focus courses (Elective and Focus courses require advanced approval of faculty advisor)		9-12

**Comprehensive Examination**

The Graduate College requirement for a comprehensive exam is met by the Department of Social Work's Capstone course, SWSS 6160. M.S.W. Candidates complete an integrative capstone paper.

**Requirements for Advancement to Candidacy for the Degree of Master of Social Work**

To achieve Advanced Candidacy and be eligible to take SWSS 6160 (the Capstone course), a student must have successfully completed 45 credit hours, including all core courses, with a minimum GPA of 3.00.

**SOCIAL-EMOTIONAL AND BEHAVIORAL HEALTH AND INCLUSIVE EDUCATION**

<https://www.uvm.edu/cess/doi>

**OVERVIEW**

The Ph.D. in Social-Emotional and Behavioral Health and Inclusive Education (Ph.D. in SHIE) engages scholars in the examination of critical interdisciplinary and multi-level issues focusing on collaboration between families, schools, and communities in supporting the social, emotional, and behavioral health of children and youth. The Ph.D. in SHIE produces researchers for positions in higher education and state and national leadership positions who are skilled in examining complex interdisciplinary societal problems relating to special education, education, and social welfare and applying a collaborative, appreciative, and proactive lens to design research and policy aimed at optimizing children's wellbeing. Producing top scholars for critical issues in the fabric of a global society will enhance the educational equity and social, emotional, and behavioral health of children and youth who have experienced adversity such as trauma, maltreatment, poverty, racism, and other forms of marginalization. SHIE Scholars will engage in a rigorous 75 credit curriculum anchored in 5 core courses that will ground them in theory, policy, prevention, intervention, and community-engaged research drawing from the fields of special education, social work, and public health. SHIE Scholars will also participate in research teams working in-situ to develop, implement and evaluate programs, practices, and policies in existing family-school-community partnerships.

**DEGREES**

Social-Emotional and Behavioral Health and Inclusive Education  
Ph.D. (p. 243)

**FACULTY**

Core Faculty

**Garnett, Bernice Raveche;** Associate Professor, Department of Education; SCD, Harvard University

**Garwood, Justin D.;** Assistant Professor, Department of Education; PHD, University of North Carolina at Chapel Hill

**Haines, Shana Jackson;** Associate Professor, Department of Education; PHD, University of Kansas

**Kervick, Colby T.;** Associate Professor, Department of Education; EDD, University of Vermont

**Strolin-Goltzman, Jessica S.;** Professor, Department of Education; PHD, University of Albany

Affiliated Faculty

**Callahan, Rebecca M.**; Professor, Department of Education; PHD, University of California, Davis  
**Hurley, Jennifer Jo**; Associate Professor, Department of Education; PhD, Vanderbilt University  
**Kolbe, Tammy G**; Associate Professor; Department of Education; EDD, University of Vermont  
**Meyer, Lori**; Associate Professor, Department of Education; PHD, University of Illinois  
**Suter, Jesse**; Research Associate Professor; Center on Disability and Community Inclusion; PhD, University of Vermont  
**Vannest, Kimberly**; Professor, Department of Education; PHD, Louisiana State University, Baton Rouge

## SOCIAL-EMOTIONAL AND BEHAVIORAL HEALTH AND INCLUSIVE EDUCATION PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

The Ph.D. in Social-Emotional and Behavioral Health and Inclusive Education (Ph.D. in SHIE) engages scholars in the examination of critical interdisciplinary and multi-level issues focusing on collaboration between families, schools, and communities in supporting the social, emotional, and behavioral health of children and youth. The Ph.D. in SHIE produces researchers for positions in higher education and state and national leadership positions who are skilled in examining complex interdisciplinary societal problems relating to special education, education, and social welfare and applying a collaborative, appreciative, and proactive lens to design research and policy aimed at optimizing children’s wellbeing. Producing top scholars for critical issues in the fabric of a global society will enhance the educational equity and social, emotional, and behavioral health of children and youth who have experienced adversity such as trauma, maltreatment, poverty, racism, and other forms of marginalization. SHIE Scholars will engage in a rigorous 75 credit curriculum anchored in 5 core courses that will ground them in theory, policy, prevention, intervention, and community-engaged research drawing from the fields of special education, social work, and public health. SHIE Scholars will also participate in research teams working in-situ to develop, implement and evaluate programs, practices, and policies in existing family-school-community partnerships.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

To be admitted, applicants must have (a) a Master’s degree in special education or a related field (e.g., social work, counseling, school psychology); (b) 2 years of professional experience (special education teacher, social worker, behavior interventionist or related role); (c) 3 letters of recommendation indicating excellence regarding potential for leadership and research; (d) a personal statement with a clear articulation of career goals as special education

faculty or related discipline; and (e) a writing sample providing evidence of excellent skills in scholarly writing, a commitment to social change and justice for students with social-emotional-behavioral health needs, and the potential to conduct independent research

### MINIMUM DEGREE REQUIREMENTS

75 Credit Hour Curriculum, including:		
5 Core Graduate Level Courses		15
EDSP 7110	Prevention Science Theory	
EDSP 7150	Critical Issues in SEBH Policy	
EDSP 7210	FSC Partnerships for SEBH	
EDSP 7220	Research Partnership in Action	
EDSP 7250	Psycho-Ed and Single Case	
Research Core		15
EDRM 6210	Quantitative Research I	
EDRM 6110	Qualitative Research I	
EDRM 6310	Mixed Methods Research: Adv	
Remaining 2 courses chosen based on specialization		
EDRM 6220	Adv Quant: Research Methods	
EDRM 6120	Adv Qual: Analysis & Writing	
ALE 6130	PAR & Transdiscipl Agroecology	
Advanced Research Electives		6
Content Specialization Electives		9-12
Professional Preparation		6-9
EDLP 7010	ProSeminar: Doctoral Intro	
EDLP 7090	Dissertation Writing Seminar	
IHS 7500	Prof Writing & Grantsmanship	
EDHI 6850	Seminar in Higher Education	
Dissertation Research		21
EDSP 7491	Doctoral Dissertation Research	

### COMPREHENSIVE EXAMINATION

Students will complete their comprehensive examination by the end of their 3rd year. After completion of all core courses, students will select 1-2 papers/assignments from one of the core seminars to scale up for publication for a practice and/or research journal. They will submit this paper/these papers as their comprehensive examination submission to a small committee of core faculty members. Students will also present their papers to their committee at an oral research colloquium.

## REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

- Completion of approved 54 credit program of study prior to pursuing the 21 dissertation credits.
- Passing the comprehensive examination will be a requirement prior to registering for any dissertation credits.
- Successful dissertation proposal.

## SPECIAL EDUCATION

<https://www.uvm.edu/cess/dae>

### OVERVIEW

This nationally accredited graduate program is designed to prepare students to collaborate with families, educators, and other professionals and service agencies in the development, implementation, and evaluation of instructional programs and supports for learners with disabilities in inclusive school and community settings. There are two primary areas of emphasis in this program, with each pathway having its own requirements:

- **Special Education (K-Age 21):** Students are prepared to collaborate with families, educators and other professionals in the design, implementation and evaluation of instruction for learners with disabilities in inclusive elementary, middle or high school classrooms.
- **Early Childhood Special Education:** Students are prepared to provide individualized, family-centered special education services to young children with disabilities and their families through both direct and collaborative delivery systems coordinated with social service agencies in integrated home, preschool and community settings in rural areas.

Within these two tracks there are different special education licensure pathways as well as a non-licensure option.

### DEGREES

Special Education AMP (p. 244)

Special Education M.Ed. (p. 245)

### FACULTY

**Garwood, Justin D.;** Assistant Professor, Department of Education; PHD, University of North Carolina at Chapel Hill

**Giangreco, Michael Francis;** Professor Emeritus, Department of Education; PHD, Syracuse University

**Haines, Shana Jackson;** Associate Professor, Department of Education; PHD, University of Kansas

**Hurley, Jennifer Jo;** Associate Professor, Department of Education; PHD, Vanderbilt University

**Kervick, Colby T.;** Assistant Professor, Department of Education; EDD, University of Vermont

**Meyer, Lori;** Assistant Professor, Department of Education; PHD, University of Illinois

**Shepherd, Katharine;** Professor, Department of Education; EDD, University of Vermont

**Vannest, Kimberly;** Professor, Department of Education; PHD, Louisiana State University, Baton Rouge

## SPECIAL EDUCATION AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathways (p. 269)

### OVERVIEW

The Accelerated Master's Degree Entry Pathway (AMP) in Special Education is designed for UVM undergraduates to complete up to 9 credits towards their graduate degree while earning their undergraduate degree. Students in this pathway receive the same M.Ed. as the traditional state-approved Special Education M.Ed., but they complete the degree one year after earning their undergraduate degree. Students must apply and be admitted to the M.Ed. while still an undergraduate and before taking any credits that will apply to the M.Ed. The M.Ed. is a secondary curriculum that becomes their primary curriculum when they have completed the bachelor's degree. There are two pathways in the AMP in Special Education: Early Childhood Special Education and K- age 21 Special Education.

1. **K-age 21 Special Education:** Students are prepared to collaborate with families, educators and other professionals in the design, implementation and evaluation of instruction for learners with disabilities in inclusive regular elementary, middle or high school classrooms. Students typically apply to the M.Ed. during the fall of their junior year. Upon acceptance, students meet with advisors to determine their course sequence. During the last 3 semesters of their undergraduate degree, students enroll in 2 or 3 required classes (6 or 9 credits) that count towards their undergraduate and graduate degrees. Additional information can be requested from the program coordinator. A non-licensure option is also available and the program plan can be tailored to students' interests.
2. **Early Childhood Special Education:** Students are prepared to provide individualized, family-centered special education services to young children with disabilities and their families through both direct and collaborative delivery systems coordinated with social service agencies in integrated home, preschool and community settings. Students typically apply to the M.Ed. in the fall semester of their Junior year or Senior year and usually take ECSP 6100, EDSP 5130, and EDSP 5100 during the spring of their junior or senior year. All 9 credits count towards the B.S. and Master's degrees. The remaining 24 graduate credits are completed during 1 post-baccalaureate year.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the AMP in Special education

Candidates for the Accelerated Master's Entry Pathway in Special Education must be UVM undergraduates. Students typically apply during their Junior or Senior year. Applicants are evaluated based on their GPA (must be least a 3.00), 3 letters of recommendation, essay, official copy of undergraduate transcript, interview, and UVM



Accelerated Master's Pathway permission form available from the Graduate College or CESS Student Services.

**Minimum Degree Requirements**

Specific courses are required for each area (K- age 21 Special Education, Early Childhood Special Education).

**SPECIFIC REQUIREMENTS FOR THE SPECIAL EDUCATION K-AGE 21 TRACK INCLUDE:**

EDSP 5100	Foundations of Special Ed	3
EDSP 5130	Severe Disabil Char&Intervent	3
EDSP 5110	Meeting Inst Needs/All Stdnts	3
EDSP 5120	Assessment in Special Ed	3
EDSP 6140	Curr & Tech Spec Ed: Literacy	3
EDSP 6150	Curr & Tech Spec Ed: Math	3
EDSP 6180	Behavior Analysis in Spec Ed	3
EDSP 6991	Internship: Student Teaching	6-12
EDSP 6130	Collaborative Consultation	3

**SPECIFIC REQUIREMENTS FOR THE EARLY CHILDHOOD SPECIAL EDUCATION TRACK INCLUDE:**

EDSP 5100	Foundations of Special Ed	3
ECSP 5110	EI for Infants and Toddlers-GR	3
EDSP 5130	Severe Disabil Char&Intervent	3
ECSP 6100	Curriculum in ECSP	3-4
ECSP 6120	Assessment in EI/ECSE	3
EDSP 6180	Behavior Analysis in Spec Ed	3
EDSP 6130	Collaborative Consultation	3
ECSP 6190	Seminar in EI/ECSE	3
ECSP 6991	Internship: EI/ECSE	9-12

**SPECIFIC REQUIREMENTS FOR THE NON-LICENSURE TRACK INCLUDE:**

EDSP 5100	Foundations of Special Ed	3
EDSP 5130	Severe Disabil Char&Intervent	3
EDSP 6180	Behavior Analysis in Spec Ed	3
EDSP 6130	Collaborative Consultation	3
3 additional courses in either EDSP or ECSP chosen in consultation with the advisor		9
3 elective courses chosen in consultation with the advisor		9

**Comprehensive Examination**

The comprehensive examination for both pathways is an oral examination taken in the last semester of study. Students meet with

faculty to present their knowledge and application of key learning related to program requirements.

**Requirements for Advancement to Candidacy for the Degree of master of education**

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all core courses. Program requires 30-36 credits depending on licensure requirements.

**SPECIAL EDUCATION M.ED.**

All students must meet the Requirements for the Master of Education Degree (p. 271)

**OVERVIEW**

There are 2 primary areas of emphasis within the M.ED.: Special Education K-age 21 and Early Childhood Special Education. Within those 2 tracks there are different special education licensure pathways as well as a non-licensure option.

1. K-age 21 Special Education: Students are prepared to collaborate with families, educators and other professionals in the design, implementation and evaluation of instruction for learners with disabilities in inclusive general elementary, middle or high school classrooms. Within this track are varied licensure options.
2. Early Childhood Special Education: Students are prepared to provide individualized, family-centered special education services to young children with disabilities and their families through both direct and collaborative delivery systems coordinated with social service agencies in integrated home, preschool and community settings.

Additional information on the above tracks and/or about the different licensure options should be requested from the program coordinator.

**SPECIFIC REQUIREMENTS**

**Requirements for Admission to Graduate Studies for the Degree of Master of Education**

Candidates for the degree of Master of Education in Special Education must have a bachelor's degree and a GPA of at least a 3.00 in the bachelor's degree. Preference is given to candidates with 2 years of teaching and/or related experience working with people with disabilities.

**Minimum Degree Requirements**

Specific courses are required for each area (K-age 21 and Early Childhood Special Education). Students seeking licensure must meet additional requirements, and specific programs plans will be developed in adherence to a student's desired licensure.

**SPECIFIC REQUIREMENTS FOR THE K-AGE 21 SPECIAL EDUCATION TRACK INCLUDE:**

EDSP 5100	Foundations of Special Ed	3
EDSP 5130	Severe Disabil Char&Intervent	3
EDSP 5110	Meeting Inst Needs/All Stdnts	3
EDSP 5120	Assessment in Special Ed	3
EDSP 6140	Curr & Tech Spec Ed: Literacy (Literacy)	3
EDSP 6150	Curr & Tech Spec Ed: Math (Numeracy)	3
EDSP 6180	Behavior Analysis in Spec Ed	3
EDSP 6991	Internship: Student Teaching	9-12
EDSP 6130	Collaborative Consultation	3

**SPECIFIC REQUIREMENTS FOR THE EARLY CHILDHOOD SPECIAL EDUCATION TRACK INCLUDE:**

EDSP 5100	Foundations of Special Ed	3
ECSP 5110	EI for Infants and Toddlers-GR	3
EDSP 5130	Severe Disabil Char&Intervent	3
ECSP 6100	Curriculum in ECSP	3
ECSP 6120	Assessment in EI/ECSE	3
EDSP 6180	Behavior Analysis in Spec Ed	3
EDSP 6130	Collaborative Consultation	3
ECSP 6190	Seminar in EI/ECSE	3
ECSP 6991	Internship: EI/ECSE	9-12

**SPECIFIC REQUIREMENTS FOR THE NON-LICENSURE TRACK INCLUDE:**

EDSP 5100	Foundations of Special Ed	3
EDSP 5130	Severe Disabil Char&Intervent	3
EDSP 6180	Behavior Analysis in Spec Ed	3
EDSP 6130	Collaborative Consultation	3
3 additional courses in either EDSP or ECSP chosen in consultation with the advisor		9
3 elective courses chosen in consultation with the advisor		9

**Comprehensive Examination**

The comprehensive examination for both pathways is an oral examination taken in the last semester of study. Students meet with faculty to present their knowledge and application of key learning related to program requirements.

**Requirements for Advancement to Candidacy for the Degree of Master of Education**

Successful completion of any prerequisite courses, and at least 15 graded graduate credits with a 3.00 GPA or better, including all core

courses. Program requires 30-36 credits depending on licensure requirements.

**STATISTICS**

<https://www.uvm.edu/cems/mathstat>

**OVERVIEW**

The Statistics Program offers biostatistics, statistics, data science and probability courses for the entire university community along with traditional degree programs and individually designed degree programs emphasizing statistics applied to other fields. The degree programs are designed primarily for students who plan careers in data science, business, actuarial science, industry, and government or advanced training in disciplines that make extensive use of statistical methods and data science. The program faculty is deeply involved in consulting and collaborative research in a wide variety of fields, including industry, agriculture, and in the basic and clinical medical sciences. These research activities along with the research of other quantitative UVM faculty offer students unique opportunities to apply their classroom training to "real world" problems. Qualified students with the goal of learning statistics to use in a specialized area of application are especially encouraged to take advantage of these cooperative arrangements.

Program faculty have active statistics research efforts in areas such as bioinformatics, statistical genetics, Bayesian models, survival data analysis, discriminant analysis, bootstrap methods, machine learning, predictive modeling, networks, categorical data analysis, measurement error models, and experimental design. Students seeking the traditional graduate degree in statistics (along with course work in mathematics and computer science, if desired) have excellent opportunities to participate in the faculty's research.

