

DEPARTMENT OF SCIENCES

B.Sc. Honors

Food Science and Nutrition

CURRICULUM AND SYLLABI (2023)

(NEP 2020 Based Curriculum)

B.Sc. Honors

Food Science and Nutrition

CURRICULUM AND SYLLABI (2023)

Preamble

The preamble of the Undergraduate curriculum framework- 2023 underlines the historical perspective, philosophical basis and contemporary realities of higher education as enshrined in the NEP 2020 and endeavors to synchronize cornerstones while charting the road ahead for the state of higher education.

The undergraduate Curriculum framework-2023 (UGCF) for B.Sc (Hons) Food Science and Nutrition is meant to bring about systemic change in the higher education system in the University and align itself with the National Education Policy 2020. The following objectives of NEP are kept in perspective while framing UGCF

- To promote each student's holistic development in both academic and on academic spheres
- To provide flexibility to students so that learners have the ability to choose their learning trajectories and programs, and thereby choose their paths in life according to their talents and interests
- To eliminate harmful hierarchies among disciplines/fields of study and silos between different areas of learning
- Multidisciplinary and holistic education to ensure the unity and integrity of all knowledge
- To promote creativity and critical thinking and to encourage logical decision-making and innovation
- To promote ethics and human and constitutional values
- To promote multilingualism and the power of language in learning and teaching
- To impart life skills such as communication, cooperation, teamwork, and resilience
- To promote outstanding research as a corequisite for outstanding education and development

GENERAL INFORMATION

ABBREVIATIONS USED IN THE CURRICULUM

L – Lecture

T - Tutorial
P - Practical
Cr – Credits
LO – Learning Objective
CO - Course Outcome
PO – Programme Outcome
PEO - Programme Education Objective
PSO – Programme Specific Outcome
HUM - Humanities (including Languages and others)
SCI - Basic Sciences (including Mathematics)
CSE – Computer Science Engineering
CUL - Cultural Education
CES – Centre for Environmental Studies
CIR-Corporate and Industrial Relationship
DSC-Discipline Specific Core
DSE-Discipline Specific Elective
SEC-Skill Enhancement Course
VAC- Value Addition Course
GE- Generic Elective
AEC-Ability Enhancement Course

Course Outcome (CO) – Statements that describe what students are expected to know, and are able to do at the end of each course. These relate to the skills, knowledge and behavior that students acquire in their progress through the course.

Program Outcomes (POs) – Program Outcomes are statements that describe what students are expected to know and be able to do upon graduating from the Program. These relate to the skills, knowledge, attitude and behaviour that students acquire through the program. NBA has defined the Program Outcomes for each discipline.

PROGRAMME EDUCATION OBJECTIVE (PEO):

Food Science graduates will be able to:

PEO1: Perform well in applied nutrition fields including public health and clinical nutrition

PEO2: Serve in the core food industry, which leverages diverse food science domains including food chemistry, product development, safety & quality control.

PEO3: Contribute to the skilled manpower requirement in this field so as to address societal & national needs

PROGRAM OUTCOME (PO):

1. **Scientific Knowledge:** Apply the knowledge of biological sciences as a basis for understanding the role of food and nutrients in health and diseases.
2. **Design/development of solutions:** Design solutions for health and nutritional problems and design products that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.
3. **Environment and sustainability:** Understand the impact of food processing and preservation solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.
4. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the nutrition and health care practice.
5. **Individual and team:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
6. **Communication:** Communicate effectively on nutritional and health burdens with the scientific community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
7. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of health care management.

PSO FOR B.SC. HONS. FOOD SCIENCE AND NUTRITION

After the successful completion of the program, the students are expected to

PSO1: Comprehend the association between nutrients with physiology, diseases and dietary solutions.

PSO2: Apply knowledge and technical skills in assessing, evaluating and providing health care solutions for individuals and communities.

PSO3: Associate the theoretical knowledge and skills acquired to the food industry.

PSO4: Develop expertise to serve the society and nation

SEMESTER I

Course Code	Course Title	LTP	Credits
23FSN101	Food Science & Experimental Foods	3 1 0	4
23FSN102	Principles of Nutrition	3 1 0	4
23FSN103	Food Processing Preservation Technology – 1	2 2 0	4
23FSN181	Food Science & Experimental Foods (P)	0 0 2	1
21ENG101	Communicative English	2 0 2	3
	Language I	2 0 0	2
22ADM101	Foundations of Indian Heritage	2 0 0	2
22AVP103	Mastery Over Mind	1 0 2	2
	Total credits		22

SEMESTER II

Course Code	Course Title	LTP	Credits
23FSN111	Nutrition Through life Span	3 1 0	4
23FSN112	Human Physiology	3 0 1	4
23FSN113	Food Processing and Preservation Technology -II	3 1 0	4
23FSN114	Food Chemistry	3 0 0	3
23FSN182	Nutrition Through life Span (P)	0 0 2	1
23FSN184	Food Processing and Preservation Technology (P)	0 0 2	1
23FSN183	Food Chemistry(P)	0 0 2	1
21ENG111	Professional Communication	1 0 2	2
	Language II	2 0 0	2
22ADM111	Glimpses of Glorious India	2 0 0	2
	Total credits		24

SEMESTER III

Course Code	Course Title	LTP	Credits
23FSN201	Nutritional Biochemistry	3 1 0	4
23FSN202	Clinical Nutrition and Dietetics – I	2 2 0	4
23FSN281	Nutritional Biochemistry (P)	0 0 2	1
23FSN282	Clinical Nutrition and Dietetics-I (P)	0 0 2	1
	Professional Elective A*	3 0 0	3
	Generic Elective A#	3 0 0	3
23FSN203	Basics of Computer Applications	2 0 0	2
	Free Elective 1**	2 0 0	2
21SSK202	Soft skill -1	1 0 2	2
	Total credits		22

Course Code SEMESTER IV

	Course Title	LTP	Credits
23FSN211	Food Microbiology	3 0 0	3
23FSN212	Clinical Nutrition and Dietetics - II	2 2 0	4
23FSN283	Food Microbiology (P)	0 0 2	1
23FSN284	Clinical Nutrition and Dietetics-II (P)	0 0 2	1
21ENV211	Environment and Sustainability	3 0 0	3
	Professional Elective B*	3 0 0	3
	Free Elective 2**	2 0 0	2
21SSK212	Soft skill -2	1 0 2	2
23FSN290***	Live in Labs ***	0 0 3	3
	Total credits		22

SEMESTER V

Course Code	Course Title	LTP	Credits
23FSN301	Food Product Development and Marketing	3 1 0	4
23FSN302	Food Service Management	3 1 0	4
	Generic Elective B [#]	3 0 0	3
23FSN303	Packaging and Labelling of Food Products	2 1 0	3
23FSN381	Food Product Development (P)	0 0 2	1
23FSN382	Food Service Management (P)	0 0 2	1
21SSK302	Soft skill – 3	1 0 2	2
23FSN390 ***	Live in Labs ***/ Professional Elective A*	0 0 3 /3 0 0	3
	Total credits		21

SEMESTER VI

Course Code	Course Title	LTP	Credits
23FSN311	Community Nutrition	3 1 0	4
23FSN312	Analytical Instrumentation	2 0 0	2
	Generic Elective -A [#]	3 0 0	3
23FSN313	Food Product Evaluation	1 1 0	2
	Professional Elective B*	3 0 0	3
23FSN314	Research Methodology and Bio Statistics	2 2 0	4
23FSN383	Food Analysis (P)	0 0 2	1
23FSN399	Project (Additional for Exit Option)		6
23FSN398 [#]	Internship [#] /Core elective (Continuing Students)		3
	Total credits		22/25
	Total credits(I+II+III+IV=V+VI)		133/136

SEMESTER VII

Course Code	Course Title	LTP	Credits
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23FSN401	Public Health Nutrition	2 2 0	4
	Professional Elective- A*	3 0 0	3
	Generic Elective -B#	3 0 0	3
23FSN402	Nutraceuticals and Functional Foods	3 1 0	4
23FSN403	Food & Nutrition Research Techniques	3 1 0	4
	Professional Elective- B*	3 0 0	3
23FSN481	Techniques of Experimental Nutrition	0 0 3	2
	Total credits		23

SEMESTER VIII

Course Code	Course Title	LTP	Credits
23FSN411	Nutrition in Health and Fitness	3 1 0	4
	Professional Elective- C*	3 0 0	3
	Generic Elective –A / B#	3 0 0	3
23FSN499	Major Project		12
	Total credits		22
	Total Credits (I+II+III+IV+V+VI+VII+VIII)		178

* Professional Elective courses (A, B and C) are to be taken by each student, one each at the 3rd, 4th, 5th, 6th, 7th and the 8th semester, from the list of electives offered by the Department.

** Free Electives - This will include courses offered by Faculty of Humanities and Social Sciences/ Faculty Arts, Commerce and Media / Faculty of Management/Amrita Darshanam - (International Centre for Spiritual Studies).

*** Students undertaking and registering for a Live-in-Lab project, can be exempted from registering for an Elective course in the higher semester.

Generic Elective courses (A & B) are to be taken by each student, one each at the 3rd, 5th, 6th, 7th and the 8th semester, from the list of generic electives offered by the Department.

PROFESSIONAL ELECTIVES

	Course Title	LTP	Credits
23FSN231	Food Hygiene and Sanitation	3 0 0	3
23FSN232	Adolescence Health and Lifestyle	3 0 0	3
23FSN233	Nutrition for Athletes	3 0 0	3
23FSN241	Home-scale preservation of foods	3 0 0	3
23FSN242	Basics of Food Engineering	3 0 0	3
23FSN243	Career Opportunities in Food Science and Nutrition	3 0 0	3
23FSN431	Bakery and Confectionery	2 0 1	3
23FSN432	Food Biotechnology	3 0 0	3
23FSN433	Food Safety and Quality control	2 1 0	3
	Course Title	LTP	Credits
23FSN331	Food Fortification	3 0 0	3
23FSN332	Food Industry Management	3 0 0	3
	Course Title	LTP	Credits
23FSN251	Food Toxicology	3 0 0	3
23FSN252	Nutrition in Emergencies and Disaster Management	3 0 0	3
23FSN253	Physical Chemistry of Food Constituents	3 0 0	3
23FSN261	Post-Harvest Technology	3 0 0	3
23FSN262	Food Bio Technology	3 0 0	3
23FSN263	Nutrition Education and Communication	3 0 0	3

LANGUAGES

Code	Course Title	LTP	Credits
21TAM101	TAMIL I	2 0 0	2
21MAL101	MALAYALAM I	2 0 0	2
21HIN101	HINDI I	2 0 0	2
21TAM111	TAMIL II	2 0 0	2
21MAL111	MALAYALAM II	2 0 0	2
21HIN111	HINDI II	2 0 0	2

Code	Course Title	LTP	Credit
21CUL230	Achieving Excellence in Life - An Indian Perspective	200	2
21CUL231	Excellence in Daily Life	200	2
21CUL232	Exploring Science and Technology in Ancient India	200	2
21CUL233	Yoga Psychology	200	2
21ENG230	Business Communication	103	2
21ENG231	Indian Thought through English	200	2
21ENG232	Insights into Life through English Literature	200	2
21ENG233	Technical Communication	200	2
21ENG234	Indian Short Stories in English	200	2
21FRE230	Proficiency in French Language (Lower)	200	2
21FRE231	Proficiency in French Language (Higher)	200	2
21GER230	German for Beginners I	200	2
21GER231	German for Beginners II	200	2
21GER232	Proficiency in German Language (Lower)	200	2
21GER233	Proficiency in German Language (Higher)	200	2
21HUM230	Emotional Intelligence	200	2
21HUM231	Glimpses into the Indian Mind - the Growth of Modern India	200	2
21HUM232	Glimpses of Eternal India	200	2
21HUM233	Glimpses of Indian Economy and Polity	200	2
21HUM235	Indian Classics for the Twenty-first Century	200	2
21HUM236	Introduction to India Studies	200	2
21HUM237	Introduction to Sanskrit Language and Literature	200	2
21HUM238	National Service Scheme	200	2
21HUM239	Psychology for Effective Living	200	2
21HUM240	Psychology for Engineers	200	2
21HUM241	Science and Society - An Indian Perspective	200	2
21HUM242	The Message of Bhagwad Gita	200	2
21HUM243	The Message of the Upanishads	200	2
21JAP230	Proficiency in Japanese Language (Lower)	200	2
21JAP2313	Proficiency in Japanese Language (Higher)	200	2
21SAN101	Sanskrit I	200	2
21SAN111	Sanskrit II	200	2
21SWK230	Corporate Social Responsibility	200	2
21SWK231	Workplace Mental Health	200	2

SEMESTER I
FOOD SCIENCE AND EXPERIMENTAL FOODS

Semester I

Course Code:23FSN101

L-T-P-C 3-1-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre requisite: Basic Food Groups, cooking methods, effects of cooking

Course Objectives:

1. To impart knowledge on food groups and its nutritional composition
2. To relate the impact of cooking on the stability of nutrients.
3. To analyze the changes during processing and storage on the nutritional composition of foods.
4. To study the factors influencing the cooking quality of different foods.