**DEGREES**

Statistics AMP (p. 247)

Statistics M.S. (p. 248)

**FACULTY**

**Bagrow, James;** Associate Professor, Department of Mathematics and Statistics; PHD, Clarkson University

**Buzas, Jeff Sandor;** Professor, Department of Mathematics and Statistics; PHD, North Carolina State University Raleigh

**Callas, Peter W.;** Research Associate Professor, Department of Mathematics and Statistics; PHD, University of Massachusetts Amherst

**Crocker, Abigail;** Associate Professor, Department of Mathematics and Statistics; PhD, University of Vermont

**Cole, Bernard;** Professor, Department of Mathematics and Statistics; PHD, Boston University

**Edwards, Erika;** Research Associate Professor, Department of Mathematics and Statistics; PhD, Boston University School of Public Health

**Single, Richard M.;** Associate Professor, Department of Mathematics and Statistics; PHD, SUNY Stony Brook

**Young, Jean-Gabriel;** Research Assistant Professor, Department of Computer Science, PHD, Université Laval

## STATISTICS AMP

All students must meet the Requirements for the Accelerated Master's Degree Pathway (p. 269)

### OVERVIEW

The Statistics Program offers biostatistics, statistics, data science and probability courses for the entire university community along with traditional degree programs and individually designed degree programs emphasizing statistics applied to other fields. The degree programs are designed primarily for students who plan careers in data sciences, business, actuarial science, industry, and government or advanced training in disciplines that make extensive use of statistical methods and data science. The program faculty is deeply involved in consulting and collaborative research in a wide variety of fields, including industry, agriculture, and in the basic and clinical medical sciences. These research activities along with the research of other quantitative UVM faculty offer students unique opportunities to apply their classroom training to "real world" problems. Qualified students with the goal of learning statistics to use in a specialized area of application are especially encouraged to take advantage of these cooperative arrangements.

Program faculty have active statistics research efforts in areas such as bioinformatics, statistical genetics, Bayesian models, survival data analysis, discriminant analysis, bootstrap methods, machine learning, predictive modeling, networks, categorical data analysis, measurement error models, and experimental design. Students seeking the traditional graduate degree in statistics (along with course work in mathematics and computer science, if desired) have excellent opportunities to participate in the faculty's research.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science for Accelerated Students

Students should discuss the possibility of an Accelerated Master's Entry Pathway in statistics with the respective program director as soon as they think they may be interested in this program. Students must declare their wish to enter the Accelerated Master's Entry Pathway in writing to the statistics program director (it is recommended that this happen before the end of their Junior year). They would apply to the Graduate College for admission, noting their interest in the Accelerated Master's Entry Pathway. They can receive concurrent undergraduate and graduate credit for 1 or 2 graduate level courses, once admitted. No graduate credit can be counted for statistics courses earned prior to admission to the graduate program. If declared for graduate credit, a third graduate level course can transfer to graduate degree requirements provided those credits are not used to satisfy undergraduate degree requirements.

#### Minimum Degree Requirements for the Degree of Master of Science

OPTION A (THESIS)		
A 30 credit program requiring 24 credits of statistics course work. The program must include:		
STAT 5230	Appld Multivariate Analysis	3
STAT 5310	Experimental Design	3
STAT 5510	Probability Theory	3
15 additional course credits are required. Other graduate level statistics courses or (if approved) other courses in mathematics, quantitative methods, or specialized fields of application can be selected.		15
6 credits of thesis research is required:		
STAT 6391	Master's Thesis Research	6

OPTION B (NON-THESIS)		
A 30 credit program requiring 27 credits of course work. The program must include:		
STAT 5230	Appld Multivariate Analysis	3
STAT 5310	Experimental Design	3
STAT 5510	Probability Theory	3
18 additional course credits are required. Other graduate-level statistics courses or (if approved) other courses in mathematics, quantitative methods, or specialized fields of application can be selected.		18
The research project requirement is met by taking three semester hours of:		
STAT 6810	Statistical Research	3
or STAT 6850	Consulting Practicum	

BOTH OPTIONS		
Under both options, the student is expected to participate in the colloquium series of the program and in the Statistics Student Association Journal Club. The student must pass the comprehensive examination.		

#### Comprehensive Examination

The comprehensive exam is a 3-hour exam that includes a mixture of questions spanning theoretical and applied statistics, probability, study design, and interpretation of analytical results. The questions are formatted as either numerical computation, derivation, or essay. The student can take the exam a maximum of 2 times. The exam is based on the courses STAT 5210, STAT 5230, STAT 5310, and STAT 5510. The exam is given at the end of August.

#### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of any prerequisite courses, and at least 15 graded graduate credits earned in compilation of the graduate GPA, including all core courses. A GPA of 3.00 or greater is also required.

## STATISTICS M.S.

All students must meet the Requirements for the Master's Degree (p. 270)

### OVERVIEW

The Statistics Program offers biostatistics, statistics, data science and probability courses for the entire university community along with traditional degree programs and individually designed degree programs emphasizing statistics applied to other fields. The degree programs are designed primarily for students who plan careers in data science, business, actuarial science, industry, and government or advanced training in disciplines that make extensive use of statistical methods and data science. The program faculty is deeply involved in consulting and collaborative research in a wide variety of fields, including industry, agriculture, and in the basic and clinical medical sciences. These research activities along with the research of other quantitative UVM faculty offer students unique opportunities to apply their classroom training to "real world" problems. Qualified students with the goal of learning statistics to use in a specialized area of application are especially encouraged to take advantage of these cooperative arrangements.

Program faculty have active statistics research efforts in areas such as bioinformatics, statistical genetics, Bayesian models, survival data analysis, discriminant analysis, bootstrap methods, machine learning, predictive modeling, networks, categorical data analysis, measurement error models, and experimental design. Students seeking the traditional graduate degree in statistics (along with course work in mathematics and computer science, if desired) have excellent opportunities to participate in the faculty's research.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Master of Science

A baccalaureate degree, 3 semesters of calculus, a course in matrix methods, and 1 semester of statistics. Provisional acceptance can be given prior to the completion of these requirements. Computer programming experience is highly recommended.

Current undergraduate students at the University of Vermont should contact the program director for details on the Accelerated Master's Program.

#### Minimum Degree Requirements for the Degree of Master of Science

OPTION A (THESIS)			
A 30 credit program requiring 24 credits of statistics course work, pf which at least 6 must be at the 6000-level. The program must include:			
STAT 5210	Advanced Stat Methods & Theory		3
STAT 5230	Appld Multivariate Analysis		3
STAT 5310	Experimental Design		3
STAT 5510	Probability Theory		3

12 additional course credits are required. Other graduate level statistics courses or (if approved) other courses in mathematics, quantitative methods, or specialized fields of application can be selected.		12
6 credits of thesis research is required:		
STAT 6391	Master's Thesis Research	6

OPTION B (NON-THESIS)		
A 30 credit program requiring 27 credits of course work, pf which at least 6 must be at the 6000-level. The program must include:		
STAT 5210	Advanced Stat Methods & Theory	3
STAT 5230	Appld Multivariate Analysis	3
STAT 5310	Experimental Design	3
STAT 5510	Probability Theory	3
15 additional course credits are required. Other graduate-level statistics courses or (if approved) other courses in mathematics, quantitative methods, or specialized fields of application can be selected.		15
The research project requirement is met by taking 3 semester hours of:		
STAT 6810	Statistical Research	3
or STAT 6850	Consulting Practicum	

BOTH OPTIONS	
Under both options, the student is expected to participate in the colloquium series of the program and in the Statistics Student Association Journal Club. The student must pass the comprehensive examination.	

### Comprehensive Examination

The comprehensive exam is a 3-hour exam that includes a mixture of questions spanning theoretical and applied statistics, probability, study design, and interpretation of analytical results. The questions are formatted as either numerical computation, derivation, or essay. The student can take the exam a maximum of 2 times. The exam is based on the courses STAT 5210, STAT 5230, STAT 5310, and STAT 5510. The exam is given at the end of August.

### Requirements for Advancement to Candidacy for the Degree of Master of Science

Successful completion of any prerequisite courses, and at least 15 graded graduate credits earned in compilation of the graduate GPA, including all core courses. A GPA of 3.00 or greater is also required.

## SUSTAINABLE DEVELOPMENT POLICY, ECONOMICS, AND GOVERNANCE

### OVERVIEW

<https://www.uvm.edu/~cdae>

### OVERVIEW

The Sustainable Development Policy, Economics, and Governance (SDPEG) Ph.D. program offers a transdisciplinary doctoral



education in the policies, practices and theories of sustainable development. By offering a core curriculum that includes applied policy and economic analysis, governance and process design, social science methods, and professional skills development, the program produces graduates capable of conducting original, applied research that is designed to support sustainability and resiliency across social, ecological, and technical systems.

This degree will prepare students to assume positions as policy leaders in government, higher education, public and private sector organizations, non-governmental organizations, and research institutes with the expertise and vision to inform local, state, national, and international policy.

## DEGREES

Sustainable Development Policy, Economics, and Governance Ph.D.  
(p. 249)

## FACULTY

**Aiyar, Anaka;** Assistant Professor, Department of Community Development and Applied Economics; PhD, University of California-Riverside

**Ament, Joseph;** Assistant Professor, Department of Community Development and Applied Economics; PhD, University of Vermont

**Beckage, Brian;** Professor, Department of Plant Biology; PHD, Duke University

**Bose, Pablo;** Associate Professor, Department of Geography; PHD, York University

**Conner, David S.;** Professor, Department of Community Development and Applied Economics; PHD, Cornell University

**Doran, Elizabeth;** Research Assistant Professor, Department of Civil and Environmental Engineering; PHD, Duke University

**Farley, Joshua C.;** Professor, Department of Community Development and Applied Economics; PHD, Cornell University

**Gleason, Kelsey;** Assistant Professor, Department of Medicine-Public Health; SCD, Harvard University

**Heiss, Sarah Noel;** Associate Professor, Department of Community Development and Applied Economics; PHD, Ohio University

**Koliba, Christopher J.;** Professor Emeritus, Department of Community Development and Applied Economics; PHD, Syracuse University

**Kolodinsky, Jane Marie;** Professor Emerita, Department of Community Development and Applied Economics; PHD, Cornell University

**Mays, Kate;** Assistant Professor, Department of Community Development and Applied Economics; PhD, Boston University

**McMahon, Edward;** Adjunct Associate Professor, Department of Community Development and Applied Economics; EDD, University of Vermont

**Ramirez-Harrington, Donna;** Associate Professor, Department of Economics; PHD, University of Illinois at Urbana-Champaign

**Reynolds, Travis;** Assistant Professor, Department of Community Development and Applied Economics; PHD, University of Washington

**Rowangould, Dana;** Assistant Professor, Department of Civil and Environmental Engineering; PHD, University of California, Davis

**Rowangould, Gregory;** Associate Professor, Department of Civil and Environmental Engineering; PHD, University of California, Davis

**Seguino, Stephanie;** Professor Emerita, Department of Economics; PHD, American University

**Shrum, Trisha R.;** Assistant Professor; Department of Community Development and Applied Economics; PHD, Harvard University – John F. Kennedy School of Government

**Tobin, Daniel;** Associate Professor, Department of Community Development and Applied Economics; PHD, Pennsylvania State University

**Wang, Qingbin;** Professor, Department of Community Development and Applied Economics; PHD, Iowa State University

**Zia, Asim;** Professor, Department of Community Development and Applied Economics; PHD, Georgia Institute of Technology

## SUSTAINABLE DEVELOPMENT POLICY, ECONOMICS, AND GOVERNANCE PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree

### OVERVIEW

The Sustainable Development Policy, Economics, and Governance (SDPEG) Ph.D. program offers a transdisciplinary doctoral education in the policies, practices and theories of sustainable development. By offering a core curriculum that includes applied policy and economic analysis, governance and process design, social science methods, and professional skills development, the program produces graduates capable of conducting original, applied research that is designed to support sustainability and resiliency across social, ecological, and technical systems.

This degree will prepare students to assume positions as policy leaders in government, higher education, public and private sector organizations, non-governmental organizations, and research institutes with the expertise and vision to inform local, state, national, and international policy.

### SPECIFIC REQUIREMENTS

#### Requirements for Admission to Graduate Studies for the Degree of Doctor of Philosophy

- Completion of a master's degree in public policy, public administration, economics, natural resources, engineering, ecology, food systems, political science or a closely related field, including social sciences, professional fields, and STEM
- Completion of 1 master's level statistical methods course (or option to take CDAE 6590 Applied Econometrics in first matriculated year)
- Completion of 1 master's level course in research methodology (or option to take CDAE 6510 Research and Evaluation Methods in first matriculated year)
- Completion of 1 master's level course in economics (or option to take CDAE 6540 Advanced Microeconomics in first matriculated year)

- Completion of 1 master’s level course in Policy Process Theory (or option to take PA 6060 Policy Systems in first matriculated year)
- Resume or Curriculum Vitae
- Applicants must submit evidence of experience and success in the research process such as writing sample(s), and/or evidence of research experience(s) (e.g., term papers, class projects, research reports and/or other descriptions of past research experience from academic or professional lives).
- January 15th application deadline for funding consideration. Otherwise rolling admissions.
- Prior to applying, applicants should take the admissions survey on the SDPEG web page.
- The Graduate Record Exam (GRE) is optional.
- For international students whose native language is not English or who have not completed undergraduate or master’s degrees in English, scores from the Test of English as a Foreign Language (TOEFL), the English Language Testing System (IELTS), or Duolingo must be submitted.

**Minimum Degree Requirements**

The degree requires a total of 75 credits. A minimum of 51 credits must be completed in residence. The residency requirement is completed by courses that are taken for graduate credit through the University of Vermont, and are taken after the student has been admitted to the Graduate College.

- 15-credit core
- Up to 24 transfer credits from prior master’s degree (12 out of 24 transferable credits must meet pre-requisite requirements in statistical methods, research methodology, economics and policy process theory)
- 15 credits of a pre-approved Certificate of Graduate Study or a customized sequence of advisor-approved graduate level elective courses
- 21 dissertation research credits

The program’s course of study includes a 15-credit core, the option to transfer in up to 24 credits of prior master’s degree credits and the pursuit of a pre-approved Certificate of Graduate Study (or 15 to 18 credits of electives that are approved by student advisor), and 21 dissertation research credits.

The 15-credit core includes:

CDAE 7710	Sustain Dev Policy & Gov	3
CDAE 7700	Political Econ of Sustain Dev	3
PA 6080	Decision Making Models	3
or PA 6110	Policy Analysis&Program Eval	
or EDRM 6110	Qualitative Research I	
CDAE 7991	Internship	3

Doctoral Seminar (CDAE 7000) must be taken 3 times	3
<b>Total Credits</b>	<b>15</b>

Doctoral students enrolled in the program are encouraged to pursue 1 of UVM’s certificates of graduate study including, but not limited to: Ecological Economics, Community Resilience and Planning, Agroecology, Public Health, Sustainable Enterprise, Complex Systems and Data Science, and any relevant new certificate programs; or any 15-credit sequence of electives with advisor permission.

**Comprehensive Examination**

A written comprehensive examination must be passed by the candidate at least 6 months before the dissertation is submitted. Upon submission of written comprehensive exam, an oral comprehensive exam is required within 1 months’ time of submission. The oral comprehensive exam defense must be passed as well as the written exam in order to officially “pass” the comprehensive exam. Success in the written and oral comprehensive examination is a prerequisite for standing for the Dissertation Oral Defense Examination and to officially reach “doctoral candidate” status.

**Requirements for Advancement to Candidacy for the Degree of Doctor of Philosophy**

Students will advance to candidacy following completion of the core and elective curriculum, passage of a written and oral comprehensive exam, passage of the written dissertation and oral dissertation defense exam, and acquisition of teaching experience in the field of sustainable development policy, economics and governance. A GPA of 3.0 must be maintained.

**TRANSDISCIPLINARY LEADERSHIP AND CREATIVITY FOR SUSTAINABILITY**

<http://www.uvm.edu/rsenr/>

**OVERVIEW**

The Ph.D. in Transdisciplinary Leadership & Creativity for Sustainability (TLCS) program will prepare students to sustain rigorous, collaborative, and original scholarly knowledge production practices across community, organizational, ecological, and social movement settings to address complex challenges from a place of creativity. This Ph.D. program is rooted in a tradition of engaged scholarship that recognizes the inseparability of environmental and social challenges, as well as the interdependence of cultural and biological diversity. Anchored by the wisdom and experience of a global community, the TLCS program is made up of practitioner scholars who embody relational leadership and knowledge generation practices rooted in lineages and traditions that stand for love, relationship, reciprocity and solidarity.

**DEGREES**

Transdisciplinary Leadership and Creativity for Sustainability Ph.D. (p. 251)

## FACULTY

**Bose, Pablo Shiladitya;** Associate Professor, Department of Geography and Geosciences; PHD, York University

**Clark/Keefe, Kelly;** Associate Professor, Department of Education; EDD, University of Vermont

**Erickson, Jon;** Professor; Rubenstein School of Environmental and Natural Resources; PHD, Cornell University

**Fisher, Brendan;** Professor, Rubenstein School of Environment and Natural Resources; PHD, University of Vermont

**Georgiou, Elena;** Adjunct Assistant Professor, Rubenstein School of Environment and Natural Resources; MA, City University of New York

**Ivakhiv, Adrian J;** Professor, Rubenstein School of Environment and Natural Resources; PHD, York University

**Kapil, Bhanu;** Adjunct Associate Professor, Rubenstein School of Environmental and Natural Resources; MA, SUNY Brockport

**Kolan, Matthew Peter;** Senior Lecturer; Rubenstein School of Environment and Natural Resources; PHD, University of Vermont

**Laine Talley, Heather;** Adjunct Assistant Professor, Rubenstein School of Environmental and Natural Resources; PHD Vanderbilt University

**Mayo, Kris;** Professor, Department of Education; PHD, University of Illinois at Urbana-Champaign

**Mendez, Victor E.;** Professor, Department of Plant and Soil Science; PHD, University of California Santa Cruz

**Panikkar, Bindu;** Assistant Professor, Rubenstein School of Environment and Natural Resources; PHD, Tufts University

**Pinto, Sayra;** Adjunct Assistant Professor, Rubenstein School of Environmental and Natural Resources; PHD, The Union Institute and University

**Reyes, Cynthia C.;** Associate Professor, Department of Education; PHD, University of Illinois at Chicago

**Stepenuck, Kristine F.;** Extension Assistant Professor, Rubenstein School of Environment and Natural Resources, PHD; University of Wisconsin-Madison

**Vea, Marie C.;** Research Assistant Professor, Rubenstein School of Environment and Natural Resources; Ed.D., University of Vermont

**Vivanco, Luis A.;** Professor, Department of Anthropology; PHD, Princeton University

**Wollenberg, Eva (Lini);** Research Professor, Rubenstein School of Environmental and Natural Resources; PHD, University of California, Berkeley

## TRANSDISCIPLINARY LEADERSHIP AND CREATIVITY FOR SUSTAINABILITY PH.D.

All students must meet the Requirements for the Doctor of Philosophy Degree (p. 275)

### OVERVIEW

The Ph.D. in Transdisciplinary Leadership & Creativity for Sustainability (TLCS) program will prepare students to sustain rigorous, collaborative, and original scholarly knowledge production practices across community, organizational, ecological, and social movement settings to address complex challenges from a place of creativity. This Ph.D. program is rooted in a tradition of engaged

scholarship that recognizes the inseparability of environmental and social challenges, as well as the interdependence of cultural and biological diversity. Anchored by the wisdom and experience of a global community, the TLCS program is made up of practitioner scholars who embody relational leadership and knowledge generation practices rooted in lineages and traditions that stand for love, relationship, reciprocity and solidarity.

### SPECIFIC REQUIREMENTS

#### REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

Applicants must have already obtained a master's degree to apply to the Ph.D. in TLCS program. In addition to the Graduate College Application, applicants must submit a Statement of Purpose, Leadership Portfolio, three letters of recommendation, college transcripts, and a resume or C.V.

#### MINIMUM DEGREE REQUIREMENTS

The Doctor of Philosophy requires 75 total credits (including NR 6110: Leadership for Sustainability, NR 6880: Ecological Leadership Seminar, NR 6120: Power, Privilege, and Catalyzing Change, NR 6720: Transdisciplinary Leadership & Creativity, and NR 6730: Transdisciplinary Methods and Modes of Inquiry). Students may transfer up to 24 approved master's credits. Of the remaining 51 required credits, 15 total graded course credits are required. At least 9 graded credits must be at the 6000- or 7000-level. Credits must include no less than 20 and no more than 45 credits of dissertation research. In addition, students must complete a public proposal defense, an approved research proposal, a written and oral comprehensive examination, and a teaching/professional skills requirement. An oral defense of the dissertation is required of all students.

#### COMPREHENSIVE EXAMINATION

Following the completion of the dissertation proposal (at the beginning of year 3) students will take their Comprehensive Exam which will be overseen by each student's studies committee. The examination will be comprised of a 3-part written exam and an oral exam and must occur at least 6 months before the dissertation is submitted.

#### REQUIREMENTS FOR ADVANCEMENT TO CANDIDACY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

It is ordinarily expected that a student will complete the following requirements for advancement to candidacy:

- at least 12 credits of dissertation research (NR 7491).
- at least 30 credits at the graduate level acceptable to the student's graduate studies committee, with a minimum of 15 of the course credits graded and taken at UVM after matriculation into the degree program.

## ACADEMIC AND ENROLLMENT POLICIES

This section of the Graduate Catalogue includes academic and enrollment policies and information for graduate students.

- Change of Graduate Program (p. 252)
- Conferral of Graduate Degrees (p. 252)
- Continuous Graduate Registration (p. 252)
- Enrollment Policies and Procedures (p. 253)
- Grading Policies (p. 258)
- Inactivation, Deactivation and Reactivation (p. 259)
- Leave of Absence (p. 259)
- Requirements for Visiting Graduate Students (p. 259)
- Rights and Responsibilities (p. 260)
- Time Limits for Graduate Degree Completion (p. 261)
- Transfer Credit and Credit by Examination (p. 262)
- Withdrawal from a Graduate Degree Program (p. 263)

## CHANGE OF GRADUATE PROGRAM

If an admitted student wishes to change to a different graduate program offered at UVM, a request must be made by the student, via online form, to the Dean of the Graduate College. Upon receipt of the request and any new supporting materials, the student's file will be forwarded to the desired program for review. That program may require additional materials or a new complete application for consideration. If both the faculty of the desired program and the Dean of the Graduate College approve, the formal transfer of program is made in the Graduate College office with notification to the former program, new program, student, and registrar. To complete the process, the student should provide an outline indicating all credits earned in the previous program that will count towards the new program and the components necessary to complete the new program (such as the comprehensive exam or required courses). This outline should be signed by the student and the program director of the new program and sent to the Dean of the Graduate College. The time limit for completion of the degree runs from the date of matriculation in the new program; however, all course credits applied to the program must be earned within 3 years of completion for a micro-Certificate of Graduate Study; 5 years of completion for a Certificate of Graduate Study; 7 years of completion for master's and doctoral (professional) degree; and 9 years for the Doctor of Philosophy degree.

## CONFERRAL OF GRADUATE DEGREES

Degrees are conferred in August, October, January, and May of each year. Diplomas are issued at Commencement in May and mailed in August, October, and January.

It is the graduate student's responsibility to make sure that their name has been submitted to their department or program and to the Office of the Dean of the Graduate College for graduation by completing an Intent to Graduate form by the published date for the cycle in which they plan to complete their degree requirements: June 1st (for August graduation); August 1st (for October graduation); October 1st (for January graduation); and February 1st (for May graduation).

## GRADUATE STUDENT COMMENCEMENT WALK POLICY

Only graduate students who have completed all degree requirements are eligible to walk in the UVM Graduate College Ceremony held each May. For thesis and dissertation students, degree requirements include the passing of a defense examination and the submission of a final copy of their thesis or dissertation approved by the Graduate College through ProQuest.

## CONTINUOUS GRADUATE REGISTRATION

Students who are actively working toward their degree completion and have completed enrollment in all credits required for the degree, but have not completed all graduation requirements, must enroll each semester for Continuous Registration and pay a flat \$100 - \$300 tuition fee for Continuous Registration each semester (Fall and Spring) until all degree requirements are completed, including resolving incomplete grades, passing the comprehensive examination, or completing a thesis or dissertation.

Continuous Registration is graded SP/UP. Continuous Registration credits appear in the credit totals on a student's transcript but do not count towards the credits required to earn the graduate degree.

Students who are working at the full-time level of nine or more credit equivalency register for GRAD 9030 in their discipline, pay a Continuous Registration fee of \$300, and must pay the Health Center fee required of full-time students (\$431.50). Students working at less than full time, but at least half time (5 to 8 credit equivalency) register for GRAD 9020 in their discipline, pay a Continuous Registration fee of \$200, and must pay the Health Center fee (\$431.50) if they elect to purchase the UVM health insurance. Students working at less than half time (1/4 to 4 credit equivalency) register for GRAD 9010 in their discipline and pay a Continuous Registration fee of \$100.

The following chart describes the characteristics of each level of registration:



	<b>Effort Expectation</b>	<b>Credit Equivalency</b>	<b>Attributes of Enrollment Designation</b>
GRAD 9010	Less than Half Time - 1-16 hours effort per week	1/4 TO 4 <sup>1</sup>	Catcard, library, fitness center and bus privileges
GRAD 9020 <sup>2</sup>	At least Half Time, but less than Full Time - 20-32 hours effort per week	5-8	Catcard, library, fitness center and bus privileges; loan deferral, eligible to enroll in UVM Student Health insurance, federal financial aid eligibility, eligible for GTA/GRA funding
GRAD 9030 <sup>3</sup>	Full Time - at least 36 hours effort per week	9 or more	Catcard, library, fitness center and bus privileges; loan deferral, health insurance required <sup>4</sup> , federal financial aid eligibility, eligible for GTA/GRA funding, ski pass eligibility

<sup>1</sup> Typically, students would register for 1-4 credits for an effort of 4-16 hours/week. However, for minimal required effort, such as sitting for a comprehensive exam a couple of days into the semester with no other requirements, students may register for ¼ credits.

<sup>2</sup> Students funded as a half time GTA, GRA or GA (10 hours per week) must be enrolled in at least 5 credits, so must register for GRAD 9020 or GRAD 9030.

<sup>3</sup> Students funded as a full time GTA, GRA or GA (20 hours per week) must be enrolled in at least 9 credits, so must register for GRAD 9030.

<sup>4</sup> Students enrolled in GRAD 9030 must provide proof of health insurance coverage or purchase UVM Student Health Insurance and must pay the UVM Student Health fee if UVM Student Health Insurance is chosen.

## ENROLLMENT POLICIES AND PROCEDURES

### REGISTRATION

Consult the UVM Academic Calendar and the Registration Schedule for registration dates. Students should consult with their program advisor before registration. Students register for courses at the time and in the manner designated by the university registrar. Early registration is encouraged for both new and presently enrolled graduate students. Students may not register for courses unless tuition and fees for any current and prior semesters have been paid.

### GRADUATE COURSE LEVELS

Courses that may apply towards a graduate program are numbered 5000 and above.

5000-level courses are entry level graduate courses and are open by default to graduate, undergraduate, and Professional and Continuing Education (PACE) students without approval. They are limited to graduate students only when the prerequisite states 'Graduate student'.

6000-level courses are Master's level courses and are open to all graduate students. Undergraduate and PACE students may enroll with Instructor permission.

7000-level courses are Doctoral level courses. Master's students may enroll with instructor permission. PACE students who hold a baccalaureate degree may enroll with Instructor permission. Undergraduate students may only enroll in specifically approved programs.

### COURSE LOADS

Generally, full-time graduate students enroll for 9 to 12 credit hours per semester, with normal maximum enrollment being 15 credits per semester and 9 hours summer. Enrollment in excess of 15 credits requires written approval from the student's advisor and the Dean of the Graduate College.

### CATALOGUE EDITION REQUIREMENT

Students must comply with the degree requirements as stated in a single catalogue edition in place during the time they are enrolled. The catalogue edition to be followed is the one in effect at the time the student matriculates at UVM. Students who would like to follow an edition that is published subsequently during their enrollment at UVM must submit a request in writing, endorsed by their program director, to the Dean of the Graduate College. Students may not mix requirements from different catalogues.

### AUDITING CLASSES

Students wishing to regularly attend a course, but not receive credit, may register as an auditor, with the approval of the Dean of the Graduate College and the instructor. Auditors have no claim on the time or service of the instructor. Students must meet minimum levels of performance set by the instructor at the time of registration in order to receive an audit grade. Tuition is charged at the applicable

rate. Under no circumstances will changes be made after the add/drop period to allow credit for courses audited. Tuition scholarships accompanying graduate assistantships do not cover tuition for audited courses.

### ADD/DROP

Courses may be added through the first 5 instructional days of the semester without instructor permission, unless indicated. Adding a course between the 6th and 10th instructional day will be at the discretion of the faculty member and will occur by means of a faculty override. Courses may be dropped through the first 10 instructional days of the semester. During summer and winter sessions, the add/drop period varies from course to course depending on when the class begins and how long it runs. Withdrawing from a course after add/drop will result in a partial or no tuition refund; being added to a new course after add/drop will result in a tuition charge. Add/drop dates may be viewed on the Academic Calendar on the Registrar's Office website.

For Part of Term courses, add/drop dates vary from full term courses and may be viewed on the Academic Calendar- Parts of Term page on the Registrar's Office website.

### WITHDRAWAL FROM COURSES

From the 11th day of instruction until the 2nd business day after the 60% point in the semester, students may withdraw from courses. To do so, students must use the registration system to withdraw from the course. The student's advisor(s) and dean(s) will be notified. The instructor(s) will be aware of the withdrawal by the Withdraw status on the class roster and the presence of a grade of W on the grade roster.

Between the 2nd business day after the 60% point in the semester and the last day of classes, students may withdraw from 1 or more courses only by demonstrating to the Graduate College Dean's Office, through a written petition, that they are unable to continue in the course(s) due to circumstances beyond their control. Such petition must contain conclusive evidence, properly documented, of the illness or other situation preventing completion of the course(s). Acceptable reasons do not include dissatisfaction with performance or expected grade, dissatisfaction with the course or instructor, or desire to change major or program. If the petition is approved, a grade of W will be assigned and recorded on the student's permanent record. If the petition is denied, the instructor(s) will assign a final grade in accordance with the same criteria applied to all other students in the course(s). Final decisions rest with the Graduate College.

Withdrawals will be permitted after the last day of classes only when the student was incapacitated before the end of the term and unable to process a late withdrawal request. To be considered, the request must be made within 60 days of the end of the term in which the course was taken, or before the end of the add/drop period of the subsequent term attended, whichever is sooner. Final decisions rest with the Graduate College.

In all instances, withdrawal grades remain on the permanent academic record, but will not affect the grade-point average. Withdrawn courses are included in the number of credits used for billing purposes.

### DEFINITION OF A CREDIT HOUR

The Faculty Senate has defined a University of Vermont credit hour as follows:

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester hour of credit or the equivalent amount of work over a different amount of time; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.
3. "Direct faculty instruction" must include regular and substantive faculty/student contact regardless of delivery mode (for example, face-to-face, hybrid, distance/online).

Semester courses must span the full term (15 weeks in fall and spring) of the semester in which they are offered, with a minimum of 45 hours of total effort per credit. Part-of-Term courses in the semester or summer must span the full part-of-term in which they are offered and distribute the 45 hours of effort per credit over a shorter time window.

### UNDERGRADUATE STUDENT COURSE ENROLLMENT FOR GRADUATE CREDIT (NON-ACCELERATED MASTER'S STUDENTS)

UVM Senior undergraduates may enroll for up to 6 graduate credits (5000- or 6000-level) at UVM that can transfer into a UVM graduate program after completion of the bachelor's under the following circumstances: the student must be enrolled in 12 credits (per semester) that are required for their undergraduate degree; courses must be graded and cannot be independent study, practicum, internship, or research credit courses. This graduate level credit can be used as transfer credit into a UVM graduate program if the course is deemed appropriate by the student's advisor for the particular graduate program and the student earned a grade of B or better. The transfer is credit only (not grade) and does not count towards the minimum graded credit required after matriculation into the graduate program. Other institutions may not accept such credit, earned before award of the bachelor's degree, in transfer to their graduate programs.

### NON-DEGREE STUDENT COURSE ENROLLMENT FOR GRADUATE CREDIT

Graduate Credit earned at UVM after completion of the Bachelor's Degree but prior to admission to a graduate program is transfer credit; only the credit and not the grade is transferred and is subject to the transfer of credit policy.

Non-degree students who enroll in graduate-level courses may transfer the credits into a graduate degree provided they meet the transfer of credit policy.

## DISTANCE EDUCATION STUDENT STATUS

A distance education student is a student whose primary affiliation with UVM is as a student matriculated in a distance education degree or academic certificate program where the majority of content is delivered at a distance. There may be a minimal residency component of the program that is exclusively available to the matriculated distance education students. A distance student may not register for an on-campus course; however a residential student may register for courses offered through a distance program on a space availability basis.

Students are billed according to their primary affiliation with UVM. These categories are residential or distance and may be program specific. When tuition differs between these categories, tuition is billed according to the primary affiliation of the student for any courses taken.

## ACADEMIC PROBATION AND DISMISSAL ON ACADEMIC GROUNDS

The Graduate College expects students to make satisfactory progress toward their degrees by enforcing minimum standards. Students not making satisfactory progress are subject to academic probation.

### Criteria for Satisfactory Academic Progress

The Graduate College sets the minimum standards for satisfactory academic progress. Programs may impose additional criteria beyond the Graduate College's for determining a student's academic standing.

There are four sets of criteria that the Graduate College considers in determining whether or not students are making satisfactory academic progress:

- Grades and cumulative GPA: A student whose overall (cumulative) grade average is below B (3.000 GPA), who has two or more grades below a B (3.00), or who receives a U (Unsatisfactory) or UP (Unsatisfactory Progress) in Thesis or Dissertation Research, Seminar or Clinical Practicum, is not making satisfactory academic progress and will be placed on academic probation by the Graduate College. Individual programs may have stricter criteria and can determine independently from the Graduate College that a student is not meeting grade and/or cumulative GPA requirements in the program and should be placed on program-level academic probation or be considered for dismissal from their graduate program with the concurrence of the Graduate College.
- Milestone deadlines: Ph.D. students who have not been admitted to candidacy (have not passed the qualifying exam) by the end of their third year, or who have not completed the dissertation proposal (prospectus) by the end of the fourth year are not making satisfactory academic progress and will be placed on academic probation by the Graduate College. For students on an approved leave of absence, the degree deadline will be extended accordingly. Individual programs may have earlier deadlines or additional milestones and can determine independently from the Graduate College that a student is not making satisfactory progress toward milestones.
- Annual Review for Ph.D. students: Ph.D. students who receive an "unsatisfactory" rating in their annual academic progress review will be placed on academic probation by the Graduate College.
- Program length: Ph.D. students must complete all requirements for the Ph.D. within nine years of initial registration in the Graduate College. Master's students must complete all requirements for the master's degree within five years of initial registration. For students on an approved leave of absence, the degree deadline will be extended accordingly. Students who do not complete degree requirements by the established deadlines will be placed on academic probation by the Graduate College. Individual programs may have stricter criteria for timely degree completion and can determine independently from the Graduate College that a student is not making satisfactory progress toward degree completion.

Programs may have criteria beyond the Graduate College's criteria for determining a student's academic standing. Examples of these additional criteria could include, but are not limited to: unsatisfactory performance in classes, unsatisfactory performance on qualifying exams, unsatisfactory research progress, unsatisfactory progress in writing the dissertation, failure to communicate with program and/or advisor, or failure to meet additional requirements outlined in a program's handbook or annual progress communications.

All programs must clearly and directly reference in their materials (in a printed handbook and/or on their website) any program-specific standards, requirements, and disciplinary policies to the extent that they differ from the Graduate College's policies.

Failure to make satisfactory academic progress as determined by either the Graduate College or the program will result in academic probation or dismissal on academic grounds.

Students will be dismissed from their graduate program if they fail the comprehensive examination or a thesis or dissertation defense on both the first and second attempt.

### The Graduate College's Academic Probation

When a student fails to meet any of the sets of criteria established by the Graduate College for maintaining satisfactory academic progress, the student will be placed on academic probation by the Graduate College.