Course Outcomes:

CO1: Acquire knowledge on the food groups and factors influencing the changes in different cooking methods.

CO2: Gain knowledge on nutritive value of Cereals, Pulses, Nuts and Oil Seeds, Fats, Oils and changes affecting the nutritive value during cooking methods.

CO3: Gain information on the classification, composition of post-harvest changes of fruits and vegetables

CO4: Gain insight on composition, nutritive value and storage properties of meat, poultry, dairy and fish

CO5: Relate the stages of sugar, types of beverages and role of spices in cookery.

Skills:

- Develop skills on various cooking methods and medium of cooking.
- Acquire skills in processing and storage of foods.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	1	3	-	-	-
CO2	2	1	-	-	-	-	1	3	-	1	-
CO3	2	1	-	-	-	-	1	2	-	3	-
CO4	2	1	-	-	-	-	1	2	-	3	-
CO5	2	1	-	-	-	-	1	2	-	2	-

Syllabus:

Unit I - Introduction of Food Groups and Cooking Methods

12 hrs.

Foods, Classification, Functions, Food groups, Balanced Food, Food pyramid, My plate

Cooking- Objectives of Cooking, Preliminary preparation, cooking methods, Dry heat, Moist heat, Merits and Demerits.

Unit II - Cereals, Pulses, Nuts and Oil Seeds, Fats and Oils

12 hrs.

Structure, Composition and Nutritive Value, Changes in Nutritive Value during Cooking, Processing and storage, cooking quality

Cereals- Cereal cookery concepts, fermented products, non-fermented products, breakfast cereals

Pulses- Factors affecting cooking quality of pulses, storage and infestation, toxic constituents, pulse cookery.

Nuts and oil seeds- Nuts and oil seeds cookery, toxins in nuts and oil seeds

Fats & Oils - Processing and refining of fats, Specific fats, Role of fats/oil in cookery, Emulsion, smoking point, rancidity.

Unit III -Vegetables and Fruits

12hrs

Vegetables - Classification, Composition and Nutritive Value, Selection, Vegetable cookery- pigments, Changes in Nutritive Value, Ripening of Fruits, Storage of vegetables and Fruits, fungi and algae as foods

Fruits - Classification, Composition and Nutritive Value, post-harvest change, enzymatic and non-enzymatic browning, vegetables and fruits as functional foods, Ripening of Fruits, Pectic substances and gel formation, Storage of Fruits.

Unit IV- Meat, Poultry, Dairy and Fish

12hrs.

Milk – Composition and Properties of milk, Nutritive Value, effect of heat, acid, enzymes, phenolic compounds and salts. Microorganisms, Processing, Milk Products, Milk Substitutes, Role of milk and milk products in cookery

Egg- Structure, Composition and Nutritive Value, Quality of eggs, Egg cookery, Buying and Handling, preservation,

Role of eggs in cookery.

Fleshy Foods- Structure, Composition and Nutritive value of meat, Selection and Storage – Effect of cooking on colour, Texture and flavour. Ageing of meat, Curing of Meat, Tendering Meat, Cuts and grades of meat, Meat cookery.

Poultry - Classification, Processing, Composition and Nutritive value, Preservation and storage

Fish - Classification, Composition, Selection, Fish cookery, Spoilage, Preservation and storage.

Unit V - Sugars, Beverages, Spices and Condiments

12hrs

Sugars - Nutritive value, Properties, Stages of sugar cookery, Sugar Related Products, Sugar Cookery and Artificial Sweetener.

Beverages - Classification, Nutritive value – Coffee, Tea, Cocoa, Chocolate, Fruit Beverages, Soups Vegetable Juices, Milk Based Beverages, Malted Beverages, Aerated and Non-Alcoholic Beverages, Miscellaneous Beverages, Alcoholic Beverages.

Spices and Condiments: Types, Functional properties, Role of spices in cookery.

Text Books:

1. Srilakshmi. B. Food Science, New Age International Pvt Ltd Publishers, 3rd Edition, 2005.
2. Shakuntala Manay, Shadaksharaswamy. M Foods, Facts and Principles, New Age International Pvt Ltd Publishers, Sixth Edition, 2015.
3. Usha Chandrasekhar, *Food Science and Application in Indian Cookery*, Phoenix Publishing House P. Ltd., New Delhi, 2002.
4. Food science, Chemistry and Experimental foods by M. Swaminathan.
5. Swaminathan, M. : Hand Book of Food Science and Experimental Food

Reference Books:

1. Brow, A., *Understanding Food*, Thomson Learning Publications, Wadsworth, 2000.
2. Mehas, K.Y. and Rodgers, S.L. *Food Science and You*, McMillan McGraw Company, New York, 2000.
3. Parker, R. *Introduction to food Science*, Delmer, Thomson Learning Co., Delma, 2000.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

PRINCIPLES OF NUTRITION

Semester I

Course Code:23FSN102

L-T-P –C 3-1-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre requisite: Nutrients, Sources, Functions and metabolism.

Course Objectives:

1. To build better understanding on nutrition science for health promotion and disease prevention
2. To impart knowledge on functions, metabolism, requirements and effects of deficiency of nutrients.
3. To outline the vital link between nutrition and health of individuals.

Course Outcomes:

CO1: Understand the principles of Energy requirements, measurements, and energy metabolism in various conditions

CO2: Gain knowledge on the classification, composition, sources, functions, digestion, and absorption of carbohydrates, dietary fibres, and proteins

CO3: Understand the classification, composition, sources, functions, digestion, and absorption of Lipids and Water

CO4: Gain knowledge on the classification, distribution in the body, functions, Source, requirements, deficiency, and toxicity-of vitamin, minerals, and antioxidants

Skills: Learn skills in developing a balanced diet based on individual requirements.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	-	1	2	3	-	-
CO2	3	-	-	-	-	-	1	3	3	-	-
CO3	3	-	-	-	-	-	1	3	3	-	-
CO4	3	1	-	-	-	-	1	3	3	-	-

Syllabus:

Unit I: Energy

12 hrs.

Energy, Units of Energy, Measurement of Calorific Value, Physiological fuel values, Determination of energy requirements-Direct and Indirect calorimetry, Relation between Respiratory quotient and Energy output, Specific dynamic action of foods (Diet Induced Thermo genesis) definition, determination of basal metabolism -Benedicts Roth Apparatus, Factors Affecting BMR, determination of energy metabolism during work- Energy requirements for various age groups.

Unit II: Carbohydrates and proteins

12hrs.

Carbohydrates - Classification, composition, sources, functions, digestion, absorption, glycemic index and metabolism, Requirements (RDA) and deficiency. Dietary fiber – definition, sources, functions and types - Soluble and Insoluble Fiber.

Proteins - Classification, composition, sources, functions, digestion, absorption and metabolism, Requirements (RDA) and deficiency. Amino acid- classification and functions. Evaluation of protein quality- PER, NPU, NDBPER, BV and Chemical score.

Unit III: Lipids and Water

12 hrs.

Lipids and fats- Classification, composition, Sources, Essential fatty acids, functions, digestion, absorption, metabolism and Requirements

Water and electrolyte Balance - Distribution of water and electrolytes, Functions, Requirements, Sources, water balance.

Unit IV: Minerals

12 hrs

Macro minerals - Classification, Distribution in the body, Functions, Source's, absorption, storage, metabolism, storage, requirements, deficiency and toxicity- Calcium, Phosphorus, Magnesium.

Micro minerals - Classification, Distribution in the body, Functions, Sources absorption, metabolism, storage, requirements, deficiency and toxicity- Sodium, Potassium, Copper, Iron, Zinc, Iodine and Fluorine, selenium

Unit V: Vitamins

12 hrs.

Fat soluble vitamins - Chemistry, Functions, Sources, absorption, transport, metabolism, Requirements, Deficiency and toxicity.

Water Soluble Vitamins - Chemistry, Functions, Sources, absorption, transport and metabolism, Requirements, Deficiency and toxicity.

Antioxidants - Free radicals damage, Oxidant defense system, Antioxidants in diseases, Sources.

Text Books:

1. *Srilakshmi, B., Nutrition Science, New Age International (P) Ltd., New Delhi, 2017.*
2. *Mahtab, S, Bamji, Kamala Krishnasamy, G.N.V. Brahmam, Text Book of Human Nutrition, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi, 2015*
3. *Swaminathan, M., Advanced Textbook on Food and Nutrition, Vol. 1, Second Edition, Bangalore Printing and Publishing Co. Ltd., Bangalore, 2015.*

Reference Books:

1. *Dietary Guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2011.*
2. *Gordon M. Wardlaw, Paul M.Insel, Perspectives in nutrition 11th edition, Mosby- year Book,Inc.St.Louis,Missouri, 2019*
3. *Krause, M.V. and Hunesher, M.A., Food, Nutrition and Diet Therapy, 14th Edition, W.B. Saunders Company, Philadelphia, London, 2016.*

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD PROCESSING AND PRESERVATION TECHNOLOGY –I

Semester I

Course Code:23FSN103

L-T-P – 2-2-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre-requisite: Basics of food processing & preservation methods

Course Objectives:

To discuss and apply the principles and methods involved in the processing of different food groups and the preservation methods.

Course Outcomes:

CO1: Comprehend the nature and properties of food and its processing.

CO2: Understand the principles of the various processing methods for cereals, millets, legumes and oil seeds.

CO3: Gain knowledge on processing methods used in animal based foods.

CO4: Adapting conventional practices and modern technology for preservation of fruits and vegetables.

Compare various millet processing techniques. iii. Discuss pulse processing and preservation techniques. iv. Identify oil seed processing and preservation. v. Explain spice processing and preservation techniques.

Skills: Develop skills in various food processing techniques

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	1	1	-	1	-
CO2	-	-	3	-	-	-	-	3	-	1	-
CO3	-	-	3	-	-	-	-	2	-	1	-
CO4	-	-	3	-	-	-	-	-	-	1	1

Syllabus:

Unit I - Introduction to food processing

12 hrs.