The Graduate College will notify the student, as well as the director of their graduate program, in writing. The student will be given until the end of the semester following the semester when probationary status was triggered to resume satisfactory academic standing. Programs are expected to provide tailored support to students on their path toward remediation. During the Graduate College-imposed probationary period, students other than those who have exceeded their degree deadline will remain eligible to receive federal and institutional funding. At the end of the probationary period, progress will be reviewed by the Graduate College. If a student does not re-establish

satisfactory academic standing during the probationary period and does not successfully petition for an extension of the probationary period, the student will become ineligible to receive financial aid and will be dismissed from the Graduate College.

### PETITIONING THE GRADUATE COLLEGE FOR AN EXTENSION OF THE PROBATIONARY PERIOD

Students who have not achieved the Graduate College's minimum GPA requirement or exceeded the Graduate College's milestones or degree deadlines and do not remediate within the probationary period may petition the Graduate College for a one-time extension of the one-semester probationary period. Extensions of the probationary period will be granted only in exceptional circumstances when there are extraordinary reasons beyond the student's control that have been discussed in advance of the initial probation deadline between the student and their program (faculty advisor and Program Director).

The petition must include:

- The specific length of the extension including the exact date by which the requirement(s) will be met. The extension time frame should be realistic, as there is no opportunity for additional extension of the probationary period.
- A rationale for the extension that explains the extraordinary reason(s) the requirement(s) could not be met by the deadline or within the initial probationary period. Detailed personal information is not required, but some explanation of the delay is necessary for the Graduate College to consider a petition.
- A detailed timeline for meeting the requirement(s) including what work remains to be completed and the specific timeline, with proposed deadlines by which that work will be completed within the extension period.
- A detailed letter of support for the extension from the student's academic/research advisor that endorses the length of the extension and the timeline for meeting requirements and addresses the plan's feasibility.
- Signatures from the student's academic/research advisor and the Program Director.

The petition must be submitted for the attention of the Associate Dean for Academic Affairs, Graduate College, no later than seven (7) calendar days before the grading deadline of the initial probationary period. Incomplete and/or late petitions will not be accepted.

### Program-Level Academic Probation

As noted above, programs may have additional or more strict criteria beyond the Graduate College's sets of criteria for determining a student's academic standing and may have their own probation process. When a program determines that a student is not making adequate academic progress, the program may place the student on probation in accordance with the probation process and for a period of time outlined in the program's handbook and in direct written communication to the student. When a program decides to place a student on probation, the student and the Graduate College must be notified in writing. Students who are placed in probationary status by their program are not eligible to change their degree objective or transfer to another academic program within the Graduate College.

Programs are expected to provide tailored support to students on their path toward remediation.

### Dismissal on Academic Grounds

A student who is on academic probation with the Graduate College and fails to resume satisfactory academic standing at the end of their Graduate College probationary period will be dismissed from the Graduate College on academic grounds. The dismissal decision is final when the Graduate College dismisses a student who does not meet one or more of the Graduate College's sets of criteria for satisfactory academic progress and who has failed to remediate within the Graduate College's probationary period. In such cases, there is no process for appeal and the dismissal will take effect immediately.

A student who has failed to make satisfactory academic progress according to program-specific criteria, or failed to remediate during a program-specific probation period, may be dismissed by the program with the concurrence of the Associate Dean of Academic Affairs in the Graduate College. A program can initiate a student's dismissal on academic grounds when:

- the criteria for dismissal have been stated clearly by the program, either in a handbook or via direct written communication to a student, and have been disseminated to students effectively; and
- the decision to dismiss is made by the program faculty or a subset of faculty which includes the Program Director. No individual faculty member may dismiss a student.

Funding will cease on the effective date of the dismissal. When a student is dismissed by the program, the student has an opportunity to appeal the decision to the Graduate College. When a student appeals the program's decision, the student remains an active student while the appeal is under review. In the event the appeal is denied, the dismissal takes effect after the appeal process has concluded.

### NOTIFICATION OF "DISMISSAL ON ACADEMIC GROUNDS"

When the Graduate College determines that a student is to be dismissed, both the program and the student will be informed in writing (email communication is considered to be "in writing") within five (5) business days of the determination.

When a decision to dismiss a student is initiated by the program and enacted with the concurrence of the Graduate College, the student must be informed in writing within five (5) business days of the decision.

Dismissal notifications must include the effective date of the dismissal, a clear statement of the reason(s) for dismissal, and details of any applicable appeals process.

### Appeal Process for Dismissal Initiated by Program with Concurrence of the Graduate College

Students wishing to appeal a dismissal decision related to program-specific standards may appeal the final program dismissal decision to the Dean of the Graduate College. To appeal a program decision, students must submit an appeal in writing to the attention of the Dean of the Graduate College within fourteen (14) calendar days



of the date of the program's final written determination of dismissal to the student. The appeal must specify the basis for the appeal and include any supporting materials. If no appeal is filed within the fourteen-day appeal period, the program's decision becomes final and not subject to appeal.

The only grounds for appeal are as follows:

- procedural errors within the program's dismissal process that may have materially and unfairly affected the dismissal decision;
- new information discovered after the program's dismissal decision that could not have reasonably been available at the time of the dismissal and is of a nature that could materially change the outcome;
- program's decision to dismiss the student was manifestly contrary to the weight of the information presented (i.e., obviously unreasonable and unsupported by the great weight of information) and/or showed clear abuse of discretion.

Appeals of program dismissals are reviewed by the Dean of the Graduate College who may request additional information from, or a meeting with, the student and/or program before making a final decision. Students may have a support person accompany them to any meetings related to the appeal; this person may not be legal counsel. If the Dean does not find that any of the aforementioned grounds for appeal are present, the Dean will uphold the outcome of the program. If the Dean finds that grounds for appeal are valid, they may amend the decision of the program. The Dean's decision will be made within thirty (30) calendar days of the submission of the appeal and will be communicated in writing to both the student and the program. When resolution cannot be achieved within thirty (30) calendar days, students and programs will be informed in writing of the delay and the final disposition will be achieved as quickly as possible. The Dean's decision is final.

## DISMISSAL ON PROFESSIONAL GROUNDS

Students whose professional integrity is deemed unsatisfactory at any time may be dismissed from the Graduate College by the Dean upon consultation with the student's department or program. Breaches of professional integrity include, but are not limited to, violations described in the Misconduct in Research Policy, violation of the Code of Academic Integrity, and actions that violate the professional standards for conduct, integrity, and ethics in an academic discipline and profession or in duties associated with an assistantship.

## FERPA RIGHTS DISCLOSURE

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. These rights include:

1. The right to inspect and review one's own student education record within 45 days of the day the university receives a request for access. Written requests for access should be submitted by the student to the university registrar, or, if appropriate, the dean of students, the dean of the student's college or school, or other school official with control over the student education record they would like to inspect and review. The written request must

contain sufficient detail to identify the record(s), as well as the identity of the person(s) who may be provided access, other than the student, if any. If the records are not maintained by the school official to whom the request is submitted, that official shall advise the student of the correct school official to whom the request should be addressed. The school official with control over the requested records will make arrangements for access and notify the student of the time and place where the records may be inspected.

2. The right to request amendment to one's own student education record if the student believes such record to be inaccurate, misleading, or otherwise in violation of the student's privacy rights under FERPA. To seek amendment of a student education record, the student must write to the school official responsible for the record at issue. The written request must clearly identify the part of the student education record they want changed, specifying why it is inaccurate, misleading, or otherwise in violation of their privacy rights under FERPA. Following review of the request, if the university decides not to amend the student education record, the university will notify the student in writing of the decision and advise them of their right to a formal hearing regarding the request. Information about the hearing procedures for such an appeal will be provided to the student as part of the written decision letter. After the hearing, if the university decides not to amend the student education record, the student has the right to place a statement with the applicable portion of their student education record setting forth their view about the contested information.
3. The right to provide written consent prior to disclosures of personally identifiable information contained in one's own student education record, except to the extent that FERPA authorizes disclosure without consent. Common exceptions to written consent include, but are not limited to:
  4. The disclosure of a student education record to a school official, within or otherwise acting on behalf of UVM, with a legitimate educational interest.
  5. The disclosure of a student education record to officials of another institution of post secondary education where the student seeks or intends to enroll, or where the student is already enrolled, so long as the disclosure is for purposes related to the student's enrollment or transfer.
  6. The disclosure of a student education record to outside law enforcement officials, mental health officials, and other experts in the community in the event of a health or safety emergency, or to assess a potential threat. Student education records may also be disclosed to a parent or legal guardian when their student is experiencing a health or safety emergency.
  7. The disclosure of student disciplinary records to a parent or legal guardian when a student under the age of 21 has violated the law or university policy concerning the use or possession of alcohol or a controlled substance.
  8. The disclosure of the final results of a disciplinary proceeding conducted by the institution, regardless of whether the institution concluded a violation was committed, to an alleged victim of any crime of violence or non-forcible sex offense.

9. The disclosure is to comply with a judicial order or lawfully issued subpoena.
10. The information is considered “directory information” and the student has not taken formal action to restrict its release.
11. The right to file a complaint with the U.S. Department of Education concerning alleged failures by the University of Vermont to comply with the requirements of FERPA. The name and address of the office that administers FERPA is:

Family Policy Compliance Office

U.S. Department of Education

400 Maryland Avenue, SW

Washington, DC 20202-5920

More detailed information is available on the FERPA Policy webpage.

## GRADING POLICIES

Grades are reported and recorded as letter grades. Graduate Students do not receive a grade of D. Student grade point averages (GPA) are calculated from quality point equivalents noted here:

Grade		Points/Credits
A+	Excellent	4.00
A	Excellent	4.00
A-	Excellent	3.67
B+	Good	3.33
B	Good	3.00
B-	Good	2.67
C+	Fair	2.33
C	Fair	2.00
C-	Fair	1.67
F	Failure	0.00
AF	Administrative Failure due to a missing grade. <sup>1</sup>	
XF	Failure resulting from academic dishonesty. <sup>2</sup>	

<sup>1</sup> The AF grade is equivalent to the grade of F in the determination of grade point averages and academic standing (Effective spring, 2017).

<sup>2</sup> The XF grade is equivalent to the grade of F in the determination of grade point averages and academic standing. (Effective fall, 2005)

A candidate for a graduate degree must complete the program with a minimum overall grade-point average of 3.00.

A course may be repeated for credit only when failed and only once. Both grades remain on the student's transcript, but only the second grade will be considered when determining GPA. Students who retake a failed course must notify the Graduate College when the retake is complete so Graduate College staff can work with the

Registrar's Office to remove the failed course from the student's GPA calculations.

In certain instances, grades are assigned that will appear on the transcript, but will not be used in grade point calculation. These grades are:

AU	Audit (see below)
INC	Incomplete (see below)
S/U	Satisfactory/Unsatisfactory (see below)
SP/UP	Satisfactory Progress/Unsatisfactory Progress (see below)
W	Withdrawn
AUP	Administrative Unsatisfactory Progress

**AU:** Students wishing to regularly attend a course, but not receive credit, may register as an auditor, with the approval of the dean and the instructor. Auditors have no claim on the time or service of the instructor. Students must meet minimum levels of performance set by the instructor at the time of registration in order to receive an audit grade. Tuition is charged at the applicable rate. Under no circumstances will changes be made after the add/drop period to allow credit for courses audited. Graduate College tuition scholarships do not cover courses taken for Audit.

**INC:** This grade may be assigned when course work is not completed for reasons beyond the student's control. Incompletes require the approval of the Graduate College dean. The incomplete course requirement will be satisfied at the earliest possible date, but not longer than the beginning of the corresponding semester of the next academic year. In cases of laboratory assignments, the student must complete all work the first time that the laboratory experience is offered again. Instructors will fill out an electronic incomplete grade exception request to the Graduate College dean and include the reason for the incomplete as well as the completion date agreed to by the student and instructor. It is the student's responsibility to learn from the Graduate College dean whether the request has been approved, the expected date of completion, and, from the instructor, the nature of all outstanding requirements.

Incompletes may be approved due to extenuating medical, academic, or personal circumstances beyond the student's control. An incomplete can only be issued with the agreement of the Dean's Office, the faculty member, and the student. The student's Dean's Office is responsible for deciding whether a student's circumstances meet the criteria for an incomplete, after which the faculty member determines whether to offer the incomplete based on established guidelines (link to RO page <https://www.uvm.edu/registrar/grades>). The faculty member will also establish the timeline for completion.

**S/U:** These grades are used in courses where the A-F grade is inappropriate, such as in seminars, internships, practica, etc. For graduate students, S and U are used to indicate levels of performance for credits received in research and may be used to indicate levels of

performance in a Seminar. There are no quality points associated with the letter grades of S and U.

SP/UP: These grades are used in courses with a linkage in credits to multiple semesters such as thesis and dissertation research. Neither SP nor UP will be included in the student's GPA. The grade of SP will be assigned when a student has made satisfactory progress during a semester prior to the final semester of the linked courses; credit will be awarded with the grade of SP. The grade of UP will be assigned when the student's progress has been unsatisfactory and no credit will be awarded. For course work, the faculty member may change the grade of SP to a letter grade once the final grade for the multiple semester work is completed; the change must occur for all students in the course. A grade of SP cannot be changed to a UP or F based on a student not completing the final semester's work satisfactorily. UP is a final grade. It can stand as it is, or it can be changed to an F. Grades of SP or UP for thesis or dissertation credits may not be changed to letter grades.

## GRADE REPORTING

Grades must be reported to the Registrar's office as soon as possible after the course is completed but not later than 72 hours after the final examination for that course. If the final exam is on the Friday of exam week, grades are due by noon on the following Tuesday.

## INACTIVATION, DEACTIVATION AND REACTIVATION

### INACTIVATION AND REACTIVATION

Students who do not register in any fall or spring semester will be inactivated by the Registrar and will be unable to enroll for classes and their CATCards will be deactivated. To be reactivated please contact the Graduate College; there is no fee for reactivation following inactivation for less than one year.

### DEACTIVATION AND REACTIVATION

Deactivation is equivalent to withdrawal from a graduate program. Students who do not enroll in their program following the termination date of a Leave of Absence will be deactivated from the Graduate College. Students who, prior to completing enrollment for all credit requirements for a graduate program, do not enroll for one or more credits for a period of one calendar year and are not on an approved Leave of Absence will be considered to have withdrawn from the degree program and deactivated from the college.

Students who have completed all credits required for their degree, but have not completed all graduation requirements, do not enroll in continuous registration (GRAD 9010, GRAD 9020 or GRAD 9030) for a period of one calendar year and are not on an approved Leave of Absence will be considered to have withdrawn from the degree program and deactivated from the college.

Reactivation into a program following deactivation requires the approval of the program and the Graduate College. Students seeking reactivation must complete the Reactivation Form and pay a \$40 Reactivation fee and, if reactivation is approved, all other outstanding fees. Reactivation is not guaranteed. At the program's discretion, a

new application may be required for students requesting to return after 1 or more years away. Re-admission is not guaranteed.

## LEAVE OF ABSENCE

A Leave of Absence may be awarded for a period of up to 1 year. Students must request a leave of absence prior to the beginning of the semester in which the leave will take effect. The leave suspends the 5 year time limit for master's and certificate of graduate study students for the duration of the leave. It does not suspend the time limit for the completion of individual courses.

The time limits for degree completion are

- micro-Certificate of Graduate Study: 3 years
- Certificate of Graduate Study and Master's degrees: 5 years
- Doctoral (professional): 7 years
- Doctoral (Ph.D.): 9 years

All credit used for the degree, including transfer credit and credit by examination, and irrespective of a Leave of Absence, must be earned within 3 (micro-certificate of graduate study); 5 (certificate of graduate study); 7 (master's or professional doctorate); or 9 (Ph.D.) years of graduation.

## PROCEDURE

Students request a Leave of Absence from their graduate program coordinator or chair prior to the start of classes in the semester during which the leave is being taken. If the program approves the request, the student and chair or program faculty complete the Leave of Absence form available on the Faculty and Current Students Resources page of the Graduate College website and forward it to the Graduate College for approval. A Leave of Absence does not take effect until after approval has been received from both the graduate program coordinator or chair and the Dean of the Graduate College.

Any student who does not enroll following termination of a Leave of Absence will be deactivated from the Graduate College.

## REQUIREMENTS FOR VISITING GRADUATE STUDENTS

1. Visitors will be enrolled (or active) in accredited graduate degree programs elsewhere (U.S. or abroad).
2. Visitors will participate at UVM in formal fellowship programs or graduate-level research projects under the direction of UVM faculty.
3. Funding for the fellowship or research activity generally will be from external sources.
4. Visitors will normally perform the equivalent of at least 5 credits of course work or research credit per semester during the term of the appointment.
5. Visitors will enroll for a Visiting Graduate Student Research section of GRAD 9020 or GRAD 9030, depending on the level of expected effort, each term (to include Fall, Spring and Summer) they are at UVM. Permission to enroll in the section is required from the Graduate College. Fees<sup>1</sup> and level of access



to UVM facilities are established by the enrollment level with a minimum provision of a UVM student ID card and access to the library, fitness center and bus privileges and can be found on the Continuous Graduate Registration topic found under Academic and Enrollment Policies in this catalogue.

6. With the equivalent of half-time student status (GRAD 9020), visiting graduate students will be eligible to enroll in the UVM student health insurance plan. Normally, visitors will be required to show proof of existing medical insurance coverage comparable to or greater than the UVM student health insurance plan, or else be required to enroll in the UVM plan.
7. Visitors will be appointed for a period of up to 1 year as determined by the Dean of the Graduate College and consistent with the educational objectives of the Visitor. Visitors may be reappointed by the dean; in most cases, the maximum total period of Visitor status will not exceed 2 years.
8. Visitors enrolled for Visiting Graduate Student Research are not enrolled in UVM degree programs and thus will not be eligible for financial aid, i.e., federal loans or work study, through the University of Vermont.
9. International students should contact the Office of International Education for information on visas and transition to UVM. For information regarding tax status, refer to Tax Information, Foreign Nationals/Nonresident Aliens on the Division of Finance website.
10. Visitor appointments will be made by the department or program subject to the approval of the college or school and the Dean of the Graduate College. Appointing departments will request visiting graduate student status from the Graduate College dean's office by providing a description of the research or other academic activity, an official transcript or a letter from the student's home institution indicating that the student is currently enrolled or active in a graduate program at that institution, and a completed cover sheet with basic background information. The Graduate College dean's office will maintain a file on all individuals appointed as Visitors. The Visiting Graduate Student Form to request Visitor Status can be found on the Graduate College website Resources page.