Nature and properties of food, fluid and visco elastic behavior of foods, Principles of different food processing such as membrane filtration (ultra, osmosis and reverse osmosis, dialysis), pulsed electric, irradiation, high pressure processing and hurdle technology. Effect of food processing on the nutritional properties of food.

Unit II - Processing of cereals and millets

12 hrs

Milling products and by products of wheat, rice, corn, barley, oats, sorghum and other millets, whole wheat atta, blended flour, fortified flour, flaked, puffed and popped cereals, malted cereals, processed foods - bakery products, pasta products and value-added products.

Unit III - Processing of legumes and oil seeds

12hrs.

Milling, processing for anti-nutritional factors, processing for production of edible oil, meal, flour, protein concentrates and isolates, extrusion cooking technology, snack foods, development of low-cost protein foods.

Unit IV - Processing of Dairy and animal foods

12hrs.

Dairy – Manufacture of different types of milk, drying of whole and skim milk, cream separation, churning of butter, processing of different types of cheese, Probiotic milk products - yoghurt, dahi and ice-cream, indigenous milk products - khoa, burfi, kalakhand, gulab jamun, rasagola, srikhand, channa, paneer, ghee, lassi.

Animal Foods: Canning, cooking, drying, pickling, curing and smoking, salami, kebabs, sausages, sliced, minced, corned, whole egg powder, egg yolk powder, fish protein concentrate and fish oil

Unit V Processing of Fruits and Vegetables

12 hrs.

Introduction to ripening of fruits and vegetables, processing and preservation of various fruits and vegetables, fruit juices concentrates and powders, purees, pastes, sugar and salt preserves, dehydrated fruits and vegetables.

Related practical experiences

1. Visit to TNAU
2. Visit to flour mill
3. Visit to milk processing unit
4. Visit to FSSAI, CODEX, NABL Accreditation labs

Text Books:

1. Shakuntala Manay, N. and Shadaksharaswamy, M., (2008) Foods – Facts and Principles, 3rd Edition, New Age International (P) Limited Publishers, New Delhi, 2013.
2. S. Ranganna, Handbook of Analysis and Quality Control for Fruit and Vegetable Products, McGraw Hill Education, 2017.
3. G.Subbulakshmi and Shoba A Udipi Food Processing and preservation, New Age International Publishers, New Delhi, 2008.
4. Sivasankar B, (2004) Food Preservation and Processing, 1st Edition, Prentice – Hall of India Private Ltd., New Delhi, 2012.
5. Bawa AS, Raju PS, Chauhan OP, (2013) Food Science, New India Publishing Agency, New Delhi, 2013.

Reference Books:

1. Fellow, P., Food Processing Technology (2016)– Principles and Practices, 3rd Edition, CRC Press Woodland Publishers, England.
2. Adams, M.R. and Moss, M.O., Food Microbiology, (2015) New Age International (P) Ltd., New Delhi.
3. Sommers, C.H. and Xveteng Fan, (2016) Food Irradiation Research and Technology, 2nd Edition, Blackwell Publishing, New Delhi.
4. Manual of methods of Analysis of foods, fruit and vegetable Processing, FSSAI, 2016.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD SCIENCE AND EXPERIMENTAL FOODS PRACTICAL

Semester I

Course Code:23FSN181

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30 hrs.

Pre requisite: Food groups, nutrients, cooking skills, cooking methods.

Course Objectives:

1. Understand different food groups, their nutritive value and role in day's diet.
2. Demonstrate recipes applying various cooking methods.
3. Calculate nutritive value for selected foods

Course Outcome:

1. Gain hands on skills through different recipes and various cooking methods
2. Understand the concept of food selection based on nutrient sources
3. Gain insight on the changes that occurs during experimental cookery
4. Developing skills to calculate the nutritive value for selected foods

Skills: Develop skills in various cooking methods in involved

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	-	1	-	1	3	-	2	-
CO2	3	-	-	-	1	-	1	3	-	2	-
CO3	3	-	-	-	1	-	1	3	-	2	-
CO4	2	-	-	-	1	-	1	3	-	2	-

Practical's:

30hrs.

1. Cereals and cereal cookery

- a. Preparation of cereal products using Rice, Wheat, Ragi, Thinai, Samai, Varagu etc.
- b. Experimental cookery on cereals.

2. Pulses

- a. Preparation of pulse based recipes.
- b. Experimental cookery.

3. Vegetables and Fruits

- a. Effect of cooking on vegetables pigments.
- b. Preparation of vegetable curries, and fruits salad.

4. Milk Cookery

Preparation of ice creams and milk products

5. Egg

Preparation of

- a. Scrambled egg.
- b. Poached egg
- c. Omelette and Experimental cookery.

6. Fats and Oils

Preparation of deep fat food products.

7. Beverage

Preparation of Coffees, Tea, Cocoa drinks and various milk based fruit juice beverages.

References:

1. Swaminathan, M. : Hand Book of Food Science and Experimental Food Text.
2. Gopalan.C& Ramasastrri: Nutritive value of Indian Foods
3. Hughes. O. 1971 : Introductory Foods.
4. Peckham, C.G. 1969 : Foundation of Food Preparation
5. Love, P. 1967 : Experimental Cookery
6. Swaminathan, M. 1976 : Essentials of Food and Nutritive Vol.I
7. Potler, N. : Food Science.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Communicative English

Semester I
Course Code:21ENG101
L-T-P – 2-0-2-3

Hours of Instruction/ week – 4
No. of Credits – 3
Total - 60 hrs.

Course Objectives:

To help students obtain an ability to communicate fluently in English; to enable and enhance the students' skills in reading, writing, listening and speaking; to impart an aesthetic sense and enhance activity.

Course Outcomes:

CO1: Demonstrate competency in all four linguistic skills viz. listening, speaking, reading and writing

CO2: Apply different styles of communication in professional context

CO3: Participate in different planned and extempore communicative activities

CO4: Interpret and discuss facts and information in a given context

CO5: Develop an appreciation for human values

CO - PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	3	3	-	-	-	-	-
CO2	-	-	-	-	-	3	3	-	-	-	-	-
CO3	-	-	-	1	2	3	3	-	-	-	-	-
CO4	-	-	-	-	-	3	3	3	-	-	-	-
CO5	-	-	-	-	-	3	3	3	-	-	-	-

Syllabus:

Unit I

Kinds of sentences, usage of preposition, use of adjectives, adverbs for description, determiners, subject-verb/ pronoun, collocation, phrasal verbs, Modifiers, Linkers/ Discourse markers, Question Tags

Unit II

Paragraph writing

Essay Writing- Descriptive and Narrative

Unit II

Letter Writing- Personal (Congratulation, invitation, felicitation, gratitude, condolence etc.)

Official (Principal/HOD/College authorities, Bank Manager, Editors of Newspapers and Magazines)

Unit IV

Reading Comprehension- Skimming and scanning- inference and deduction-Reading different kinds of materials-Speaking: Narration of incidents/ stories/anecdotes- Current news awareness

Unit V

John Holt's Three Kinds of Discipline (Detailed)

Max Beerbohm's The Golden Drugget (Detailed)

Ogden Nash- This is Going to Hurt Just a Little Bit (Detailed)

Robert Kroetsch- I am getting Old Now(Detailed) Langston Hughes(I Too)

Wole Soyinka Telephone Conversation (Non- detailed)

Kamala Das The Dance of the Eunuchs (Non-detailed)

Edgar Allan Poe The Black Cat (Non-detailed)

Ruskin Bond Time Stops at Shamili (Non-detailed)

References

1. Bond, Ruskin. Time Stops at Shamili and other Stories, Penguin Book India Pvt. Ltd, 1989
2. Martinet, Thomson. A Practical English Grammar, IV Ed. OUP, 1986
3. Murphy, Raymond,. Murphy's English Grammar, OUP, 2004
4. Online Sources

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

TAMIL I

Semester I
Course Code: 21TAM101
L-T-P-C – 2-0-0-2

Hours of Instruction/ week – 2
No. of Credits – 2
Total - 30 hrs.

Objectives:

- To introduce the students to different literature - Sangam literature, Epics, Bhakthi literature and modern literature.
- To improve their ability to communicate with creative concepts, and also to introduce them to the usefulness of basic grammatical components in Tamil.

Unit 1

Sangam literature: Kuṛuntokai; (2, 6,8,40 pāṭalkaḷ) – puṛanāṅṁūru (74,112,184,192 pāṭalkaḷ) – tirukkuṛaḷ (iṛaimāṭci, amaiccu)

Unit 2

Epic literature: cilappatikāram maturaik kāṅṭam (vaḷakkuṛaikkātai 50-55)

Spiritual Literature: tiruppāvai(3,4) – tēvāram (mācilvīṅaiyum)

Medieval Literature: bāratiyar kaṅṅaṅ pāṭṭu (eṅ viḷaiyāṭṭu piḷḷai) – bāratitacaṅ kuṭumpaviḷakku (tāyiṅ tālāṭṭu).

Unit 3

Novel: Jeyakāntaṅ “kuru pīṭam”

Essay: Aṅṅā “ē tāḷnta tamiḷakamē”

Unit 4

Tiruñāṅa campantar – tirunāvukkaracar – cuntarar – māṅikka vācarar – āṅṭāḷ – tirumūlar – kulacēkara āḷvār – cīttalaic cāttāṅār toṭarpāṅa ceytikaḷ, mēṅkōḷkaḷ marrum ciṛappup peyarkaḷ

Unit 5

Tamil Grammar: Col vakaikaḷ - vēṛrumai urupukaḷ - valliṅam mikumiṭam mikāyiṭam - canti(puṅarcci) - ilakkaṅakkuṛippu.

Practical skills: Listening, speaking, writing and reading

Textbooks:

- Aṅṅā “ē tāḷnta tamiḷakamē” nakkīraṅ paḷikēṣaṅs.
- Caktitācaṅ cupramaṅiyaṅ “nalla kuṛuntokai mūlamum uraiyum” mullai patippakam, 2008.
- <http://Www.Tamilvu.Org/libirary/libindex.Htm>.
- jeyakāntaṅ “kuru pīṭam” mīṅāṭci puttaka nilaiyam, 1971.
- Nā.Pārttacāraṅ “puṛanāṅṁūru ciṅkatakaḷ” tamiḷ puttakālayam, 1978, 2001
- Poṅ maṅimāraṅ “aṭṭōṅ tamiḷ ilakkaṅam” “aṭṭōṅ paḷiṣiṅ kurūp, vaṅciyūr, tiruvaṅantapuram, 2007.
- puliyūr kēcikaṅ “kuṛuntokai mūlamum uraiyum” cārāta patippakam, 2010.
- Puliyūr kēcikaṅ “puṛanāṅṁūru” srīceṅpakā patippakam, 2010

CO-PO MAPPING:

S.No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	1	1	2	-	-	-	-	-
CO2	-	-	-	1	1	3	-	-	-	-	-
CO3	-	-	-	1	1	2	-	-	-	-	-
CO4	-	-	-	1	1	3	-	-	-	-	-
CO5	-	-	-	1	1	2	-	-	-	-	-
CO6	-	-	-	1	1	2	-	-	-	-	-

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

MALAYALAM I

Semester I

Course Code: 21MAL101

L-T-P – 2-0-0-2

Hours of Instruction/ week – 2

No. of Credits – 2

Total 30 hrs.

Course Objectives:

To teach Malayalam for effective communication in different spheres of life:- Social context , Education, Research & Media.

Course Outcomes:

- CO1 Inculcate philosophical thoughts and practice.
- CO2 Understand the postmodern trends of literature.
- CO3 Understand the literary cultural era of a particular region
- CO4 Familiarize with the Malayalam literary maestro.
- CO5 Expansion of ideas in writing

CO -PO MAPPING

S.No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	3	1	2	1	-	-	-	-
CO2	-	-	-	1	1	2	1	-	-	-	-
CO3	-	-	-	1	1	2	1	-	-	-	-
CO4	-	-	-	1	1	2	1	-	-	-	-
CO5	-	-	-	1	1	2	1	-	-	-	-
CO6	1	-	-	1	1	2	1	-	-	-	-

Syllabus:

Unit I

Ancient poet trio: *Adhyatmaramayanam, LakshmanaSwanthanam* (Lines: *valsasoumitre... mungikidakayal*), *Ezhuthachan -Medieval period classics – Jnanappana*(Lines:201 to 298), *Poonthanam*.

Unit II

Modern Poet trio: *EnteGurunathan*, Vallathol NarayanaMenon- Critical analysis of the poem.

Unit III

Short stories from period 1/2/3: *Poovanpazham*-Vaikaom Muhammed Basheer-Literary & Cultural figures of Kerala and about their literary contributions.

Unit IV

Literary Criticism: *Bharatha Paryadanam*-*VyasanteChiri*–Ithihasa studies-Kuttikrishna Mararu-Outline of literary Criticism in Malayalam Literature-Introduction to Kuttikrishna Mararu & his outlook towards literature & life.

Unit V

Error-free Malayalam: **1.** Language; **2.** Clarity of expression; **3.** Punctuation-Theettillatha Malayalam – Writing-**a.** Expansion of ideas; **b.** Precis Writing; **c.** Essay Writing; **d.** Letter writing; **e.** Radio Speech; **f.** Script/Feature/Script Writing; **g.** News Editing; **h.** Advertising; **i.** Editing; **j.** Editorial Writing; **k.** Critical appreciation of literary works (Any one or two as an assignment).

References:

1. Leelavathy.M, Malaya kaavidha Sahithiya saritraam, Kerala sahitya Akademi, Thrissur; 2015th edition
2. Tarahan. K.M, Novel Sahithiya CHARITRAM, Kerala Sastrasahitya Parishad, 2015
3. Ulloor S. Parameshwara Iyer, Kerala Sahithiya CHARITRAM., World eBook Library, 2010
4. Autobiography of Gandhiji, Ente Sathyanweshana Pareekshana Katha

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

HINDI I

Semester I
Course Code: 21HIN101
L-T-P – 2-0-0-2

Hours of Instruction/ week – 2
No. of Credits – 2
Total 30 hrs.

Course Objectives:

To teach Hindi for effective communication in different spheres of life: -

Course Outcomes:

CO1: Gain knowledge about the origin and development of Hindi language.

CO2: Understand the grammatical structures of classes of words.

CO3: Apply the mechanics of writing.

CO4: Appreciate different genres of literary texts.

CO5: Demonstrate linguistic competence in written communication.

CO6: Creating different forms of literary writing

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	1	3	-	1	-	-	-
CO2	-	-	-	-	1	3	3	-	1	-	-
CO3	-	-	-	-	1	3	-	-	-	-	1
CO4	-	-	-	-	1	3	3	-	-	1	-
CO5	-	-	-	-	1	3	-	-	-	-	1
CO6	-	-	-	-	1	3	2	-	-	1	-

Syllabus:

Unit-I

- Introduction to Hindi Language, -other Indian Language's, Official Language, link Language Technical terminology.
- Hindi alphabet: Paribhasha Aur Bhed.
- Shabda: Paribhasha Aur Bhed, Roopantharki Drishti se
- Sangya -Paribhasha Aur Bhed,Sangyake Roopanthar-ling, vachan, karak
- Sarvanaam- Paribhasha Aur Bhed.

Unit- II

- Common errors and error corrections in Parts of Speech –with emphasis on use of pronouns, Adjective and verb in different tenses –gender& number
- Conversations, Interviews, Short speeches.

Unit -III

- Letter writing –Paribhasha Aur Bhed, Avedanpatra (request letter) &Practice
- Translation-Paribhasha Aur Bhed, English to Hindi

Unit- IV

Poem:

- Maithilisharangupth: sakhivemujsekahakarjaate
- Suryakanthtripatinirala: Priyatam
- Mahadevvarma- adhikaar
- Shiyaramsharangupth: ekphoolkichah

Unit- V

Kahani

- Kafan- Premchand,
- Rajasthan kiEkGaavkeetheerthyatra - Beeshmasahni
- Raychandrabhai: ByMahathma Gandhi - Sathyakeprayog
- Rajani -Mannu Bhandari

Text Books:

- Prem Chand Ki Srvashrestha Kahaniyam: Prem Chand; Diamond Pub Ltd. New Delhi, Hindi Samay.com.*
 - Vyavaharik Hindi Vyakaran, Anuvadhaha Rachana: Dr. H. Parameswaran, Radhakrishna publishing House, New Delhi*
 - Kamtha Prasad Guru: Hindi Vyakaran, Best Book pub House, New Delhi*
- Poetry: *Kavya Ganga-Ed: Chandrashekar –Suman Prakashan; Mysore, kavyaSargam-Ed; Dr. Santhosh Kumar Chathurvedi – Lokbharathi Prakashan*

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA – Can be Assignment, Projects, and Reports

FOUNDATIONS OF INDIAN HERITAGE

Semester I

Course Code: 22ADM101

L-T-P -C - 2-0-0-2

Hours of Instruction/ week – 2

No. of Credits – 2

Total 30 hrs.

Course Objectives:

The course is designed as an introductory guide to the variegated dimensions of Indian cultural and intellectual heritage, to enable students to obtain a synoptic view of the grandiose achievements of India in diverse fields. It will equip students with concrete knowledge of their country and the mind of its people and instil in them some of the great values of Indian culture.

Course Outcomes:

CO1: Be introduced to the cultural ethos of Amrita Vishwa Vidyapeetham, and Amma's life and vision of holistic education.

CO2: Understand the foundational concepts of Indian civilization like puruśārtha-s, law of karma and varṇāśrama.

CO3: Gain a positive appreciation of Indian culture, traditions, customs and practices.

CO4: Imbibe spirit of living in harmony with nature, and principles and practices of Yoga.

CO5: Get guidelines for healthy and happy living from the great spiritual masters

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	2	3	-	3	-	-	-	-
CO2	-	-	-	1	3	-	3	-	-	-	-
CO3	-	-	-	1	3	-	3	-	-	-	-
CO4	-	-	-	3	3	-	3	-	-	-	-
CO5	-	-	-	1	3	-	3	-	-	-	-

Syllabus:

Unit I

Introduction to Indian culture; Understanding the cultural ethos of Amrita Vishwa Vidyapeetham; Amma's life and vision of holistic education.

Unit II

Goals of Life – Purusharthas; Introduction to Varnasrama Dharma; Law of Karma; Practices for Happiness.

Unit III

Symbols of Indian Culture; Festivals of India; Living in Harmony with Nature; Relevance of Epics in Modern Era; Lessons from Ramayana; Life and Work of Great Seers of India.

Text Book: Cultural Education Resource Material Semester-1

Reference Books:

1. The Eternal Truth (A compilation of Amma's teachings on Indian Culture)
2. Eternal Values for a Changing Society. Swami Ranganathananda. Bharatiya Vidya Bhavan.
3. Awaken Children (Dialogues with Mata Amritanandamayi) Volumes 1 to 9
4. My India, India Eternal. Swami Vivekananda. Ramakrishna Mission.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

MASTERY OVER MIND (MAOM)

Semester: I

Course Code: 22AVP103

L-T-P – 1-0-2-2

Hours of Instruction/ week – 2

No. of Credits – 2

Total 30 hrs.

Course Objectives:

1. Understand the basics of meditation process, need and health benefits of medication
2. Practice MA OM meditation in daily life and improve communication and relationships

Course Outcomes:

CO1: To be able to describe what meditation is and to understand its health benefits

CO2: To understand the causes of stress and how meditation improves well-being

CO3: To understand the science of meditation

CO4: To learn and practice MA OM meditation in daily life

CO5: To understand the application of meditation to improve communication and relationships

CO6: To be able to understand the power of meditation in compassion-driven action

SYLLABUS

Unit 1: Describe Meditation and Understand its Benefits

A: Importance of meditation. How does meditation help to overcome obstacles in life. *Abhyasa* Yoga: The Yoga of Practice.

B: Understand how meditation works. Understand how meditation helps in improving physical and mental health. Understand how meditation helps in the development of personality. The Potential Health Benefits of Meditation

Unit 2: Causes of Stress and How Meditation Improves Well-being

A: Learn how to prepare for meditation. Understand the aids that can help in effectively practicing meditation. Understand the role of sleep, physical activity, and a balanced diet in supporting meditation.

B: Causes of Stress. The problem of not being relaxed. Effects of stress on health. How meditation helps to relieve stress. Basics of stress management at home and the workplace.

Unit 3: The Science of Meditation

A: A preliminary understanding of the Science of meditation. What can modern science tell us about this tradition-based method?

B: How meditation helps humanity according to what we know from scientific research. Does Meditation Aid Brain and Mental Health. 'Science and Spirituality.

Unit 4: Practicing MA OM Meditation in Daily Life

Guided Meditation Sessions following scripts provided (Level One to Level Five). MA OM and White Flower Meditation: A Brief Note. 'Live in the Present Moment.

Unit 5: Improving Communication and Relationships

How meditation and mindfulness influence interpersonal communication. The role of meditation in improving relationship quality in the family, at the university and in the workplace. Unexpected Ways Meditation Improves Relationships a Lot. Psychology Today.

Unit 6 Meditation and Compassion-driven Action

Understand how meditation can help to motivate compassion-driven action. The relation of mindfulness and prosocial behaviour. Sympathy and Compassion.

Reference Books:

Amritam Gamaya (2022). Mata Amritanandamayi Mission Trust.

Schindler, S., & Friese, M. (2022). The relation of mindfulness and prosocial behavior: What do we (not) know?. *Current Opinion in Psychology*, 44, 151-156

Seppala E (2022). 5 Unexpected Ways Meditation Improves Relationships a Lot. Psychology Today. <https://www.psychologytoday.com/intl/blog/feeling-it/202206/5-unexpected-waysmeditation-improves-relationships-lot>

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Assessment- Group Activities, class participation and Meditation Sessions

SEMESTER II
NUTRITION THROUGH LIFESPAN

Semester II	Hours of Instruction/ week – 4
Course Code: 23FSN111	No. of Credits – 4
L-T-P – 3-1-0-4	Total 60 hrs.

Pre-requisite: Growth, Development, Demand for nutrition, Different stages of life

Course Objective:

This course will give you an on insight how nutrient needs vary during the lifespan - nutrition during preconception, pregnancy and lactation, infant nutrition, childhood and adolescent nutrition, as well as adult and older adult nutrition.

Course Outcomes:

- CO 1:** Apply the knowledge of basics of balanced diet, significance of RDA and its purpose.
- CO 2:** Understand the metabolic changes and nutritional requirements during pregnancy and lactation.
- CO 3:** Comprehend the knowledge on nutrition for infant, childhood, adolescents, adulthood and old age.
- CO 4:** Understand the physiological changes and diet modifications during old age.

Skills: To provide wide knowledge and develop skill in planning the nutritional needs of all age groups by understanding their growth and development, requirements and nutritional problems.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	1	-	2	-	-
CO3	3	-	-	-	-	-	1	-	1	-	-
CO4	-	2	-	-	-	-	1	-	3	-	-

Syllabus:

Unit I: Introduction to RDA and Balanced Diet 12 hrs.