<sup>1</sup> 2024-2025 fees are \$200 per semester for GRAD 9020 and \$300 per semester for GRAD 9030. For students who also want eligibility to utilize the Center for Health and Well Being and/or to purchase UVM health insurance, an additional fee of \$431.50 is required. The estimated annual health insurance premium for the 2024-2025 school year is not yet available; the 2023-2024 premium was \$3,814 per year.

## RIGHTS AND RESPONSIBILITIES

Students have the responsibility to familiarize themselves with the policies and procedures of the university, the Graduate College, and their department or program. Students are primarily responsible for knowing the degree requirements and following the policies that govern their academic program. If students have questions or concerns about individual policies and procedures, they may contact their advisor, their program or department chair, or the

Graduate College office, which is the ultimate arbiter of policies and procedures.

University policies and those of the Graduate College are contained on the UVM Institutional Policies website.

## ADVISING

Unless a department or program employs an alternative approved procedure, each graduate student will have a faculty advisor to advise on matters of course selection, research direction, and overall guidance from admission to the Graduate College to completion of degree requirements. The initial advisor is assigned by the department chair or the graduate program coordinator prior to or shortly after enrolling in the Graduate College. If an initial advisor is not assigned by either of the above parties within 2 weeks after the initiation of course work in a given graduate program, the student is encouraged to contact the Graduate College. Many times, 1 faculty member serves as an initial advisor for several students, and the advisor may change as the student's program and research interests develop.

Another common model, especially in doctoral programs, is a graduate studies committee composed of faculty who share a student's scholarly and professional interests. The committee meets regularly to discuss the student's progress and consult with the student regarding academic development.

While there are a variety of advising models, in each case students have the right to consult regularly with their academic advisor or graduate studies committee.

## ATTENDANCE POLICY

Students are expected to attend all regularly scheduled classes. With the exceptions outlined below, the instructor has the final authority to excuse absences. It is the responsibility of the instructor to inform students of their policy for handling absences and tardiness, and the consequences that may be imposed. Notification should be done both verbally and in writing at the beginning of each semester.

It is the responsibility of the student to inform the instructor regarding the reason for absence or tardiness from class, and to discuss this with the instructor in advance whenever possible. The instructor has the right to require documentation in support of the student's request for an absence from class and to determine the appropriate response (e.g., excused absence, deadline extension, substituted work). If an out-of-class exam or other activity (e.g., field trip, campus speaker or event, workshop) conflicts with a regularly scheduled class, the regularly scheduled class has priority. Any conflicts between student and instructor regarding this policy may be presented for resolution to the course department chair or college dean's office.

When a student is unable to attend classes for reasons of health, bereavement, or required legal appearances (e.g., jury duty, citizenship hearing), the student should contact the Graduate College Dean's Office regarding support. An instructor may request



documentation to support a student's request for an excused absence from the Graduate College Dean's Office.

## INTERCOLLEGIATE AND ACADEMIC COMPETITIONS

Students who represent the University of Vermont in official intercollegiate varsity athletic or academic program-sponsored competitions should plan their schedules with special care, recognizing the primary importance of their academic responsibilities. It is the responsibility of the student to avoid signing up for a course or section whose scheduled meetings consistently conflict with the intercollegiate competition and travel schedule. If travel for such intercollegiate competition requires absences from a class, it is also the student's responsibility to provide the instructor with documentation of anticipated absences and to meet with the instructor regarding the missed course work and instruction. Provided a student has submitted documentation for absences due to participation in official intercollegiate competitions, an instructor must excuse the absences and should provide reasonable assistance to the student concerning missed instruction, assignments, and exams, including final exams. Any conflicts between student and instructor may be presented for resolution to the course department chair or college dean's office.

## RELIGIOUS HOLIDAYS

Religions may be practiced in many different ways, and can impact participation in classes variably. Students have the right to practice the religion of their choice. Each semester students should submit in writing to their instructors as early as possible and at least one week prior to their documented religious holiday the date(s) of the conflict or absence. Faculty must permit students who miss work or exams for the purpose of religious observance to make up this work. In addition, faculty and students are encouraged to review the Interfaith Calendar of holidays maintained by the UVM Interfaith Center to proactively plan course schedules and exam schedules.

### Professional Ethics and Academic Honesty

Graduate students are required to adhere to the highest standards of professionalism as students, researchers, and teachers. The university, in order to encourage a positive atmosphere in all phases of academic learning, teaching and research, has created specific guidelines and policies regarding academic honesty. Information may be found on the Center for Student Conduct website.

## SEXUAL HARASSMENT

No member of the university community may sexually harass another. Unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature constitute sexual harassment when:

1. submission to such conduct is made either explicitly or implicitly a term or condition of an individual's employment or education;
2. submission to or rejection of such conduct by an individual is used as the basis for academic or employment decisions affecting that individual; or

3. such conduct has the purpose or effect of substantially interfering with an individual's academic or professional performance or creating an intimidating, hostile, or offensive employment, educational, or living environment.

Any University of Vermont student having a complaint of sexual harassment should notify the Office of Affirmative Action and Equal Opportunity; students may also contact the Dean of Student's office. If a student has personal concerns regarding sexual harassment, confidential counseling can be arranged through the Center for Health and Wellbeing. Policies and procedures governing complaints of sexual harassment are available on the Title IX and Sexual Misconduct page on the Affirmative Action and Equal Opportunity website.

## DISCRIMINATION

The university community will not tolerate discrimination. Information, resources, and incident reporting forms may be found at The Office of Affirmative Action and Equal Opportunity website.

## APPEALS

The Graduate College is ultimately responsible for grievances regarding policies and procedures related to graduate education. A grievance properly begins within the student's department by an appeal to a program director or chair. If this does not resolve the grievance, the student can present the grievance in writing to the dean of the unit in which the program resides, and thereafter to the Dean of the Graduate College. Grievances must state clearly and precisely the basis for appeal and provide supporting evidence that a student's rights have been jeopardized. The Graduate College dean may recommend that the grievance be reviewed by the Graduate College Executive Committee. The Graduate College dean is the final arbiter of Graduate College regulations.

Specifically excluded from the Graduate College appeals process are grievances that contest grades on grounds other than due process. Grade appeals go through the academic unit of the faculty teaching the course, not the Graduate College or the academic program of the student making the appeal. The procedure for grade appeals may be found on UVM's Institutional Policies website, listed above.

## TIME LIMITS FOR GRADUATE DEGREE COMPLETION

Doctor of Philosophy: 9 years from matriculation

Doctoral degree (professional): 7 years from matriculation

Master's degree: 5 years from matriculation

Certificate of Graduate Study: 5 years from matriculation

micro-Certificate of Graduate Study: 3 years from matriculation

All courses applied towards the degree must be taken within 9 years for the Doctor of Philosophy degree; 7 years for professional doctorates and Master's degrees; 5 years for Certificates of Graduate

Study; and 3 years for micro-Certificates of Graduate Study. Individual departments may set deadlines within these time limits.

## TRANSFER CREDIT AND CREDIT BY EXAMINATION

A limited number of graduate course credits acquired at other regionally accredited institutions, at UVM prior to admission to a graduate program, or by credit by examination may be included as part of a student's program of study, with approval of the program faculty and the Dean of the Graduate College. Credit by examination is earned by arranging through a program faculty member to take an examination that tests the student's skills and knowledge in a particular UVM course appropriate for inclusion in the student's degree program.

If credit is transferred, only the credit is transferred, not the grade.

Graduate Credit earned at UVM after completion of the bachelor's degree but prior to admission to a graduate program is transfer credit; only the credit and not the grade is transferred, and is subject to the requirements and limits that follow.

Transfer credits may transfer into 1 graduate degree program or 1 Certificate of Graduate Study; credits may not transfer into more than one program.

### APPROVAL OF CREDIT

Approval of credit is recommended by the graduate program and approved by the Graduate College based on the specific program requirements described in the Graduate College catalogue, as well as:

1. the number of credits requested,
2. the appropriateness of credit for inclusion in the degree program, and
3. the currency of the credit.

These criteria are described below. Any exceptions must be approved by the program faculty and the Dean of the Graduate College.

### NUMBER OF CREDITS

In general, Master's degree students are allowed 9 hours of transfer credit, and/or credit by examination, and an additional 6 credits acquired from appropriate courses taken at UVM prior to admission to a degree program may also be transferred; Doctor of Philosophy students are allowed 24 credits, and an additional 6 credits acquired from appropriate courses taken at UVM. This means that all master's students take at least 21 credits at the University of Vermont (at least 15 after admission) and Doctor of Philosophy students at least 51 credits (at least 45 after admission). For master's programs that require more than 30 credits, program faculty may, in individual cases, recommend more transfer credits. Credits allowed by professional doctoral degrees may vary; refer to individual programs for limit. In all cases, students must take at least one half of their degree credits at the University of Vermont after admission to the graduate program and adhere to all requirements stipulated by the graduate program. Graduate programs, at their discretion, may accept

fewer transfer credits than those listed above; see individual programs for limit.

Graduate credits taken at other institutions may not transfer into a UVM Certificate of Graduate Study program. Up to 6 credits (not the grades) from 5000- or 6000-level courses taken as a continuing education student at UVM prior to matriculation in the certificate may transfer into the Certificate of Graduate Study.

Graduate credits taken at other institutions may not transfer into a UVM micro-Certificate of Graduate Study program. For a 12-14 credit micro-Certificate of Graduate Study, 3-5 credits (not the grades) from 5000- or 6000-level courses taken as a continuing education student at UVM prior to matriculation in the micro-CGS may transfer into the micro-Certificate of Graduate Study.

### APPROPRIATENESS OF CREDIT

Transfer credit and credit by examination must be approved by the program faculty as appropriate for inclusion as part of the student's degree requirements. Credit cannot be awarded for:

1. courses taken prior to completion of an undergraduate degree program,
2. courses that were not graduate credit where taken or would not receive graduate credit if taken at the University of Vermont,
3. courses with a grade lower than B (3.00),
4. independent study or independent research,
5. thesis or dissertation research credits,
6. credit by examination given by another institution,
7. credits taken at a non-regionally accredited institution.

### CURRENCY OF CREDIT

Transfer credit and credit by examination must be taken within 3 years of completion for a micro-Certificate of Graduate Study; within 5 years of completion for a Certificate of Graduate Study; within 7 years of completion for a master's or doctoral (professional) degree; and within 9 years of completion for the Doctor of Philosophy degree. Students wishing to apply for readmission to a program after deactivation must demonstrate currency of knowledge in the field of study to which they are applying. Currency of knowledge must be formally evaluated by the program faculty and approved by the Dean of the Graduate College. In addition, the returning student must complete a program of study including at least two courses in the current program.

### CONCURRENT MASTER'S AND DOCTOR OF PHILOSOPHY CREDIT

Up to 24 credits of course work for which graduate credit is earned at UVM in a master's degree program, whether a master's degree is received or not, may be applied toward a Ph.D. at UVM, provided that the credit is appropriate for the Ph.D. program. If the UVM master's program has a course-based (non-thesis or project) option, then 30 credits of course work for which graduate credit is earned at UVM in a master's degree program may be applied toward a Ph.D. at UVM, provided that the credit is appropriate for the Ph.D. program. Students must still complete a minimum of 15 graded

credits that do not count towards the Master's degree as part of the Ph.D. curriculum, unless the Ph.D. is in the same discipline as the Master's degree at UVM.

Up to 15 credits of course work for which graduate credit is earned at UVM in a doctoral degree program, whether a doctoral degree is received or not, may be applied toward a master's degree at UVM, provided that the credit is appropriate for the master's program.

No provision is made for a person to employ the same credit to satisfy 2 master's degrees at the University of Vermont.

## WITHDRAWAL FROM A GRADUATE DEGREE PROGRAM

Students must notify the Graduate College Dean's Office, in writing, of their intent to withdraw from a degree program. If a student does not register at the University of Vermont for course work, thesis or dissertation research, or continuous registration for a period of more than one calendar year, and does not notify the department or the Graduate College Dean's Office in writing, the student will be considered to have withdrawn from the degree program and will be deactivated from the college. It will be necessary to apply for reactivation and pay a reactivation fee if the student wishes to resume the graduate program. Approval of both the Graduate Program Director (or equivalent) and the Dean of the Graduate College is required for reactivation. Reactivation is not guaranteed. At their discretion, programs may require an application from students requesting reactivation after 1 or more years away. Re-admission is not guaranteed.

## ADMISSION AND FINANCIAL INFORMATION

- Admissions (p. 263)
- Tuition and Fees (p. 263)
- Financial Aid (p. 264)
- Financial Aid Programs (p. 265)
- Fellowships, Assistantships, Traineeships, Stipends, and Grants (p. 266)
- Payments (p. 266)
- Sponsored and Institutional Research (p. 267)

## ADMISSIONS

Admissions criteria, procedures and deadlines for graduate programs vary by individual program. Current information about graduate admissions can be found on the Graduate Admissions page of the Graduate College website.

In order to allow sufficient time to process applications and immigration documents for international applicants, the Graduate College recommends that applicants submit their application and supporting materials as early as possible. Although deadlines posted by the program may be different, international applicants must submit their documents by the deadlines indicated on the

International Graduate Admissions page found on the Graduate College website.

## ADMISSION TESTS

Information about admission tests is available from the GRE website or from the Educational Testing Service, P.O. Box 6103, Princeton, NJ 08541-6103 for the Graduate Record Examinations Test, or from the official GMAT website for the Graduate Management Admission Test. Those considering application to a graduate program that requires an admissions test must plan for the four to six weeks it can take for the Graduate College to receive the results of test scores.

Applicants must consult the listing of the program to which they are applying to determine exactly which test scores are required, if any. Scores must be from tests taken within five years of the date of application.

If a prospective student's native or first language is not English, scores must be submitted from the Test of English as a Foreign Language (TOEFL); the International English Language Testing System (IELTS), academic version; or the Duolingo English Test.

Minimum acceptable TOEFL, IELTS, or Duolingo scores for admission to the Graduate College at the University of Vermont:

TOEFL iBT (Internet Based Test)	90
IELTS	6.5
Duolingo	110

Minimum acceptable scores for a student to qualify for receiving funding as a Graduate Teaching Assistant at the University of Vermont:

TOEFL	100
IELTS	7.0
Duolingo	120

Institution Code for test scores for UVM is 3920.

## TUITION AND FEES

The student expenses outlined in the following paragraphs are charges for the 2024-2025 academic year for graduate students enrolled in most on-campus degree programs. View graduate college tuition and fees to find charges approved by the UVM Board of Trustees after the February 2024 board meeting.

## APPLICATION FEE

The application fee is \$65.

## TUITION

Tuition rates for the 2024-25 academic year are as follows:

For Vermont residents, \$678 per credit hour. For out-of-state residents, \$1,780 per credit hour. Some graduate programs have alternate out-of-state tuition rates, and the information on the graduate college tuition and fees page should be referred to for details.

The lower rates for Vermont residents are made possible by a subsidy to the university from the state of Vermont.

Note: Tuition and fee charges are the same whether a course is taken as audit or for credit.

### CONTINUOUS REGISTRATION TUITION FEE: GRAD 9010/9020/9030

Continuous Registration status is for graduate students who have completed all credits required of their program, but are still working on their thesis. Students pay a continuous registration fee ranging from \$100-\$300 each semester until all degree requirements are completed, including removing incomplete grades, passing the comprehensive examination, or completing a thesis or dissertation. For students enrolled in Continuous Registration, the estimated UVM Health Fee of \$431.50 will be billed as a separate charge if the UVM Student Health Insurance Plan (SHIP) is purchased.

### COMPREHENSIVE FEE

Estimated 2024-25 per semester comprehensive fee schedule:

Credits Enrolled/Semester	Fee
1	\$10
2	\$20
3	\$30
4	\$40
5	\$447
6	\$499
7	\$561
8	\$624
9 and above	\$1,086

### GRADUATE STUDENT SENATE FEE

Graduate students enrolled below 5 credits, are charged \$7 for the Graduate Student Senate Fee each semester, and students enrolled in 5 or more credits are charged \$10. The Graduate Student Senate allocates this fee toward the support of student organizations and student activities. Students enrolled in Continuous Registration must also pay this fee.

### STUDENT HEALTH FEE

A health fee is included in the comprehensive fee for students enrolled in 9 or more credits. The health fee is a required fee for any student enrolled in fewer than 9 credits who purchases the UVM Student Health Insurance Plan (UVM SHIP). The health fee for 2024-25 is estimated at \$431.50 per semester, and is subject to change. Visit graduate college tuition and fees (mandatory student fees) for updated cost information.

### UVM STUDENT HEALTH INSURANCE PLAN (UVM SHIP)

Through an arrangement with a commercial insurance company, students are able to procure health insurance that is designed to provide coverage for services beyond those provided by the Center

for Health and Wellbeing (CHWB). There is an additional charge for this extended coverage beyond the student health fee. The 2023-24 cost for one year's coverage for single students is \$3,814 and is subject to change for 2024-25. Married students may obtain coverage for their spouse and children. Health insurance information is available from the Center for Health and Wellbeing. To participate in this insurance, the student health fee must be paid each semester as well as the additional insurance premium.

### CREDIT BY EXAMINATION

Under certain circumstances, a student may receive credit for a course by taking and passing an examination. A fee of \$50 per credit is charged for each examination. Any credit earned by examination applies to the total number of credits allowed for validation and transfer. Students initiate the process by completing the Credit by Examination Form (PDF) available through the Registrar.

### REACTIVATION FEE

Reactivation following withdrawal without an approved leave of absence for longer than two consecutive semesters requires the Reactivation Form (PDF) to be completed along with payment of a \$40 reactivation fee.

### BILL ADJUSTMENT

Tuition refunds for students who drop or withdraw from courses will be handled according to the university's published tuition refund schedule.

### WITHDRAWALS

A student may voluntarily withdraw from the university by notifying the Dean of the Graduate College and the registrar. The student will receive a refund in accordance with the Bill Adjustment Policy (PDF). Date and time of withdrawal normally will be the date the withdrawal notice is received by the registrar.

### DISMISSAL

In the case of suspension or dismissal from the University for disciplinary reasons, the student will receive a refund in accordance with the Bill Adjustment Policy (PDF).

### DEATH

In case of the death of a student, tuition, room and fees that have been paid for the semester during which the death occurs will be refunded fully.

### FINANCIAL AID

Federal education loans are the primary source of financial assistance for graduate students. For detailed information about financial aid, view information on types of aid for graduate students. Funding opportunities such as assistantships or fellowships, may be available through the UVM Graduate College or academic departments. Since the cost of attendance is mostly met through loans, graduate students should carefully assess the costs and funding opportunities before making a final decision about attendance.



Eligibility for federal financial aid is based on the Free Application for Federal Student Aid (FAFSA), UVM's cost of attendance, and any other sources of aid being received, such as funding from assistantships, fellowships, traineeships, or tuition grants. Students must meet core eligibility requirements for federal student aid, including U.S. citizenship, permanent residency, or another eligible non-citizen status as defined by the U.S. Department of Education, and at least half-time enrollment (5 credits per semester).

For students seeking a Graduate Certificate, financial aid will generally not be available. View information on costs, types of aid and financing options for UVM Certificate Programs.

## APPLICATION FOR FINANCIAL AID

A U.S. citizen or eligible non-citizen student can file the Free Application for Federal Student Aid (FAFSA) as soon as the FAFSA opens, using UVM's Title IV School code, 003696. The FAFSA is the only financial aid application required. While there is no specific deadline, we recommend completing the FAFSA for the upcoming academic year as early as possible in order to receive an on-time aid offer. Students will be notified via email if additional information is required in order to determine financial aid eligibility. For students who are starting their graduate programs in the summer, the FAFSA will need to be submitted for the prior and upcoming academic years.

In addition to completing the FAFSA, graduate students applying for financial aid will be asked to inform us of their enrollment plans and funding they may have been awarded through their program through the Graduate Student Data form each year. Incoming students for the fall semester will be notified by email of the financial aid offer once processed FAFSAs have been received by the Department of Education. Official aid offers will be issued once all requested documentation has been received and reviewed.

Students must reapply for financial aid through the FAFSA each year as soon as October 1 when the FAFSA opens.

## FOR ADDITIONAL INFORMATION

More detailed information about the financial aid availability and procedures may be obtained from the UVM Office of Student Financial Services located in 223 Waterman Building:

Phone: (802) 656-5700

Please use the Student Financial Services website as a resource to find answers to questions, or email a member of the Student Financial Services team at [sfs@uvm.edu](mailto:sfs@uvm.edu).

## CHANGES IN ENROLLMENT

A student who adds courses during an enrollment period will be billed additional tuition and fees applicable to the adjusted credit hours. Students who drop or withdraw from courses during the enrollment period will receive a tuition credit based upon UVM's published Refund and Bill Adjustment Policy (PDF) which is subject to change. Financial aid will be reviewed and adjusted for any changes in enrollment. It is recommended that financial aid recipients speak with Student Financial Services before withdrawing from or dropping courses.

## SATISFACTORY ACADEMIC PROGRESS (SAP) STANDARDS FOR FINANCIAL AID RECIPIENTS

Federal financial aid regulations require that financial aid recipients maintain satisfactory academic progress in order to remain eligible for financial aid. The UVM Satisfactory Academic Progress (SAP) policy for financial aid recipients is found in the Student Financial Services handbook and can also be obtained by contacting UVM Student Financial Services. All students should review the complete SAP policy to understand the requirements to remain eligible for aid.

## FINANCIAL AID PROGRAMS

### FEDERAL DIRECT LOAN PROGRAMS

The Federal Direct Unsubsidized Loan and Federal Direct Graduate PLUS Loan programs are the primary source of financial assistance for graduate students. Students who submit the Free Application for Federal Student Aid (FAFSA) will be reviewed for loan and work-study eligibility. The financial aid offer provided by Student Financial Services will indicate eligibility and provide information on next steps, including loan application procedures. Read more about the types of federal financial aid for graduate students.

### VETERANS BENEFITS

The university provides support and information to any veteran or dependent eligible for benefits under Federal Law, Chapters 30, 31, 32, 33, 34, 35, or 106. Students eligible for these benefits should contact the Registrar's Office at least one month prior to registration each semester. Students wishing to register for benefits should be prepared to present their certificates of eligibility. Read the information for Veterans regarding application for and use of GI Bill® benefits, including the Yellow Ribbon Program. GI Bill® is a registered trademark of the U.S. Department of Veterans Affairs (VA). More information about education benefits offered by VA is available at the official U.S. government Web site at <https://www.benefits.va.gov/gibill>.

Students involved in the Veterans Program should contact the university in the event of any change in credit load, dependency status, address, or major. The phone number is (802) 656-0581.

### NEW ENGLAND BOARD OF HIGHER EDUCATION (NEBHE) TUITION BREAK PROGRAM

The New England Board of Higher Education (NEBHE) Tuition Break Program is an opportunity for qualified legal residents of New England states to enroll at discounted tuition for some programs that are not offered by the home state university but are offered in another New England state. You can learn more about the tuition break policy for UVM graduate students through the New England Board of Higher Education (NEBHE).

Applicants must indicate to the Office of Graduate Admissions that they are seeking admission under the terms of the NEBHE Tuition Break Program. Applicants are then sent an application to apply under the NEBHE Tuition Break Program where they are requested to provide residency information and supporting documentation. In

cases where the program of study is clearly unique or distinctive to the out-of-state institution, the Office of Graduate Admissions will certify directly the applicant's eligibility.

## FELLOWSHIPS, ASSISTANTSHIPS, TRAINEESHIPS, STIPENDS, AND GRANTS

### GRADUATE STUDENT ACADEMIC APPOINTMENTS: ASSISTANTSHIPS, PREDOCTORAL FELLOWSHIPS AND TRAINEESHIPS

Ph.D. students typically hold academic appointments: Graduate Teaching Assistantships, Graduate Research Assistantships, Graduate Assistantships, Predoctoral Fellowships, Predoctoral Traineeships.

Master's students in certain programs may also have access to appointments as assistants.

For definitions, appointment guidelines, and responsibilities, see the Academic Regulations governing each academic appointment types available on the Graduate College website Resources page.

For AY 2024-25, 9-month academic appointments carry a minimum stipend of \$24,000; 12-month appointments carry a minimum stipend of \$32,000. The stipends in some colleges and programs are higher than the minimum. In addition to the stipend, assistantship awards include payment for the Single Student Health Insurance Premium, a tuition scholarship for 9 credits per semester, (and up to 5 credits in summer if on a 12-month assistantship), as well as a scholarship to cover the Comprehensive Fee during the period of the assistantship. Tuition scholarships accompanying Graduate Assistantships, Graduate Teaching Assistantships, and Graduate Research Assistantships do not cover audits or physical education activity courses, nor do they cover courses numbered below 5000 with the exception of 3000- or 4000-level courses where prior approval of the Graduate College was obtained. The Graduate Student Senate Fee is the responsibility of the student.

### GRADUATE COLLEGE CONFERENCE GRANT PROGRAM

The Graduate College provides grants to help students underwrite the cost of attending conferences where they present their research. The student's program must provide matching funding. Further information on the Graduate College Conference Grant Program is available on the Graduate College website.

### OTHER FELLOWSHIPS

Fellowships established by private donors or through departmental resources are available periodically in some departments. Please check relevant departmental websites.

### GRADUATE STUDENT AWARDS

The Graduate College offers competitive awards in particular disciplinary areas and awards for outstanding Graduate Teaching

Assistants, theses, and dissertations. Please see the Graduate College website for further information.

## PAYMENTS

By registering for courses, enrolling in the student health plan, entering into a housing and meal plan contract, and otherwise utilizing university facilities, students are entering into a financial arrangement with UVM and accept responsibility for charges billed to their UVM account. This legal responsibility of the student is regardless of whether a third party is assisting with payment of their UVM expenses. The online registration system will generate charges based on enrolled credits as well as health, housing, parking, and meal plan selections. Students will receive notification at their university email address when itemized billing statements of applicable charges are ready to view online. The billing statement will include instructions to settle in full by a specific date. Any checks or payments received by the university may be applied to outstanding balances.

Students who cannot meet their financial obligations because of unusual circumstances should contact the Office of Student Financial Services as soon as possible before the payment due date.

Students who have not satisfactorily completed financial arrangements with UVM in writing by the announced due date will be assessed a late payment fee and a financial hold preventing access to add courses. Depending on the circumstances and subject to applicable law, UVM may also withhold student's transcripts in certain cases. They are also subject to potential cancellation of their enrollment. Dis-enrollment will automatically place a registration hold on a student's account that will prevent re-enrolling until the student has contacted Student Financial Services and entered into an appropriate payment plan.

The university reserves the right to withhold registration material, the diploma, degree, and all information regarding the record, including possibly the transcript, of any student who is in arrears in the payment of tuition, fees, or other charges, including, but not limited to, student loans, meal and housing charges, and parking fines where the student has not entered into an appropriate written payment plan.

Delinquent accounts may be placed with an outside collection agency and/or reported to the national credit bureau system. Students shall be responsible for all late payment fees, collection charges, attorney fees, interest and any other costs and charges necessary for the collection of amounts not paid when due.

International student accounts may be placed with a collection agency if the University can identify a collection agency willing to pursue collections in the student's home country. Since international student visas require students to supply proof of ability to pay, if it is determined that they no longer have the ability to meet their financial obligations they may have their immigration records terminated and the student may be required to leave the United States as a result.

Accounts with problematic history of payment may be required to pre-pay for the semester or year depending upon case by case assessment by the Director of Student Financial Services.

## BUDGETED PAYMENT

The university offers a Monthly Payment Plan that allows payment of tuition and fees, as well as university billed housing and meals, over a 5-month period (July 1 to November 1 and December 1 to April 1).

## LATE PAYMENT FEE

Students who have not satisfactorily completed written financial arrangements by the announced due date will be assessed a late payment fee of \$250 and a financial hold. Learn more about reviewing and responding to the bill to avoid a late payment fee.

## SPONSORED AND INSTITUTIONAL RESEARCH

During fiscal year 2023, the university received 688 research awards representing \$230,000,000 in funding from a diverse range of sponsors (over 300) from proposals submitted by more than 300 Principal Investigators. UVM ranks nationally as one of the 80 leading public research universities in terms of federal grant support. In addition, there are a substantial number of faculty research projects supported, in part, by institutional funds. Research graduate students collaborate with faculty on research projects across the disciplines.

## ACADEMIC AND STUDENT LIFE RESOURCES

### GRADUATE TEACHING PROGRAM

UVM's Center for Teaching & Learning (CTL), Writing in the Disciplines Program (WID), and the Graduate College invite graduate students to participate in the Graduate Teaching Program. Graduate students completing the program can earn formal recognition from the Graduate College.

This program, designed for graduate students who are interested in pursuing teaching in higher education, provides encouragement and feedback in developing teaching philosophies, practices and strategies to prepare you to teach to a wide variety of students, support for preparing a teaching portfolio, a supportive community encouraging professional development.

### GRADUATE WRITING CENTER

The Graduate Writing Center offers free one-on-one and small group consultations for graduate student writers. It supports writing for any project, at any stage in the process. Staffed by experienced consultants who hail from graduate programs across campus, the Graduate Writing Center also offers writing retreats, workshops, in-class support, and multi-day camps for thesis and dissertation writers.

### STUDENT ACCESSIBILITY SERVICES

Student Accessibility Services (SAS) offers: exam accommodations, meetings with Accessibility Specialists to receive advisement and advocacy around disability-related matters, ebooks, Deaf and Hard of Hearing services, notetaking and adaptive technology, as well as other programs and services. For a student with a diagnosis/condition that may be considered disabling, using accommodations and services at

SAS could be a resource that helps break down barriers and insures equal access. In order to be eligible for academic services through SAS, students should provide documentation about their disability and meet with a staff person to discuss their disability and their accommodations.

### UVM STUDENT RESEARCH CONFERENCE

All UVM students performing research or creative projects under the mentorship of a UVM faculty member are encouraged to participate in the UVM Student Research Conference, which is a full day devoted to presentations by graduate and undergraduate students from all disciplines. This event is sponsored by the Vice President for Research, the Graduate College and the Honors College.

### STATISTICAL SOFTWARE SUPPORT AND CONSULTING SERVICES

Located on the first floor of Howe Library in room 115, Statistical Software Support and Consulting Services provides help with statistical methodologies, data analysis, experimental design, and the use of statistical software. Please visit the Howe Library website for additional information, review drop-in hours, or schedule an appointment.

### GRADUATE STUDENT SENATE

The Graduate Student Senate (GSS), composed of graduate student representatives from various graduate programs, provides a forum for discussion of graduate student issues and assists the dean and the Executive Committee in matters affecting graduate students. Issues considered by GSS include academic matters, professional development and student life. GSS sponsors occasional social events and advises on Graduate College Conference Grants.

### GRADUATE STUDENT OMBUDSPERSON

The Graduate Student Ombudsperson is responsible for providing independent, confidential, informal and impartial assistance to graduate students on matters affecting their graduate education. The Graduate College ombudsperson is a designated neutral party and approaches each case impartially and without prejudice. The Ombudsperson is committed to fairness, equity and the humane treatment of all parties.

### GRADNET

GRADNET is an electronic forum where graduate students, faculty, and staff discuss issues, research topics, graduate student life, and announcements that pertain to the graduate community. Subscription is voluntary. Please refer to the Graduate College website for further information and instructions to subscribe.

### INTERFAITH CENTER

The Interfaith Center is open to all UVM students, staff, faculty, and affiliates for reflection, spiritual practice, conversation, education, and community building. The Center offers a peaceful space to study, pray, meditate, explore resources and talk with others who share a desire to explore faith across cultures. The Center hosts a



number of programs throughout the year to bring people together and encourage conversation.

### PRISM CENTER

The Prism Center serves the diverse queer and trans communities at UVM. The Center supports and empowers lesbian, gay, bisexual, transgender and queer students, as well as students whose identities fall in between or expand beyond those categories, and works to create a campus community where people of all sexual and gender identities can thrive. The Center offers opportunities for all members of UVM's LGBTQA+ and allied communities to be together, build community and learn from one another. The Prism Center holds a variety of events, social and educational programs, and training & advocacy opportunities throughout the year for students, staff, and faculty members.

### THE MOSAIC CENTER FOR STUDENTS OF COLOR

The vision for the Mosaic Center for Students of Color (MCSC) is to create a diverse and rich community of empowered, engaged, and enthusiastic students of color at UVM. The MCSC is designed to connect students with resources to assist them in their journey and with one another. The Center fully supports the holistic development of self-identified students of color so that they can reach their goals for academic achievement, personal growth, identity formation, and cultural development. The MCSC administers a variety of programs throughout the year.

### WOMEN AND GENDER EQUITY CENTER

The Women and Gender Equity Center (WAGE) envisions a diverse and equitable learning environment for all members of the UVM community. The WAGE Center strives to provide programming, education, and events that connect our community through the exploration of the intersections of their gender and other identities.

### LIVING WELL

Living Well in the Dudley H. Davis Center is a home base for health promotion on the UVM campus. Whether you're looking for medical services, drop-in counseling, or help changing habits, you can find it at Living Well. Programs and services at Living Well include drop-in office hours for questions and support about sexuality, nutrition, substance use, tobacco and nicotine; free safer sex supplies; full spectrum lights (HappyLights); massage; mindfulness, meditation, and yoga programs; mental health and suicide prevention workshops; sexuality education; substance-free game nights; and therapy dogs.

### CAREER CENTER

The Career Center offers a range of services that help connect students to the people, opportunities, and resources needed to advance career exploration, readiness, and success. Services include Career Interest Groups, drop-in hours, online resources, career fairs, panels, workshops, and networking events.

### OFFICE OF STUDENT AND COMMUNITY RELATIONS

The Office of Student & Community Relations provides resources and support to University of Vermont students living off campus. They aim to facilitate communication and build relationships among students and non-students so that they can create healthy, safe, and socially just neighborhoods. They are committed to providing resources, education, and support for students living off campus and collaborating with students, neighbors, and city partners to improve the collective quality of life in Burlington.

### UVM VETERANS SERVICES

UVM Student Veteran Services supports Veterans and VA students with education and other benefits and help them to make the smoothest possible transition to higher education after serving in the armed forces.

### DEGREE REQUIREMENTS

The Graduate College of the University of Vermont is responsible for all advanced degree programs except the program leading to the degree of Doctor of Medicine. Degree requirements for graduate students vary by academic program and degree type. Please see below for degree specific requirements of the Graduate College and program pages for additional program specific requirements.

### MINIMUM GRADE-POINT AVERAGE REQUIREMENT

To meet the graduation requirements of the Graduate College, a student must have attained a minimum cumulative grade-point average of 3.00. Individual graduate programs may require a higher grade-point average for graduation. Transfer of credit grades cannot be included in this average. Additionally, at least 15 graded credit hours must have been taken after matriculation into a graduate degree program or 9 credits must have been taken after matriculation into a micro-Certificate of Graduate Study or Certificate of Graduate Study.

Requirements for Accelerated Master's Degree Pathways (p. 269)

Requirements for Certificates of Graduate Study (p. 269)

Requirements for the Master's Degree (p. 270)

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## ACCELERATED MASTER'S DEGREE PATHWAYS

Accelerated Master's Degree Pathways (AMP) are designed to allow current UVM undergraduate students to earn both bachelor's and master's degrees within a total of 5 years for standard 30-36 credit master's programs. Master's programs with more credit requirements will take longer to complete. Students are expected to be full-time until completion of the master's degree. Not all UVM master's degree programs include an AMP option. Those programs that do are listed in the undergraduate catalog under Unique Learning Opportunities/Accelerated Degree Pathways. The curriculum for an AMP is identical to that of the affiliated master's degree. The AMP is an entry point into an existing master's degree, not a separate degree.