Basics for Recommending the Dietary Allowances, Acceptable Dietary Intake, Purposes of RDA, Factors Affecting Recommended Dietary Allowances, Requirements and Recommended Dietary Allowances, Growth chart, Uses of ICMR RDA in planning balanced diet, Consumption Units. Reference Man and Woman, Food and Nutritional Requirements for Adults doing Different Activities.

Unit II: Maternal Nutrition 12 hrs.

Nutrition in Pregnancy: Maternal nutrition and outcome, Importance of pre and periconceptional nutrition during pregnancy; Pre pregnancy weight and fetal outcome. Fetal weight gain. Nutritional assessment and guidance in prenatal care. - Physiological changes during pregnancy, expansion in blood volume, hormonal profile in pregnancy, organ functions, placental transfer of nutrients and resulting complications in pregnancy. Other nutrition related conditions; pregnancy in obese women, gestational diabetes, preeclampsia, alcohol and caffeine abuse. - Maternal nutrient metabolism and recommended intakes in pregnancy. Maternal weight gain

in pregnancy. Intrauterine growth retardation. High risk pregnancies and common concerns during pregnancy. Importance of antenatal care.

Nutrition in Lactation: Nutritional needs for lactation. Breast feeding biology, Psycho - physiological aspects of lactation. Factors affecting lactation capacity. Management of lactation, exclusive breast feeding, Breast support and counseling. Effect of breast feeding on maternal health.

Unit III: Nutrition for Infant

12 hrs.

Infant growth and physiological development. Norms/standards for growth. Growth monitoring and promotion. Failure to thrive. Infant nutritional needs and concerns. Nutrition and brain development. Infant feeding, volume and composition of breast milk, human milk Vs. artificial formula. -Development and nutritional quality of infant food: Modern infant formula, complementary and supplementary feeding. Dietary management issues in infant feeding. Food allergies in infancy. -Preterm and LBW infants: Consequences, implications for feeding and management. Neonatal infant mortality and child mortality, IMR. Government policies, schemes and entitlements.

Unit IV: Nutrition in Childhood and Adolescence

12 hrs

Childhood: Growth and development, physiological development. Nutritional needs and feeding for preschool children. Micronutrient malnutrition among preschool children. Child health, morbidity, mortality and under five mortality rate (U5MR). -Nutritional requirements and RDA. Feeding school children, behavioral characteristics and feeding problems. Dietary patterns, planning a school lunch, factors to be considered. Implications of childhood obesity and other nutritional concerns. Healthy food choices during childhood.

Adolescence: Growth during adolescence, nutritional requirements, hormonal influences, age of menarche-factors affecting, physiological problems and nutritional issues in adolescence. Government policies, schemes and entitlements

Unit V: Nutrition for Adulthood and Old age

12 hrs.

Nutritional requirements for adult man and woman. Nutritional concerns and diet. Nutrition and work efficiency. -Physiological changes in aging, effects of aging on nutritional health of elderly. RDA, nutritional guidelines. Modification in diet, feeding old people. Nutritional concerns in old age and their management. Government policies, schemes and entitlements

Reference Textbooks:

1. Chernoff R. Geriatric Nutrition, The Health professionals Hand book.4th Edition, Jones and Bartlett Learning, Burlington. 2013.
2. Edelstein S and Sharlin J. Life Cycle Nutrition: An Evidence Based Approach, Jones and Barlett publishers, USA. 2009.
3. Ghai OP. Essential Pediatrics, 2ndedn, Interprint, New Delhi. 1990.
4. John EM and David RT. Geriatric Nutrition. CRC Press. Taylor & Francis group. Boca Raton. 2007.
5. Kathleen ML and Escott S. Krause's Food, Nutrition and Diet Therapy,9thedn, W.B. Saunders Company Pennsylvania. 2000.
6. Mahtab S. Bamji, Kamala Krishna Swamy and G N V Brahman. Text book of Human Nutrition. Oxford and IBH Publishing, New Delhi. 2009.

Suggested Readings:

1. Park K. Text Book of Preventive and Social Medicine. 21stedn, Banarsidas Bhanot Publishers, Jabalpur, India. 2011.

2. Shills ME, Olson JA, Moshe S and Ross CA. Modern Nutrition in Health and Disease, 9 thedn, Lippincott Williams and Wilkins. 2006.
3. Seth V and Singh K. Diet planning through life cycle: Part 1. Elite publishing house pvt ltd, New Delhi. 2006.
4. Smolin and Grosvenor. Nutrition Science and Applications, 3rdedn, Saunders College Publishing, Philadelphia. 2000.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

HUMAN PHYSIOLOGY

Semester: II

Course Code:23FSN112

L-T-P – 3-0-1-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre-requisite: Basic biology, Human body, Organs and systems, functions.

Course Objectives:

To provide keen knowledge on physiological concepts of homeostasis and control mechanisms and to study the anatomy and physiology of body systems. The course also provides practical sessions and tutorials.

Course Outcomes:

CO1: Understand the Composition and Functions of Blood, Haemostasis, Homeostasis, Blood Coagulation, Anemia, Blood Transfusion and Blood Groups.

CO2: Comprehend the structure and functions of Cardiovascular, Respiratory Systems, Endocrine Glands, Nervous system and sense organs.

CO3: Understand the Anatomy and Physiology of the Digestive and Excretory System.

CO4: Understand the Anatomy and Physiology of Male and Female Reproductive Systems.

CO6: Practical awareness of identification, measurement of blood, tissues and common physical fitness tests.

Skills: Develop skills to assess physical and clinical symptoms based on the physiological changes

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	3	-	-	-	-	1	-	-
CO3	1	3	-	-	-	-	2	-	2	-	-
CO4	-	3	-	-	-	-	3	-	2	-	-

Syllabus:

Unit I -Blood, Heart and Circulation

10 hrs.

Blood - Composition, functions, RBC – Structure, functions, erythropoiesis, Haemoglobin, WBC – Structure, functions, Classification.

Blood Platelets - Structure, functions, Reticulo endothelia system, Blood groups – Rh factor. Blood coagulation, spleen –Structure and functions, Lymph and Lymphatic system.

Heart and Circulation - Heart – Anatomy and physiology, Blood vessels –Structure of artery, vein, capillaries, Cardiac output, Arterial Blood pressure, clinical measurement of blood pressure, properties of cardiac muscle, origin and conduction of heart beat, cardiac cycle, Regulation of the Heart's action.

Unit II - Respiratory and Excretory System

10 hrs.

Respiratory System - Structure of respiratory organs, Mechanics of respiration, subdivisions of lung air, Chemistry of respiration. Artificial respiration, control of respiration, oxygen saturation, pulse oximeter.

Excretory System - Structure of Excretory System. Kidney, Nephrons, Urine Formation Composition of Urine, Micturition.

Unit III - Digestive System and Musculoskeletal System

10 hrs.

Digestive System - General anatomy of digestive system – Digestive in the mouth, stomach and intestines. Movements of small intestine. Role of pancreas, Liver – Structure and function.

Musculoskeletal System: General Anatomy of Muscular system- Functions of muscles, Ligaments, Tissues, Skeletal system, Bones and Joints

Unit – IV - Endocrine and Reproductive system

10 hrs.

Endocrinology - Structure and functions of thyroid, pituitary, parathyroid, adrenals, islets of Langerhans of pancreas, sex glands.

Reproductive System - Anatomy of Male and Female Reproductive Organs, Physiology of Menstruation, Pregnancy and Associated Changes, Placenta, mammary Gland and Lactation- Structure, lactation and process of reproduction, fertilization, development of embryo, pregnancy and parturition.

Unit V - Nervous System and Sense Organs

10 hrs.

Nervous System:

Spinal cord - Structure and functions. Ascending and descending tracts, reflex action.

Brain - Structure and functions of cerebrum, optic thalamus, midbrain, pons medulla oblongata, Hypo thalamus, cerebellum.

Autonomic nervous system, sympathetic and parasympathetic.

Special Senses.

Eye - Physiology of vision, Structure of eye, dark and light adaptation, accommodation of the eye, visual fields, common problems due to abnormalities – presbyopia, cataract, Astigmatism, Blindness.

Ear – Structure and Physiology.

Nose- Structure and Physiology

Tongue Structure and Physiology.

Unit VI: Practical Experience:

1. Bleeding time
2. Clotting time
3. Identification of tissues
4. Blood groups – identification
5. Measurement of Hemoglobin
6. Measuring Pulse Rate
7. Measuring Blood Pressure
8. Measurement of height, weight and calculation of BMI
9. Physical fitness test

Text Books:

1. Chatterjee C.C (2016), Human Physiology 11th Edition, Medical Allied Agency, Kolkata
2. Sembulingam, K. (2012) Essentials of Medical Physiology, 6th Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
3. Sathya Narayana, Essentials of Biochemistry (2000)
4. Saratha Subramanian, Text of Human Physiology(2000).
5. Stuart Ira Fox, Human Physiology (2015)

Reference Books:

1. Best and Taylor, (2011) 13th Edition The Physiological Basis of Medical Practice, Saunders Company.
2. Chaudhri, K. (2016) 7th Edition Concise Medical Physiology, New Central Book Agency (Parental) Ltd., Calcutta.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD PROCESSING AND PRESERVATION TECHNOLOGY –II

Semester II

Course Code: 23FSN113

L-T-P – 3-1-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre-Requisite: Techniques involved in food processing and preservation

Course Objectives:

1. To give better understanding on the importance of food preservation.
2. To relate between different types of food spoilage
3. To apply the use of different temperatures in food processing
4. To compare the preservation of various foods using sugar, chemicals and salt
5. To offer knowledge on the principles and concept of food fermentation

Course Outcomes:

CO1: Understand the basic principles and importance of food preservation

CO2: Gain knowledge on high and low temperature processing methods

CO3: Comprehend sugar preservation methods and the preparation of sugar-based recipes

CO4: Gain better understanding on the use of chemical preservatives based on the standards and fermentation methods used in preparation of fruit juices and pickles

CO5: Acquire knowledge on the fermented food products

Skills:

1. Develop skills in food preservation
2. Develop new products with minimal processing for better retention of essential nutrients

CO PO Mappings:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	2	-	-	-	1	1	-	2	-
CO2	2	2	1	-	-	-	1	1	-	2	-
CO3	2	2	2	-	-	-	1	1	-	2	-
CO4	2	2	2	-	-	-	1	1	-	2	-
CO5	2	2	1	-	-	-	1	1	-	2	-

Syllabus:

Unit I - Introduction to Food Preservation

10hrs.

Importance of Food Preservation, Types of Spoilage, Basic Principles of Food Preservation.

Unit II - Preservation by the Use of Low and High Temperature

14hrs.

a) Preservation by the Use of Low temperature- Refrigeration, freezing

Refrigeration, Advantages, Factors to be Considered, Common Spoilages, Freezing, Difference between Refrigeration and Freezing, Methods of Freezing, freeze drying and freeze concentration, Steps Involved in Freezing Common Foods, Spoilages, storage.

b) Preservation by the Use of High Temperature - Drying, Dehydration

Sun Drying, Solar Drying and Dehydration, Mechanical Dehydration, Merits and demerits, Factors Affecting Drying, Preparation of Foods for Drying, Freeze Drying and Dehydro Freezing – Mechanism and Advantages, Spray drying, Canning, Steps Involved, Types of Cans, Spoilage Encountered, Pasteurization and Sterilization

Unit III - Preservation by Using Sugar**12hrs.**

Sugar Concentrates – Principles of Gel Formation, Preparation of Jam, Jelly, Marmalades, sauce and squash, Preserves, Candied, Glazed and Crystallized Fruits

Unit IV - Preservation by Using Chemicals and Salts Fermentation**12hrs.**

Definition, Types of Fermentation, Advantages, Preparation and Preservation of Fruit Juices, RTS Pickling – Principles Involved and Types of Pickles- Indian Pickles, Vinegar, Salt Preservation Chemical Preservatives – Definition, Role of Preservation, Permitted Preservatives, FPO Specification, Bio preservatives of microbial origin, FSSAI

Unit V - Preservation by Fermentation**12hrs.**

Common Fermented Foods, Wine and Cheese Making

Text Books:

1. Sivasankar, B. (2013) Food Processing and preservation 2nd edition, prentice Hall, Pvt, Ltd.
2. Srilakshmi, N., (2016) 6th Edition, Food Science, New Age International Private Ltd., New Delhi, 2002.
3. Bibek Ray, Fundamental Food Microbiology, CRC Press, 2003
4. Swaminathan, M., Food Science, Chemistry and Experimental Foods, Bappco Publishers, Bangalore, 2014.
5. Chandrasekhar, U, Food Science and Applications in Indian Cookery, Phoenix Publishing House Private Ltd., New Delhi, 2012.

Reference Books:

1. Adams, M.R. and Moss, M.O., Food Microbiology, New Age International (P) Ltd., New Delhi, 2015.
2. Fellow, P., (2010) Food Processing Technology – Principles and Practices, 3rd Edition, CRC Press Woodland Publishers, England.
3. Sommers, C.H. and Xveteng Fan, Food Irradiation Research and Technology, Blackwell Publishing, 2016.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD CHEMISTRY

Semester II
Course Code: 23FSN114
L-T-P –3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre requisite: Basics of chemistry - water, carbohydrates, proteins and fats.

Course objective:

To provide a deeper knowledge on the chemical constituents, their stability, changes - in different medium and their applications

Course outcomes:

CO1: Gain clear understanding of the interaction of water with food and the role of water in food

CO2: Understand the chemistry of sugars and starch and their contribution in the foods

CO3: Gain knowledge on the types of proteins, properties and the action of chemicals on it.

CO4: Recognize the characteristics of fats and oils

CO5: Familiarize with the pigments in food, spices and condiments, enzymes additives and toxic substances.

Skills: Develop skills in the chemistry behind foods during processing

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-
CO3	-	1	-	-	-	-	-	-	-	-	-
CO4	-	1	-	-	-	-	-	-	-	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-

Syllabus:

Unit I: Sols, Gels and Solutions

12 hrs

Moisture in Foods, Hydrogen Bonding, Bound Water, Water and its interaction with food components and food stability, Water Activity in Foods, Determination of Moisture Content in Foods, True Solutions, Dispersions, Sols, Gels, Foams, Colloids and Emulsions.

Unit II: Carbohydrates- Chemical properties for Food Applications

12 hrs

Carbohydrates- Starch - granule structure and properties, native and modified Heteropolysaccharides - pectic substances and seed gums, Sweeteners, Effect of Sugar, Acid, Alkali, Fat and Surface Active Agents on Starch, Types of Candies, Chemistry of Milk Sugar, Non Enzymatic Browning, Swelling of Starch Granules, Gel Formation, Retrogradation, Syneresis.

Unit III: Proteins- Chemical properties for Food Applications

12 hrs

Proteins - Amino acid chemistry, Protein structure, Components of Wheat Proteins, Structure, Gluten Formation Effect of Soaking, Fermentation and Germination on Pulse Proteins. Properties of Egg Protein,

Chemistry of Milk Protein, Changes in Milk, Egg and Meat Proteins during Heating, Action of Heat, Acid, Alkalis on vegetables Proteins and animal Proteins

Unit IV: Fats and Oils- Chemical properties for Food Applications **12 hrs**

Lipids - Fatty acids and triglycerides, Phospholipids, Physical and Chemical Properties of Fats and Oils, Lipid oxidation -Rancidity, hydrolytic and oxidative Hydrogenation - mechanisms and catalysts, Winterization, Decomposition of Triglycerides, Shortening Power of Fats, Changes in Fats and Oils during Heating, Factors affecting fat absorption in foods

Unit V: Chemistry of Pectic Substances, Plant Pigments, Spices and condiments **12 hrs**

Pectins, Phenolic Components, Enzymatic Browning in Fruits and Vegetables, Volatile Compounds from Cooked Vegetables, Different Types of Plant Pigments – Water- and Fat-Soluble Pigments, Properties and Active Principles of Spices and Condiments, Colours and colorants, Food additives, Flavours, Acid -base chemistry of foods and common additives, Toxic substances.

Textbooks

1. Shakuntala Manay, Shadaksharaswamy. M (2017) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition
2. Chandrasekhar, U. Food Science and applications in Indian Cookery (2002) Phoenix Publishing House, New Delhi.
3. Swaminathan, M. Food Science, (2015) Chemistry and Experimental Foods, Bappco Publishers, Bangalore

References

1. Meyer, L.H, Food Chemistry, (2004) CBS Publishers and Distributors, 4th edition
2. Paul, P.C. and Palmer, H.H. Food Theory and Applications (2000) JohnWiley and Sons, New York, (Revised Edition)
3. Chopra H.K, Panesar, P.S, Food Chemistry (2010) Narosa Publishing House, New Delhi
4. “Fennema’s Food Chemistry “4th ed. Damodaran, Parkin & Fennema (2008), CRC Press, Boca Raton, USA

Evaluation pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

NUTRITION THROUGH LIFESPAN PRACTICAL

Semester II

Course Code: 23FSN182

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30hrs.

Pre requisite: Stages of Human development, Food & Nutritional Requirements

Course Objectives:

1. To relate foods and nutrients to the biological requirements of humans at different stages of the life cycle.
2. To describe nutrition-related concerns specific to each stage of the human life cycle to consequences for health and disease.
3. Relate the role of a dietitian in diet planning and home maker in family meal planning

Course Outcomes:

1. Understand the basic concept of meal management, meal planning for all age groups.
2. Develop skills in planning balanced diet variety food preparation using five food groups a day.
3. Apply the knowledge in preparing nutrients dense value-added foods.

Skills: Develop skills in planning and evaluating menu plans throughout different stages of life span

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	3	-	-	-	-	1	-	-	-	-
CO2	1	3	-	-	-	-	2	3	-	-	1
CO3	3	3	-	-	-	1	-	-	-	-	1

Practical:

30hrs.

S.No Practicals

- 1 Planning, Preparing and Evaluating Menu During Pregnancy
- 2 Planning, Preparing and Evaluating Menu During Lactation
- 3 Planning, Preparing and Evaluating Menu for Infants (Supplementary Foods)
- 4 Planning, Preparing and Evaluating Menu for Preschoolers
- 5 Planning, Preparing and Evaluating Menu for School Going Children
- 6 Planning, Preparing and Evaluating Menu for Adolescents
- 7 Planning, Preparing and Evaluating Menu for Adults
- 8 Planning, Preparing and Evaluating Menu for Elderly

Reference books:

1. Dietary Guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2013.
2. Gopalan, C. Rama Sastri B.V. and Balasubramanian, Nutritive Value of Indian Foods, NIN, ICMR, Hyderabad, 2014.
3. Srilakshmi, B., Dietetics, New Age International (P) Ltd., New Delhi, 2013.
4. Swaminathan, M., Advanced Textbook on Food and Nutrition, Vol. 1, Second Edition, Bangalore Printing and Publishing Co. Ltd., Bangalore, 2012.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

FOOD PROCESSING AND PRESERVATION TECHNOLOGY PRACTICAL

Semester II

Course Code: 23FSN184

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30 hrs.

Pre requisite: Food preservation, cooking methods.

Course objectives:

1. To give an understanding on the principles behind the methods of preservation
2. To relate with the stages of cookery and chemical characteristics in food preservation
3. To able to formulate preserved products with nutritional value addition
4. To acquire skills to preserve different food groups based on perishability

Course Outcomes:

CO1: Know the principles of sugar preservation methods and preparation of sugar preserves.

CO2: Develop value added novel food products with greater shelf life

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	-	1	-	2	2	2	2	-
CO2	2	2	-	1	1	-	2	2	2	2	-

Skills: Develop food processing and preservation skills for product development

Practicals:

30hrs.

1. Stages in sugar cookery, Evaluation of pectin quality, sugar concentration (Brix), pH and acid content
2. Preparation of jam, jelly, marmalades, preserves, candied, Tutti fruity, Glazed, Crystallized fruits, Toffees
3. Preparation of squashes, fruit juice and RTS
4. Preparation of Tomato sauce, Tomato ketchup.
5. Preparation of pickles (oil, vinegar and salt based)
6. Preparation of salted, dehydrated, vegetables preserves (vathals)
7. Preparation of dehydrated cereal and pulse products (vadams), -Rice, Sago, Wheat, Maida, Rice flakes, black gram dhal, green gram dhal, horse gram dhal.
8. Visit to Fruits and Vegetable processing industry.

Text Books:

1. Srivastava R.P. Fruit and vegetable preservation – Principles and Practices, International Book Distributing Co., (IBDC), New Delhi.2013

Reference Books:

1. Maria Parloa (2012), Canned fruit, preserves and jellies: Household methods of preparation,

Published by US department of Agriculture, Washington

2. M. Shafiur, Rahman (2017), Handbook of food preservation 2nd Edition, CRC press, USA.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

FOOD CHEMISTRY PRACTICAL

Semester II

Course Code: 23FSN183

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30 hrs.

Pre requisite: Chemistry behind foods, Effects of cooking, changes during cooking

Course Objectives:

1. To enable the students to Study the physio-chemical changes that occur in foods during cooking.
2. To Gain knowledge about the chemistry underlying the properties and reactions of various food components.
3. To Understand the various properties exhibited by starch and sugars, proteins, fats and oils , pectic substances and spices and condiments

Course Outcomes:

CO1: Demonstrate proficiency in understanding physiochemical changes occurring in foods during cooking.

CO2: Describe the basic principles and properties of starch proteins, fats and oils, pectic substances and spices and condiments.

CO3: Gain sufficient knowledge about chemistry of starch proteins, fats and oils, pectic substances.

Skills: Develop products with minimum nutritional loss based on the knowledge of food chemistry.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	3	1	2	-	1	-
CO2	2	2	-	-	-	3	1	2	-	1	-
CO3	2	2	1	-	-	3	1	2	-	1	-

Practicals:

30hrs.

1. Dispersion, Colloids, Emulsions, Sols, Gels, etc
2. Microscopic Examination of uncooked and gelatinized Starch
3. Enzymatic Browning & Non Enzymatic Browning
4. Retrogradation and Syneresis
5. Scum formation
6. Boiling over and scorching of milk
7. Effect of Soaking, germination and fermentation of Pulses
8. Over boiling of Eggs and formation of Hydrogen sulphide
9. Mayonnaise -Emulsion
10. Smoking Temperature of Different Fats, Factors Affecting Absorption of Fats
11. Water properties
12. PH, Acidity, of various foods
13. Colours and Food Additives

Text Books:

1. Shakuntala Manay, Shadaksharaswamy. M (2017) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition

2. Chandrasekhar, U. Food Science and applications in Indian Cookery (2002) Phoenix Publishing House, New Delhi
3. Swaminathan, M. Food Science, (2015) Chemistry and Experimental Foods, Bappco Publishers, Bangalore.