AMP students may use up to 9 credits of graduate-level courses taken at UVM toward both the bachelor's and master's degrees. Some programs specify the courses that must be taken; in others it is determined individually. Some programs allow only 6 credits to count towards both the bachelor's and master's degrees, but may then allow another 3 taken as an undergraduate student to count towards the master's degree only.

Graduate-level courses taken for the AMP prior to earning the bachelor's must be graded A-F and cannot be independent study or research; thesis research credits; internships; or practica.

Under no circumstance will more than 9 credits of graduate-level coursework taken prior to earning the bachelor's be applied towards the graduate degree.

Students must apply for and be accepted to the AMP through the standard Graduate College application process. Typically, the application and admission process are finalized in the semester prior to the beginning of the senior year. In all cases, students must be admitted by the Graduate College before taking any courses that will apply to the master's degree, i.e., all courses used for the master's degree must be taken after formal admission to the AMP.

Standardized admissions tests are typically not required for AMP admission. AMP students may not receive fellowship or assistantship funding prior to completion of the bachelor's degree and, normally, AMP students are not funded following completion of the bachelor's as the intent is for them to be fully engaged in their studies and complete the master's one year beyond the bachelor's degree.

AMP students are dually enrolled as an undergraduate and a graduate student until they have completed the requirements for an undergraduate degree, and have received their diploma. Once the bachelor's degree is conferred, students are enrolled as graduate students only. Students are subject to the Graduate College dismissal policy while taking graduate coursework in undergraduate status.

AMP students are expected to enroll in the term following completion of their bachelor's degree unless approved for a leave of absence. If the AMP student does not enroll in courses, or take a leave of absence, they will be required to reapply for consideration as a direct entry Master's student should they wish to enroll. The credits taken as an AMP undergraduate student will not count toward their

Master's degree. If the credit is for a required course, the program may use their discretion in waiving the requirement but not the credit.

## REQUIREMENTS FOR THE CERTIFICATE AND MICRO-CERTIFICATE OF GRADUATE STUDY

### REQUIREMENTS FOR THE CERTIFICATE OF GRADUATE STUDY (CGS)

Certificates of Graduate Study provide opportunities for students currently enrolled in a UVM graduate degree program and /or for Non-Degree students to engage in in-depth understanding of a particular area of interest. Certificates of Graduate Study help students prepare for further graduate study and/or develop their professional skills. The awarding of a Certificate of Graduate Studies will be annotated on the official transcript of a student who successfully meets the requirements set forth for the Certificate.

The general requirements for a Certificate of Graduate study at UVM are:

1. Certificates of graduate study require a minimum of 10 graded credits at the graduate-level. The credits must be in a defined subject area and approved for the specific certificate. A CGS may include requirements for non-course educational activities, such as workshops or projects. At least 6 of the credits must be identified as core requirements in the curriculum, and the remaining credits must be chosen from a published and approved list of options for that certificate.
2. All credits must be completed at UVM within a 5-year period. Graduate credits taken at other institutions may not transfer into a UVM CGS program. Certificate students who are enrolled in a UVM degree program may transfer up to 4 credits (but not grades) from 5000- or 6000-level courses taken at UVM as a non-degree student into the Certificate.
3. Students who elect to pursue a CGS in conjunction with a master's or doctoral program must apply to the Certificate before registering for the final 4 graded credits needed for the Certificate. Students pursuing a master's or doctoral degree must choose a CGS in a discipline different from that of their graduate degree program.
4. A minimum grade point average of 3.00 must be achieved in the certificate program. At least 4 graded credits taken after admission to the certificate program are required to calculate the Certificate of Graduate Study GPA.
5. Credits used for a Certificate of Graduate Study may be applied toward an appropriate graduate degree at UVM. Credits may overlap between 1 certificate and 1 degree program. Credits taken for 1 Certificate of Graduate Study may not be used to fulfill the requirements of another Certificate of Graduate Study.

### REQUIREMENTS FOR THE MICRO-CERTIFICATE OF GRADUATE STUDY (MCGS)

Micro-Certificates of Graduate Study indicate familiarity with a specific topic or area. Micro-Certificates may be offered to students

currently enrolled in a UVM graduate degree program and / or to Non-Degree students. Micro-Certificates are intended to be flexible and adaptive and to meet the evolving demands of enrollees and other stakeholders. The awarding of a micro-Certificate of Graduate Study will be annotated on the official transcript of a student who successfully meets the requirements set forth for the mCGS.

The general requirements for a micro-Certificate of Graduate study at UVM are:

1. A micro-Certificate of Graduate Study is comprised of between 4 and 9 credits of which no fewer than 4 must be graded. The credits must be in a defined subject area and approved for the specific micro-Certificate. Micro-Certificates of Graduate Study may include requirements for non-course educational activities, such as workshops or projects. All credits must be chosen from a published and approved list of options for the Micro-Certificate.
2. All credits must be completed at UVM within a 3-year period. Graduate credits taken at other institutions may not transfer into a UVM micro-Certificate of Graduate Study program. Micro-Certificate students who are enrolled in a UVM degree program may transfer up to 3 credits (but not grades) from 5000- or 6000-level courses taken at UVM as a Non-Degree student into a Micro-Certificate that requires at least 7 credits total.
3. Students who elect to pursue a micro-Certificate of Graduate Study must apply to the micro-Certificate before registering for the final 3 credits needed for the mCGS. Students enrolled in a UVM graduate degree program must choose micro-Certificates of Graduate Study in areas beyond their degree program.
4. A minimum grade point average of 3.00 must be achieved in the micro-Certificate of Graduate Study.
5. Credits used for a micro-Certificate of Graduate Study may be applied toward an appropriate Certificate of Graduate Study, master's degree, or doctoral degree at UVM. Credits may overlap between 1 micro-Certificate of Graduate Study, 1 Certificate of Graduate Study, and 1 degree. Credits taken for 1 Micro-Certificate of Graduate Study may not be used to fulfill the requirements of another micro-Certificate of Graduate Study.

## REQUIREMENTS FOR THE MASTER'S DEGREE

In addition to the requirements described below, individual programs may have their own specific requirements. Students must read and familiarize themselves with their program's requirements. Some of them are detailed in this catalogue under individual program listings and other requirements are available from the director or chair of each program.

### CREDITS

Master's degrees require a minimum of 30 credits, at least 6 credits of which must be comprised of 6000-level coursework; some programs require more. A minimum grade point average of 3.00 must be achieved. A minimum of 15 graded credits used in compilation of the graduate GPA must be taken in residence at UVM following matriculation into the master's program. Consult individual program descriptions for specific credit requirements. In programs that require

a thesis, the number of credits earned in thesis research may vary by program between 6 (minimum) and 15 (maximum). Thesis credit is included as part of the 30-hour minimum. With the prior approval of their program and the Graduate College, students may apply 3 credits of 3000- or 4000-level coursework toward their graduate program. The student's advisor must petition the Graduate College for approval before the student enrolls in the course. Consult individual programs for further limitations. Under no circumstances will a course numbered below 3000 be applicable to a master's program.

### MINIMUM RESIDENCE REQUIREMENTS

Candidates for the master's degree must satisfactorily complete 21 credits in residence. The residency requirement is completed by courses that

1. are taken for graduate credit through the University of Vermont, and
2. are taken after the student has been admitted to the Graduate College.

Some programs may require more than the above minimum hours in residence. Consult with the individual program.

### COMPREHENSIVE EXAMINATION

All master's degree students are required to pass a written and/or oral comprehensive examination in their field of specialization. If both formats are used, satisfactory completion of the written examination is prerequisite to standing for the oral examination. 1 re-examination only is permitted for any failed comprehensive examination. The comprehensive examination is not the same as the oral thesis defense, and must be passed satisfactorily before defending the thesis. Consult individual program descriptions for specific information.

There is no fee for the master's comprehensive examination. The student's program director or advisor must notify the Graduate College of the outcome of the examination. The result and date of the examination is recorded as a notation on the academic transcript.

### RESEARCH AND THESIS

If a thesis is required, the candidate for the master's degree undertakes a problem of original research under the supervision of a faculty member in the department of specialization. At the conclusion of the research, the student must present and defend successfully a thesis which embodies the results of the work and demonstrates the capability for independent research.

### THESIS DEFENSE FORMS

A Public Notice of the defense is required at least 3 weeks prior to the scheduled defense in order for the student to defend. The Intent to Graduate form must be submitted to the candidate's department/program and the Graduate College by the published deadline for the graduation cycle. The Defense Committee form is due as soon as the student's committee is formed, or by the published due date of the Intent to Graduate form at the latest.

## THESIS FORMAT

Students are required by the Graduate College to use a computer software program appropriate to the discipline to create the Table of Contents and the Lists of Tables and Figures from the thesis text headings.

The thesis must be prepared and submitted in compliance with the "Guidelines for Writing a Thesis or Dissertation" available from the Graduate College website. A formatted copy of the thesis must be submitted to the Graduate College for a Format/Record Check at least 3 weeks prior to the scheduled defense. Students must also provide defensible copies of the thesis to members of their thesis defense examination committee at least 2 weeks before the scheduled examination. Individual departments may require earlier deadlines.

Students must notify the Graduate College of the thesis defense at least 3 weeks prior to defending their thesis.

The oral defense of a thesis may be scheduled only after successful completion of the comprehensive examination and the submission of an original copy of the thesis to the Graduate College for a Format/Record Check.

## THESIS DEFENSE EXAMINATION COMMITTEE

The thesis defense examination committee consists of at least 3 University of Vermont faculty members, at least 2 of whom must be regular members of the graduate faculty. If a student has co-advisors, they count as 1 committee member. Ordinarily, 2 committee members will be from the candidate's program, including the thesis advisor. The third member, who acts as chair of the committee, must be a member of the graduate faculty, must be from a different program and department (including any secondary or adjunct appointments) than the candidate and advisor, and must be approved by the Graduate College. For University-wide interdisciplinary programs, and/or programs that incorporate faculty from multiple departments, the chair must be outside the department of the candidate's advisor. The thesis defense examination committee and the graduate studies committee do not have to be the same.

The chair of the thesis defense examination committee has the responsibility for ensuring proper conduct of the examination, appropriate documentation of the results, and that the signatures of endorsement are added to the Defense Examination Record following a successful defense.

The acceptability of the thesis is determined by the thesis defense examination committee. The result and date of the examination is recorded as a notation on the academic transcript. If a student's defense examination performance is not satisfactory, then only one re-examination is permitted.

After a successful thesis defense, candidates must electronically upload the corrected thesis to <http://www.etsadmin.com/uvms> for approval by the Graduate College within the time period specified by the thesis defense examination committee and/or the Graduate College.

## ADDITIONAL REQUIREMENTS FOR THE MASTER OF ARTS IN TEACHING

The M.A.T. degree in Curriculum and Instruction is designed for students seeking initial licensure for middle school or high school teaching. Students enrolled in the M.A.T. in Secondary Education are required to complete a 31-credit program in education course work and an internship that will prepare them to teach in grades 7-12. In addition, some students may be required to complete additional content related course work to fulfill content requirements for State of Vermont licensure. Students enrolled in the M.A.T. in Middle Level Teacher Education are required to complete a 30-credit program in education course work with an additional subject methods course to prepare them to teach math, English/Language Arts, Social Studies or Science in grades 5-9. Students seeking more than one content area endorsement will be required to complete additional methods courses.

## ADDITIONAL REQUIREMENT FOR THE MASTER OF SCIENCE FOR TEACHERS

Applicants for the Master of Science for Teachers must be licensed teachers. Students in a Master of Science for Teachers program may apply more than one 3-credit, undergraduate level course toward their degree. Consult specific department listings for additional requirements and policies related to this degree program.

## REQUIREMENTS FOR THE MASTER OF EDUCATION DEGREE

The graduate program of each student admitted to candidacy for the degree of Master of Education is planned and supervised by an advisor in the respective program area. Program planning is based upon the student's undergraduate curriculum, professional experience, and aims and purposes in pursuing the master's degree.

Each program must include a minimum of 30 approved credits, at least 6 of which must be comprised of 6000-level or above coursework (some programs require more; check individual program pages for requirements). A minimum grade point average of 3.00 must be achieved. If a student's preparation is inadequate to begin study at the graduate level, additional undergraduate courses will be required.

## COMPREHENSIVE EXAMINATION

A comprehensive examination is required. It may be written, oral, or both. The choice of the examination format will be made by faculty members in the area of specialization after consultation with the advisor and the candidate.

1. The written comprehensive examination will cover the field of education with emphasis on the area of specialization.
2. The oral comprehensive examination will emphasize the area of specialization.

It is the responsibility of the candidate to schedule the required examination with the College of Education and Social Services. Since each program has different options for meeting the oral and written



comprehensive requirements, candidates must contact the respective program coordinator or advisor regarding program policy.

## THESIS OPTION

If the thesis option is elected (Interdisciplinary and Educational Leadership and Policy Studies only), the oral or written comprehensive examination must be successfully completed prior to the thesis defense.

## RESEARCH AND THESIS

If a thesis is elected (Interdisciplinary and Educational Leadership and Policy Studies only), the candidate for the master's degree undertakes a problem of original research under the supervision of a faculty member in the department of specialization, and registers for a minimum of 6 credits of thesis research. At the conclusion of the research, the student must present and successfully defend a thesis which embodies the results of the work and demonstrates the capability for independent research.

## THESIS DEFENSE FORMS

A Public Notice of the defense is required in order to defend. The Intent to Graduate form must be submitted to the candidate's department and the Graduate College by the published deadline for the cycle in which the student plans to graduate. The Defense Committee form is due as soon as the student's committee is formed, or by the published due date of the Intent to Graduate form at the latest.

## THESIS FORMAT

Students are required by the Graduate College to use a computer software program appropriate to the discipline to create the Table of Contents and the Lists of Tables and Figures from the thesis text headings.

The thesis must be prepared and submitted in compliance with the "Guidelines for Writing a Thesis or Dissertation" available from the Graduate College website. A formatted copy of the thesis must be reviewed by the Graduate College at the Format/Record Check at least 3 weeks prior to the scheduled defense. Students must also provide defendable copies of the thesis to members of their thesis defense examination committee at least 2 weeks before the scheduled examination. Individual departments may require earlier deadlines.

Students must notify the Graduate College of the thesis defense at least 3 weeks prior to defending their thesis.

## THESIS DEFENSE EXAMINATION COMMITTEE

The thesis defense examination committee consists of at least 3 University of Vermont faculty members, at least 2 of whom must be members of the graduate faculty. Ordinarily, 2 committee members will be from the candidate's program, including the thesis advisor. The third member, who acts as chair of the committee, must be a member of the graduate faculty, must be from a different program and department (including any secondary or adjunct appointments) than the candidate and advisor, and must be approved by the Graduate

College. The thesis defense examination committee and the graduate studies committee do not have to be the same.

The chair of the thesis defense examination committee has the responsibility for ensuring proper conduct of the examination, appropriate documentation of the results, and that the signatures of endorsement are added to the Defense Examination Record following a successful defense.

The acceptability of the thesis is determined by the thesis defense examination committee. The result and date of the examination is recorded as a notation on the academic transcript. If a student's defense examination performance is not satisfactory, then only 1 re-examination is permitted.

After a successful thesis defense, candidates must electronically upload the corrected thesis to <http://www.etsadmin.com/uvm> for approval by the Graduate College within the time period specified by the thesis defense examination committee, and/or the Graduate College.

## REQUIREMENTS FOR ADMISSION TO GRADUATE STUDIES FOR THE DEGREE OF MASTER OF EDUCATION

15 credits of Education and related areas or appropriate professional experience as detailed in application. The Education courses prerequisites may not apply to the Higher Education and Student Affairs Administration, Educational Leadership and Policy Studies, or Interdisciplinary Studies programs, i.e., persons seeking positions which do not require public school certification.

## MINIMUM DEGREE REQUIREMENTS

A minimum of 30 credits in approved graduate courses or 6 additional credits and thesis research; successful completion of the comprehensive examination.

## REQUIREMENTS FOR THE MASTER OF PROFESSIONAL STUDIES DEGREE

In addition to the requirements described below, individual programs may have their own specific requirements. Students must read and familiarize themselves with their program's requirements. Some of them are detailed in this catalogue under individual program listings and other requirements are available from the director or chair of each program.

## CREDITS

Master of Professional Studies (M.P.S.) degrees require a minimum of thirty credits, at least 6 credits of which must be comprised of 6000-level coursework; some programs require more. A minimum grade point average of 3.00 must be achieved. A minimum of fifteen graded credits used in compilation of the graduate GPA must be taken in residence at UVM following matriculation into the master's program. Consult individual program descriptions for specific credit requirements. With the prior approval of their program and the Graduate College, students may apply 3 credits of 3000- or 4000-level coursework toward their graduate program. The student's



advisor must petition the Graduate College for approval before the student enrolls in the course. Consult individual programs for further limitations. Under no circumstances will a course numbered below 3000 be applicable to a master's program.

## MINIMUM RESIDENCE REQUIREMENTS

Candidates for the M.P.S. degree must satisfactorily complete 21 credits in residence. The residency requirement is completed by courses that:

1. are taken for graduate credit through the University of Vermont, and
2. are taken after the student has been admitted to the Graduate College.

Some programs may require more than the above minimum hours in residence. Consult with the individual program.

## COMPREHENSIVE EXAMINATION

All M.P.S. degree students are required to pass a written and/or oral comprehensive examination in their field of specialization. If both formats are used, satisfactory completion of the written examination is prerequisite to standing for the oral examination. One re-examination only is permitted for any failed comprehensive examination. Consult individual program descriptions for specific information.

There is no fee for the Master's Comprehensive Examination. The student's program director or advisor must notify the Graduate College of the outcome of the examination. The result and date of the examination is recorded as a notation on the academic transcript.

## INTERNSHIP/RESEARCH

All M.P.S. degree students must complete a minimum of 3 and a maximum of 6 credits of project research or internship to apply their newly acquired knowledge as they develop practical skills.