Reference Books:

1. Meyer, L.H, Food Chemistry, (2004) CBS Publishers and Distributors, 4th edition
2. Paul, P.C. and Palmer, H.H. Food Theory and Applications.(2000). JohnWiley and Sons, New York.
3. Chopra H.K, Panesar, P.S, Food Chemistry (2010) Narosa Publishing House, New Delhi.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

PROFESSIONAL COMMUNICATION

Semester II
Course Code: 21ENG111
L-T-P – 1-0-2-2

Hours of Instruction/ week – 2
No. of Credits –2
Total 30 hrs.

Course Objectives:

1. To convey and document information in a formal environment
2. To acquire the skill of self-projection in professional circles
3. To inculcate critical and analytical thinking

Course Outcomes:

CO1: Demonstrate competency in oral and written communication

CO2: Apply different styles of communication in professional context

CO3: Participate in different planned & extempore communicative activities

CO4: Interpret and discuss facts and information in a given context

CO5: Develop critical and analytical thinking

Skills: Develop skills in critical and analytical thinking

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	3		-	-	-	-
CO3	2	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	2	-	3	-	-	-	-	-
CO5	-	-	-	-	-	3	2	-	-	-	-

Syllabus:

Unit I

Vocabulary Building: Prefixes and Suffixes; One-word substitutes, Modal auxiliaries, Error Analysis: Position of Adverbs, Redundancy, misplaced modifiers, Dangling modifiers – Reported Speech

Unit II

Instruction, Suggestion & Recommendation - Sounds of English: Stress, Intonation
- Essay writing: Analytical and Argumentative

Unit III

Circulars, Memos – Business Letters - e - mails

Unit IV

Reports: Trip report, incident report, event report - Situational Dialogue - Group Discussion

Unit V

Listening and Reading Practice - Book Review

Unit- VI

Practical sessions

Text books:

1. Kenneth, Anderson, Tony Lynch, Joan Mac Lean. *Study Speaking*. New Delhi: CUP, 2008.
2. Marks, Jonathan. *English Pronunciation in Use*. New Delhi: CUP, 2007.
3. Syamala, V. *Effective English Communication for You (Functional Grammar, Oral and Written Communication)*: Emerald, 2002.

Reference books:

1. Felixa Eskey. *Tech Talk*, University of Michigan. 2005
2. Michael Swan. *Practical English Usage*, Oxford University Press. 2005
3. Anderson, Paul. *Technical Communication: A Reader Centered Approach*, V Edition, Harcourt, 2003.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	20	
Periodical 2 (P2)	20	
Continuous Assessment (CA)	40	
End Semester		20

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

TAMIL II

Semester II

Course Code: 21TAM111

L-T-P – 2-0-0-2

Hours of Instruction/ week – 2

No. of Credits – 2

Total 30 hrs.

Objectives: To learn the history of Tamil literature. To analyze different styles, language training, to strengthen the creativity in communication, Tamil basic grammar, Computer and its use in Tamil language.

Unit 1

The history of Tamil literature: Nāṭṭupuraṅṅa pāṭaḷkaḷ, kataikkaḷ, paḷamolikaḷ - ciṅkatakaḷ tōṛramum vaḷarcciyum,

ciṅṅilakkiyaṅkaḷ: Kaliṅkattup paraṅi (pōṛpāṭiyatu) - mukkūṭar paḷḷu 35.

Kāppiyaṅkaḷ: Cilappatikāram – maṅimēkalai naṭaiyiyal āyvu maṅṅum aimperum – aiṅciṅṅai kāppiyaṅkaḷ toṭarpāṅa ceytikaḷ.

Unit 2

tiṅai ilakkiyamum nīyilakkiyamum - patiṅṅeṅkiḷkkaṅakku nūlkaḷ toṭarpāṅa piṅa ceytikaḷ - tirukkuṅaḷ (aṅṅu, paṅṅu, kalvi, oḷukkam, naṭṅu, vāymai, kēḷvi, ceynaṅṅi, periyāraittuṅakkōṭal, viḷippuṅarvu pēṅṅa atikāratil uḷḷa ceytikaḷ.

Aṅṅūlkaḷ: Ulakanīti (1-5) – ēḷāti (1,3,6). - Cittarkaḷ: Kaṭuveḷi cittar pāṭaḷkaḷ (āṅṅantak kaḷippu –1, 4, 6, 7, 8), maṅṅum akappēy cittar pāṭaḷkaḷ (1-5).

Unit 3

tamiḷ ilakkaṅam: Vākkiya vakaikaḷ – taṅviṅṅai piṅaviṅṅai – nēṅkūṅṅu ayaṅkūṅṅu

Unit 4

tamiḷaka aṅṅiṅkaḷiṅṅai tamiḷ toṅṅum camutāya toṅṅum: Pāṅṅaiyār, pāṅṅatitācaṅṅai, paṅṅukkōṅṅai kalyāṅṅacuntaram, curatā, cujātā, ciṅṅi, mēṅṅtā, aptul rakumāṅṅai, na.Piccaimūrṅṅai, akilaṅṅai, kalki, jī.Yū.Pōṅ, vīramāmuṅṅivar, aṅṅā, paritimāṅṅai kalaiṅṅai, maṅṅaimalaiyaṅṅai.

Unit 5

tamiḷ moḷi āyvil kaṅṅiṅṅai payaṅṅpāṅṅu. - Karuttu parimāṅṅam - viḷampara moḷiyamaippu – pēccu - nāṅṅakam paṅṅai - ciṅkatakaḷ, katai, putiṅṅam paṅṅai.

Textbooks:

- <http://Www.tamilvu.trg/libirary/libindex.htm>.
- http://Www.tunathamizh.tom/2013/07/blog0post_24.html
- Mu.Varatarācaṅṅai “tamiḷ ilakkiya varalāṅṅu” cāhitya akaṅṅemi paḷḷikēṅṅai, 2012
- nā.Vāṅṅamāmalai “paḷaṅṅakataikaḷum, paḷamolikaḷum” niyū ceṅṅuri puttaka veḷiyiṅṅakam, 1980,2008
- nā.Vāṅṅamāmalai, “tamiḷar nāṅṅupāṅṅai” niyū ceṅṅuri puttaka veḷiyiṅṅakam 1964,2006
- poṅṅai maṅṅimāṅṅai “aṅṅai tamiḷ ilakkaṅam “aṅṅai paḷḷiṅṅai kurūṅṅai, vaṅṅaiyūr, tiruvaṅṅantapuram, 2007.

CO-PO MAPPING

S.No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	2	-	3	2	-	-	-	-
CO2	-	-	-	3	-	3	2	-	-	-	-
CO3	-	-	-	3	-	3	2	-	-	-	-
CO4	-	-	-	2	-	3	3	-	-	-	-
CO5	-	-	-	3	-	3	2	-	-	-	-
CO6	1	-	-	2	-	3	3	-	-	-	-

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	20	
Periodical 2 (P2)	20	
Continuous Assessment (CA)	40	
End Semester		20

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

MALAYALAM II

Semester II

Course Code: 21MAL111

L-T-P – 2-0-0--2

Hours of Instruction/ week – 2

No. of Credits – 2

Total 30 hrs.

Course Objectives: To understand the ancient cultural language specialities

Course Outcomes:

CO1 To understand the different cultural influence of linguistic translation.

CO2 To identify the romantic elements of modern literature.

CO3 To analyze the autobiographical aspects.

CO4 To create awareness of the historical, political and socio-cultural aspects of literature.

CO5 Expansion of ideas in writing

CO-PO MAPPING

S.No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	3	1	-	-	-	-
CO2	-	-	-	1	-	3	-	-	-	-	-
CO3	-	-	-	3	-	3	2	-	-	-	-
CO4	-	-	-	2	-	3	3	-	-	-	-
CO5	-	-	-	1	-	3	2	-	-	-	-

Syllabus: -

Unit I

Ancient poet trio: *Kalayanasougandhikam*, (Lines: *kallummarangalum... namukkennarikavrikodara*)
,KunjanNambiar - Critical analysis of his poetry-Ancient Drama: *Kerala Sakunthalam* (Act 1), Kalidasan
(Translated by Attor Krishna Pisharody).

Unit II

Modern/romantic/contemporary poetry: *Chandanakkattil* –G.Sankarakurupu-Romanticism – modernism.

Unit III

Memoirs from Modern Poets: *Theppathi*, BalachandranChullikkadu-literary contributions of his time.

Unit IV

Part of an autobiography/travelogue: *KannerumKinavum*, Chapter: ValarnnuVarunnoratmavu, V.T.Bhattathirippadu-Socio-cultural literature-historical importance.

Unit V

Error-free Malayalam-1. Language; 2. Clarity of expression; 3. Punctuation-Thettillatha Malayalam-Writing-
a. Expansion of ideas; **b.** Précis Writing; **c.** Essay Writing; **d.** Letter writing; **e.** RadioSpeech; **f.** Script/Feature/ScriptWriting; **g.** NewsEditing; **h.** Advertising; **i.** Editing; **j.** Editorial Writing; **k.** Critical appreciation of literary works (Any one or two as an assignment)

References:

1. Leelavathy.M, Malaya kaavidha Sahithiya saritraam, Kerala sahitya Akademi, Thrissur; 2015th edition
2. Tarahan. K.M, Novel Sahithiya CHARITRAM, Kerala Sastrasahitya Parishad, 2015
3. Ulloor S. Parameshwara Iyer, Kerala Sahithiya CHARITRAM., World eBook Library, 2010
4. Autobiography of Gandhiji, Ente Sathyanweshana Pareekshana Katha

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	20	
Periodical 2 (P2)	20	
Continuous Assessment (CA)	40	
End Semester		20

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

HINDI II

Semester II
Course Code: 21HIN111
L-T-P – 2-0-0-2

Hours of Instruction/ week – 2
No. of Credits – 2
Total 30 hrs.

Course Objectives:

Appreciation and assimilation of Hindi Literature both drisya & shravya using the best specimens provided.

Course Outcomes:

- CO1: Understand the fundamentals of grammar
CO2: Apply the mechanics of writing.
CO3: Develop their critical and creative skills.
CO4: Appreciate different genres of literary texts.
CO5: Demonstrate linguistic competence in written communication.
CO6: Creating different forms of literary writing for Media.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	3	3	1	-	-	-
CO2	-	-	-	-	-	3	3	-	1	-	-
CO3	-	-	-	-	-	3	-	-	-	-	1
CO4	-	-	-	-	-	3	2	-	-	1	-
CO5	-	-	-	-	-	3	2	-	-	-	1
CO6	-	-	-	-	-	3	2	-	-	1	-

Syllabus:

Unit I

- Visheshan- Paribhasha Aur Bhed. special usage of adverbs, changing voice and conjunctions in sentences.
- kriya- Paribhasha Aur Bhed, rupantharkidrushti se-kaal
- padhparichay.
- Vigyapan Lekhan (Advertisement writing), Saar Lekhan (Precise writing).

Unit II

Communicative Hindi –Moukhik Abhivyakthi –understanding proper pronunciation, Haptics ...etc in Interviews, short speeches.

Unit III

Film review, Audio –Visual-Media in Hindi – Movies appreciation and evaluation. News reading and presentations in Radio and TV channels in Hindi, samvaadhlekhan,

Unit IV

- a) Harishankarparasaiyi- SadacharkaThavis
- b) Jayashankarprasadh – Mamata
- c) Mannubandari- Akeli
- d) Habibtanvir- Karthus

Unit V

Kavya Tarang

- a) Himadrithungshrung se (poet- Jayasankarprasad)
- b) Dhabba (poet- kedarnath sing),
- c) Proxy (poet- Venugopal),
- d) Machis (poet –Suneeta Jain),
- e) Vakth. (poet – Arunkamal)
- f) Fasal (poet- SarveshwarDayalSaxena)

Text Books:

- 1.Kavay Tarang: Dr. Niranjana, JawaharPusthakaalaya, Mathura. kavyaSargam-Ed; Dr. Santhosh Kumar Chaturvedi – Lokbharathi Prakashan.
- 2.KahaniKunj: Editor:Shashidar , GovindPusthakaalaya , Mathura
- 3.Vyavaharik Hindi Vyakaran, AnuvadthahaRachana: Dr. H. Parameswaran, Radhakrishna publishing House, New Delhi

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50
Total	100	

*CA – Can be Assignment, Projects, and Reports.