## CAPSTONE PROJECT

All M.P.S. degree students must complete a capstone project that is the culmination of their studies and integrates their research or internship experience into a professional framework informed by their curriculum. The capstone project must be presented to and assessed by program faculty.

## REQUIREMENTS FOR THE DOCTOR OF EDUCATION DEGREE

### CREDITS

A minimum of 60 credits earned in courses and in dissertation research, at least 54 of which were completed at UVM following formal admission to the program. With the prior approval of their graduate program advisor and the Graduate College, doctoral students may apply up to 6 credits of 3000- or 4000-level coursework towards their graduate program. A student's advisor must submit this request to the Graduate College for approval before the student enrolls in the course. Under no circumstances will a course numbered

below 3000 be applicable to a doctoral program. Doctoral students must achieve a 3.00 grade point average.

A maximum of 6 credit hours may be accepted in transfer from an accredited graduate program. Credits to transfer may be completed prior to admission to the Doctor of Education program provided that the credit is approved by the student's graduate program advisor and that the credit conforms to all other Graduate College requirements.

## COMPREHENSIVE EXAMINATION

Consistent with Graduate College requirements, the Ed.D. program requires students to complete a comprehensive examination of core knowledge prior to the completion of the degree program. This examination occurs in the semester following completion of the core course curriculum. The examination tests knowledge in areas of study germane to all Ed.D. students.

## RESEARCH AND DISSERTATION

Each candidate must complete an acceptable original research project which contributes new knowledge or techniques in an academic field. Each candidate must enroll in a minimum of 18 credits of dissertation research. Only a member of the graduate faculty may supervise dissertation research for the Ed.D.

## DISSERTATION DEFENSE FORMS

A Public Notice of the defense is required at least three weeks prior to the scheduled defense date in order for the student to defend. The Intent to Graduate form and Defense Committee form must be submitted to the candidate's department and the Graduate College by the published deadline for the cycle in which the student plans to complete all degree requirements.

## DISSERTATION FORMAT

Students are required by the Graduate College to use a computer software program appropriate to the discipline to create the Table of Contents and the Lists of Tables and Figures from the dissertation text headings.

A dissertation must be prepared and submitted in compliance with the "Guidelines for Writing a Thesis or Dissertation" available from the Graduate College website. A formatted copy of the dissertation must be reviewed by the Graduate College for a Format/Record Check at least 3 weeks prior to the scheduled oral defense. Each student must also provide copies of the dissertation to members of the dissertation defense examination committee at least 2 weeks before the scheduled examination. A student's committee may require earlier deadlines.

The dissertation may be defended only after successful completion of the comprehensive examination and the submission of an original copy of the dissertation to the Graduate College for a Format/Record Check.

## DISSERTATION DEFENSE EXAMINATION COMMITTEE

The dissertation defense examination committee consists of a minimum of 4 University of Vermont faculty members, all regular members of the graduate faculty. The advisor and 2 graduate faculty members must be from inside the Department of Education or the Department of Leadership and Developmental Sciences, though one may be from outside these departments with program approval. The chair must be both a member of the graduate faculty and from outside the candidate's and advisor's department and program. The definition of outside faculty means the faculty member has no appointment of any kind in the department or program. The dissertation defense examination committee must be approved by the Graduate College prior to the defense.

The chair of the dissertation defense examination committee has the responsibility for ensuring proper conduct of the examination, appropriate documentation of the results, and that the signatures of endorsement are added to the Defense Examination Record following a successful defense.

The acceptability of the dissertation is determined by the dissertation defense examination committee. The chair of the dissertation defense examination committee notifies the Graduate College of the outcome. The result of the defense and the date defended will be recorded as a notation on the academic transcript. If a student's defense examination performance is not satisfactory, then 1 reexamination, and 1 only, is permitted.

After a successful dissertation defense, candidates must electronically upload the corrected dissertation to <http://www.etdadmin.com/uvvm> for approval by the Graduate College within the time period specified by the dissertation defense examination committee, and/or the Graduate College.

## REQUIREMENTS FOR THE DOCTOR OF NURSING PRACTICE DEGREE

The Department of Nursing offers a graduate program leading to a Doctor of Nursing Practice (D.N.P.) degree. The program prepares nurses to assume leadership roles within health care systems in a variety of settings, to expand knowledge of the discipline of nursing, and to acquire the foundation for doctoral study and continued professional development. The ability to work collaboratively on an interdisciplinary team, provide patient-centered care, employ evidence-based practice, access information technology, and apply quality improvement strategies are basic competencies expected of all graduates of this program. The D.N.P. program prepares graduates to provide primary care as advanced practice registered nurses (APRNs) in one of two tracks: Adult-Gerontology Nurse Practitioner (AGNP), or Family Nurse Practitioner (FNP). Additionally, the program offers nurses with an earned Master's Degree in nursing the opportunity to complete a post-MS D.N.P. degree, either in primary care or as an executive nurse leader.

## MINIMUM DEGREE REQUIREMENTS

The D.N.P. graduate curriculum includes 9 core courses essential for all students that address the theoretical foundation of nursing care, professional issues and role development of APRNs, evidence based research utilization and practice, health policy and finance, ethics, health care informatics, quality of health care delivery, leadership of health care systems, genetics/ genomics, population-based health, biostatistics and epidemiology. Students apply core content to their D.N.P. Program. Upon successful completion of program requirements APRN students are eligible to complete a national certification exam as either FNP or AGNP.

Students on the Adult-Gerontology Nurse Practitioner (AGNP) track are required to earn 69.5 credits; students on the Family Nurse Practitioner (FNP) track are required to earn 76 credits. A course list for both tracks can be found on the College of Nursing and Health Sciences website. A minimum grade point average of 3.00 must be achieved.

As a CNHS graduate nursing student, students are required to complete the CNHS mandatories prior to matriculating into the program. Students must keep these requirements current throughout their program: Immunizations, CPR, HIPPA/OSHA training, annual PPD, and RN License. Some clinical sites require a criminal background check as well. It is essential to be compliant with this process to participate in clinical courses/experiences. Complete details on CNHS Mandatories are available on the college website.

## COMPREHENSIVE EXAMINATION

The Comprehensive Examination is conducted by the Graduate Program in the Department of Nursing. The examination is designed to allow the student to demonstrate analysis and synthesis of knowledge gained through the program. Students may take the examination any time after the majority of the core courses have been successfully completed, and must be completed prior to the final track courses and practicums. Students will be expected to orally present their D.N.P. Project proposal, clearly articulating, synthesizing, and applying the D.N.P. Essentials and the NP competencies and core content addressed throughout the program of study as they relate to their D.N.P. Project.

The Comprehensive Examination is rated on a satisfactory/unsatisfactory basis. In the event that the student does not achieve a satisfactory on the oral comprehensive exam, one opportunity to provide written evidence of satisfactory achievement of the goal of the comprehensive exam will be allowed and is to be submitted by 2 weeks following the oral attempt.

## D.N.P. PROJECT

The project option is a scholarly academic experience of the graduate program where students develop and conduct an innovative project/production relevant to advanced nursing practice with faculty supervision. It is anticipated that the D.N.P. project will result in innovative practices that will improve health care delivery and patient outcomes. Students are required to present and defend the project orally upon its completion.

## REQUIREMENTS FOR THE DOCTOR OF OCCUPATIONAL THERAPY DEGREE

The Department of Rehabilitation and Movement Science offers an entry-level Doctor of Occupational Therapy (OTD) degree. The entry-level Occupational Therapy Doctorate Degree is designed to prepare students to become Occupational Therapy practitioners.

Graduates will learn how to help people attain their desired level of participation in life regardless of age, race, ethnicity, culture, or socioeconomic background. They will learn Occupational Therapy practice across the lifespan and across practice settings. They will become scholarly and innovative thinkers, and will articulate clearly through written and verbal communication the value of the profession.

The University of Vermont's entry-level occupational therapy doctoral degree program has applied for accreditation and has been granted Candidacy Status by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA), located at 6116 Executive Boulevard, Suite 200, North Bethesda, MD 20852-4929. ACOTE's telephone number c/o AOTA is (301) 652-AOTA (2682) and its web address is [www.acoteonline.org](http://www.acoteonline.org). The program must have a preaccreditation review, complete an on-site evaluation, and be granted Accreditation Status before its graduates will be eligible to sit for the national certification examination for the occupational therapist administered by the National Board for Certification in Occupational Therapy (NBCOT). After successful completion of this exam, the individual will be an Occupational Therapist, Registered (OTR). In addition, all states require licensure in order to practice; however, state licenses are usually based on the results of the NBCOT Certification Examination. Note that a felony conviction may affect a graduate's ability to sit for the NBCOT certification examination or attain state licensure.

### DEGREE REQUIREMENTS

Students enter the entry-level Doctor of Occupational Therapy program with a bachelor's degree. The program is an 8-semester, 98-credit program that consists of traditional, didactic teaching, experiential learning, fieldwork, and a scholarship capstone project and experience. Students must satisfactorily complete every aspect of the program. Students must also complete and maintain College of Nursing and Health Sciences mandatories including but not limited to: Immunizations, CPR, HIPPA/OSHA training, criminal background checks, etc.

### FIELDWORK

Fieldwork in the OTD program is where students are given the opportunity to practice learned skills in real-world settings. In the OTD program, students participate in 2 Level II fieldwork experiences, 12-weeks each for a total of 24 weeks. During these Level II fieldwork experiences, students work under the supervision of a licensed occupational therapist. Students must successfully pass the 2 12-week Level II fieldwork experiences as part of the entry-level OTD program.

## CAPSTONE EXPERIENCE AND PROJECT

Students are expected to complete a capstone project. The capstone project is an individual, scholarly project that enhances the student's knowledge in an interest area. As part of the capstone project, the student designs and executes a 14-week capstone experience and identifies a capstone mentor to work with during this process.

Students must successfully complete and disseminate the entire capstone experience and project as part of the entry-level OTD program.

## REQUIREMENTS FOR THE DOCTOR OF PHILOSOPHY DEGREE

In addition to the requirements described below, individual programs may have their own specific requirements. Students must consult and familiarize themselves with their program requirements.

### CREDITS

The degree of Doctor of Philosophy requires a minimum of 75 credits earned in courses and in dissertation research, including a minimum of 30 credits of course work, at least 15 of which must be graded and may not count towards a master's degree, and a minimum of 20 credits of dissertation research. At least 9 credits of 6000-level coursework is required. A minimum grade point average of 3.00 must be achieved. A minimum of 15 credits in courses used in compilation of the grade point average must be taken in residence at the University of Vermont following matriculation for the Ph.D. Consult individual programs for additional information on credit hour requirements. Generally, the first year of each doctoral program consists of required courses. With the prior approval of their department and the Graduate College, doctoral students may apply up to 6 credits of 3000- or 4000-level coursework towards their graduate program. A student's advisor must petition the Graduate College for approval before the student enrolls in the course. Consult individual programs for further limitations. Under no circumstances will a course numbered below 3000 be applicable to a doctoral program.

### MINIMUM RESIDENCE REQUIREMENTS

Candidates for the doctoral degree must satisfactorily complete a minimum of 51 hours in residence. The residency requirement is completed by courses that:

1. are taken for graduate credit through the University of Vermont, and
2. are taken after the student has been admitted to the Graduate College.

Some programs may require more than the above minimum hours in residence.

### TEACHING REQUIREMENT

All doctoral candidates must acquire appropriate teaching experience in their chosen fields prior to the awarding of the degree. The nature and amount of teaching, for which no academic credit is allowed, will be determined by each candidate's program.



## LANGUAGE REQUIREMENT

Demonstration of competency in foreign languages may be required in some programs. The requirement may be fulfilled by an examination administered by the program or in conjunction with the appropriate language department. The outcome of the language examination is reported to the Graduate College and will appear as a notation on the transcript. There is no fee for taking the exam.

## GRADUATE STUDIES COMMITTEE

It is the responsibility of the graduate studies committee to supervise the graduate student's program and to review progress at least annually. A graduate studies committee consisting of at least 4 regular members of the graduate faculty is appointed by the department chair or designated departmental representative and approved by the Dean of the Graduate College within the first 2 semesters after first enrollment in the Graduate College, unless the student's department employs an alternative procedure approved by the Graduate College. The chair of the graduate studies committee serves as the student's academic advisor and also as the dissertation advisor or supervisor. Only a regular member of the graduate faculty can serve as an advisor of a doctoral dissertation. On occasion, it may be appropriate for a professional other than a regular member of the graduate faculty to serve as a member of a graduate studies committee. In such cases, written approval must be obtained from the Dean of the Graduate College prior to the student's beginning dissertation research.

## COMPREHENSIVE EXAMINATION

A written comprehensive examination in the field of study must be passed by the candidate at least 6 months before the dissertation defense. The examination must be prepared by the program concerned, in consultation with the candidate's graduate studies committee. Should the candidate fail the examination, only 1 reexamination is permitted. Some programs also require an oral comprehensive examination; success in the written comprehensive examination is prerequisite to standing for the Dissertation Oral Defense Examination.

There is no fee for the Doctoral Comprehensive Examination. The student's program director or advisor must notify the Graduate College of the outcome of the examination. The result of the examination and the date taken will be recorded as a notation on the academic transcript.

## RESEARCH AND DISSERTATION

Each candidate, while in residence at the University of Vermont, must complete an acceptable original research project which contributes new knowledge or techniques in an academic field. Each candidate must enroll in a minimum of 20 credits of dissertation research. Only a member of the graduate faculty may supervise dissertation research for the Ph.D.

## DISSERTATION DEFENSE FORMS

A Public Notice of the defense is required at least 3 weeks prior to the scheduled defense date in order for the student to defend. The Intent to Graduate form must be submitted to the candidate's department and the Graduate College by the published date for the cycle in which

the student plans to graduate. The Defense Committee form is due as soon as the student's committee is formed, or by the published due date of the Intent to Graduate form at the latest.

## DISSERTATION FORMAT

Students are required by the Graduate College to use a computer software program appropriate to the discipline to create the Table of Contents and the Lists of Tables and Figures from the dissertation text headings.

A dissertation must be prepared and submitted in compliance with the "Guidelines for Writing a Thesis or Dissertation" available on the Graduate College website and the program. A formatted copy of the dissertation must be reviewed by the Graduate College at the Format/Record Check at least 3 weeks prior to the scheduled oral defense. Each student must also provide defendable copies of the dissertation to members of the dissertation defense examination committee at least 2 weeks before the scheduled examination. Individual departments may require earlier deadlines.

Students must notify the Graduate College prior to defending their dissertations.

## DISSERTATION DEFENSE EXAMINATION COMMITTEE

The dissertation defense examination committee consists of a minimum of 4 University of Vermont faculty members, all regular members of the graduate faculty. If a student has co-advisors, they count as 1 defense committee member. At least 2 graduate faculty members must be from inside the student's department or program. The chair must be both a member of the graduate faculty and from outside the candidate's and advisor's department and program. The definition of outside faculty means the faculty member has no appointment of any kind in the department or program. For University-wide interdisciplinary programs, and/or programs that incorporate faculty from multiple departments, the chair must be outside the department of the candidate's advisor. Individual programs may require more than 4 committee members or have other specific membership requirements. The dissertation defense examination committee must be approved by the Graduate College prior to the defense. The dissertation defense examination committee and the graduate studies committee do not have to be the same.

The chair of the dissertation defense examination committee has the responsibility for ensuring proper conduct of the examination, appropriate documentation of the results, and that the signatures of endorsement are added to the Defense Examination Record following a successful defense.

The acceptability of the dissertation is determined by the dissertation defense examination committee. The chair of the dissertation defense examination committee notifies the Graduate College of the outcome. The result of the defense and the date defended will be recorded as a notation on the academic transcript. If a student's defense examination performance is not satisfactory, then 1 reexamination, and 1 only, is permitted.



After a successful dissertation defense, candidates must electronically upload the corrected dissertation to <http://www.etdadmin.com/uvm> for approval by the Graduate College within the time period specified by the dissertation defense examination committee, and/or the Graduate College.

## REQUIREMENTS FOR THE DOCTOR OF PHYSICAL THERAPY DEGREE

The Doctor of Physical Therapy (D.P.T.) program at the University of Vermont (UVM) consists of 102 graduate credits offered in a 2.5-year full-time program format, over 8 semesters inclusive of summers, that leads to a Doctor of Physical Therapy (D.P.T.) degree. The program is well recognized for preparing D.P.T. graduates as primary care movement system experts who translate evidence into contemporary best practice. Graduates advocate to improve health outcomes and well-being at the individual and community level.

The movement system is the foundation of the curriculum design. Organized in a systems-based model, the curriculum integrates the basic and clinical sciences across the musculoskeletal, nervous, cardiovascular/pulmonary, integumentary and endocrine systems to facilitate student ability to develop as movement system experts. Additionally, the study of evidenced based practice, leadership and professional formation, health policy, business management, and social responsibility shape the students' professional role and identity as a Doctor of Physical Therapy.

Students engage in an array of active learning experiences with multiple opportunities for interprofessional education and community engagement. Integrated clinical experiences and 32 weeks of full time clinical internships broaden student professional preparation. Internships are offered throughout the U.S. in a variety of specialty areas and settings and assignments are based on students' educational needs and clinical site availability. Students are responsible for all costs associated with clinical internships.

Exceptional faculty role model clinical and research expertise across each of the specialty areas of physical therapist practice to facilitate student development as movement system experts.

## COMPREHENSIVE EXAMINATION

The examination takes the form of an individual written student portfolio. Should students not pass the comprehensive examination, they will have one additional opportunity to remediate and provide evidence of achievement of the learning outcomes of the comprehensive examination prior to being able to graduate from the program.

## MINIMUM DEGREE REQUIREMENTS

The UVM D.P.T. program requires successful completion of 102 graduate credits; the passing of all clinical internships and clinical education coursework expectations during their clinical experience and receiving no more than one U grade in a clinical education course (that was successfully retaken for a S grade); and illustrating evidence of professional behaviors commensurate with professional doctoral

practice in physical therapy. A minimum cumulative GPA of 3.00 is required for graduation.

## GRADUATE FACULTY

### A

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