GLIMPSES OF GLORIOUS INDIA

Semester II
Course Code: 22ADM111
L-T-P – 2-0-0-2

Hours of Instruction/ week – 2
No. of Credits – 2
Total 30 hrs.

Course Objectives:

The course is designed to enable students to deepen their understanding and further their knowledge about the different aspects of Indian culture and heritage. It will equip students with concrete knowledge of their country and the mind of its people and instill in them some of the great values of Indian culture

Course Outcomes:

- CO1 Get an overview of Indian contribution to the world in the field of science and literature
- CO2 Understand the foundational concepts of ancient Indian education system
- CO3 Learn the important concepts of Vedas and *Yogasutra*-s and their relevance to daily life
- CO4 Familiarize themselves with the inspirational characters and anecdotes from the *Mahābhārata* and *Bhagavad-Gītā* and Indian history
- CO5 Gain an understanding of Amma's role in the empowerment of women

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	1	-	2	-	-	-	-
CO2	-	-	-	-	1	-	2	-	-	-	-
CO3	-	-	-	-	1	-	2	-	-	-	-
CO4	-	-	-	-	1	-	2	-	-	-	-
CO5	-	-	-	-	1	-	-	-	-	-	-

Syllabus:

Unit I

To the World from India; Education System in India; Insights from Mahabharata; Human Personality. India's Scientific System for Personality Refinement.

Unit II

The Vedas: An Overview; One God, Many Forms; Bhagavad Gita –The Handbook for Human Life; Examples of Karma Yoga in Modern India.

Unit III

Chanakya's Guidelines for Successful Life; Role of Women; Conservations with Amma.

Text Book:

1. Heritage of India. R.C.Majumdar. Ramakrishna Mission Institute of Culture.
2. The Vedas. Swami ChandrashekharaBharati. BharatiyaVidyaBhavan.
3. Indian Culture and India's Future. Michel Danino. DK Publications.
4. The Beautiful Tree. Dharmapal. DK Publications.
5. India's Rebirth. Sri Aurobindo. Auroville Publications

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50
Total	100	

*CA – Can be Assignment, Projects, and Reports.

SEMESTER III
NUTRITIONAL BIOCHEMISTRY

Semester III
Course Code: 23FSN201
L-T-P – 3-1-0-4

Hours of Instruction/ week – 4
No. of Credits – 4
Total 60 hrs.

Pre-requisite: School level chemistry of biomolecules

Course Objective:

1. Understand basic concepts of biomolecules, enzymes and hormones
2. Gain knowledge on the biochemistry and metabolism of macronutrients and micronutrients

Course Outcomes:

- CO1: Understand the fundamental concepts of the chemistry, structure, and function of biological molecules
CO2: Gain knowledge on the chemical/biochemical properties and metabolic pathways of carbohydrates, proteins, lipids and nucleotides
CO3: Acquire a clear understanding on the significance of nucleic acids in protein synthesis.
CO4: Build an ability to employ critical thinking and scientific inquiry regarding disruptions in intermediary metabolic pathways during disease conditions

Skills: To provide wide knowledge in connection to nutrition and biochemistry involved in the food components.

CO-PO Mappings

	PO 1	PO2	PO3	PO4	PO7	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	2	-	-
CO2	2	-	-	-	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	-	-	2	-	-
CO4	1	-	-	-	-	-	-	2	1	-	-

Syllabus:

UNIT I - Biomolecules

10 hrs

Chemical constituents of life. Biomolecules and the cell. Types of biomolecules- Carbohydrates, lipids, amino acids, proteins and nucleic acids. Digestion and absorption of biomolecules. Biological oxidation.

Unit II - Enzymes and Hormones

12 hrs

Enzymes - Classification and functions. Mechanisms of enzyme action. Regulation of enzyme activity. Factors affecting enzyme activity. Enzyme inhibition. Coenzyme- types. Enzymes and metabolic pathways in cellular organelles. Hormones – Classification and mechanism of action. Biological functions of hormones.

Unit III - Carbohydrates and Proteins and their Metabolism**12 hrs**

Carbohydrates- Classification, structure and physico-chemical properties. Metabolisms of carbohydrates- Glycolysis, Citric acid cycle, Glycogenesis, Glycogenolysis, Gluconeogenesis. Abnormalities in carbohydrate metabolism.

Proteins and amino acids- Classification, structure and physico-chemical properties. Metabolism of proteins Urea cycle. Glutamine and Alanine cycle. Abnormalities in protein metabolism.

Unit IV - Metabolism of Lipids and Integration of Metabolic Pathways**12 hrs**

Lipids- Classification and structure. Metabolic pathways of Triacylglycerol, fatty acids, cholesterol and lipoproteins. Biosynthesis of fatty acids and ketone bodies. Abnormalities in lipids metabolism.

Integration and regulation of metabolic pathways- Central role of the liver metabolism. Metabolic crossroads. Tissue-Specific Metabolism during the Fed-Fast Cycle System.

Unit V - Nucleic acids, Nucleotides and their Metabolisms**13 hrs**

Nucleic acids and nucleotides- Classification, structure and functions. Nucleosides vs nucleotides. Metabolism of nucleic acid components - Biosynthesis of nucleotides. Structure of DNA and RNA. Types of RNA. DNA replication, transcription and translation- Role of nucleic acids in protein synthesis.

Textbooks:

1. Satyanarayana U. and Chakrapani U. 2020. BIOCHEMISTRY. Elsevier Health Sciences, New Delhi.
2. Rodwell V.W., Bender D., Botham K.M., Kennelly P.J. and Weil P.A. (2018). Harper's Illustrated Biochemistry, 31th Edition. McGraw Hill Publishers, USA.

Reference books:

1. Lehninger, Principles of Biochemistry, W H Freeman & Co, 2021.
2. Lubert Stryer, Jeremy M. Berg, Biochemistry, WH Freeman, 2019.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

CLINICAL NUTRITION AND DIETETICS – I

Semester III
Course Code: 23FSN202
L-T-P – 2-2-0-4

Hours of Instruction/ week – 4
No. of Credits – 4
Total 60 hrs.

Pre-requisite: Diet management & Role of Dieticians

Course Objective:

1. Extensive study of role of nutrition in community health.
2. Deals with role of dietician in hospital and community settings in nutrition care, case based study of patient's condition followed by dietary principles and management.

Course Outcomes:

CO1: Understand the basic concepts of Dietary management.

CO2: Acquire knowledge of the roles and responsibilities, skills, ethics and opportunities of a dietician

CO3: Apply principles of diet therapy, and modification of normal diet for therapeutic purposes.

CO4: Comprehend the causes, symptoms, and dietary management addressing risk factors.

Skills:

- Enhance knowledge and skills of nutrition and to develop critical evaluation skills through an integration of nutrition, dietetics and research.
- Applying technical skills, knowledge of health behavior, clinical judgment, and decision-making skills when assessing and evaluating the nutritional status of individuals and communities

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	3	-	-	-	-	1	-	-
CO3	1	3	-	-	-	-	2	-	2	-	-
CO4	-	3	-	-	-	-	3	-	2	-	-

Syllabus:

Unit I: Introduction to Clinical Nutrition and Dietetics

12hrs.

Definition and history of dietetics- Concepts of a desirable diet for optimum health-Interrelationship between food, nutrition and health- Factors affecting food choices, Physiologic factors regulating food intake- role of neurotransmitters and nutrients in hunger and satiety.

Introduction to diet therapy- Glycemic Index, dietary supplements, adjunct to diet therapy, food nutrition and drug interaction

Unit II - Role and Responsibilities of Dieticians

12 hrs.

Dietician, classification, responsibilities, code of ethics, assessment and diet planning, diet counselling and nutrition education, dietician in India, Indian Dietetic Association (IDA)

Unit III - Principles and Objectives of Medical Nutrition Therapy

12 hrs.

Characteristics of a Regular diet, rationale for modifications in terms of energy and other nutrients, texture, consistency. Translation of diet orders into menu: defining nutrient needs, desirable dietary pattern, menu plan, use of exchange list, types of menu. Monitoring food intake.

Enteral and Parenteral feeding- Indications, types (oral supplements, tube feeding, parenteral feeding, TPN, pre and post-operative diets, immuno nutrition), methods of administration, monitoring and associated complications.

Unit IV- Dietary Principles and Management of Special Conditions

12hrs.

Protein and energy malnutrition (hospital and domiciliary treatment) - Febrile diseases-classification of fevers, metabolism, general dietary considerations- diet in acute and chronic fevers (typhoid and tuberculosis) - Surgical conditions, Burns and organ transplants, Infectious diseases (typhoid, malaria, tuberculosis, HIV), arthritis, gout, hypothyroidism

Unit V - Nutrition in adverse reactions to food

12 hrs.

Pathogenesis, food allergens, symptoms, tests for diagnosis, food allergies - pollen food allergy syndrome, latex –fruit syndrome, food dependent, exercise- induced anaphylaxis, food induced anaphylaxis, food –protein induced enterocolitis syndrome, cow’s milk protein allergy (CMPA). Management - restricted diets, elimination diets and hypo- sensitization.

Reference Textbooks:

1. Srilakshmi. B. Dietetics, New age International Publishers, 6th Edition, 2012
2. Davidson S, Passmore R, Breck JFT. Human Nutrition and Dietetics, The English Language Book Society and Churchill Livingston, 1975.
3. Kathleen ML and Escott S. Krause's Food, Nutrition and Diet Therapy, 9thedn, W.B. Saunders Company Pennsylvania, 2000.

Suggested Readings:

1. Bemadette. M. Marriott and Sydne J Carlson, Nutritional needs in cold and high altitude environments
2. Cresci, P. D. (Ed.). (2015). Nutrition support for the critically ill patient: A guide to Practice. CRC Press.
3. Escott-Stump, S. (2008). Nutrition and diagnosis-related care. Lippincott Williams & Wilkins.
4. Gable, J., & Herrmann, T. (2015). *Counselling skills for Dietitians*. John Wiley & Sons.
5. Nelms, M., & Sucher, K. (2015). Nutrition therapy and pathophysiology. Nelson Education

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

NUTRITIONAL BIOCHEMISTRY PRACTICAL

Semester III

Course Code: 23FSN281

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30 hrs.

Pre requisite: Basics on biochemical assessments

Course Objective: To impart knowledge quantitative estimation of blood and urine parameters.

Course Outcomes: At the end of the course, the students will be able to

CO1: Understand the fundamental concepts biomolecules.

CO2: Gain hands on experience in quantitative and qualitative analysis of urine and blood parameters

CO3: Develop skill and proficiency in preparation of laboratory reagents and handling glassware and equipment's.

Skills: Develop skills on blood and urinary analysis.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	-	-	-	2	-	1
CO2	1	-	-	-	-	-	-	-	2	-	1
CO3	-	-	-	-	-	-	-	-	-	-	-

Practicals

1. Separation of serum, plasma, RBC and WBC from the whole blood
2. Quantitative Analysis of Blood Glucose by using Nelson Somogi Method
3. Quantitative Analysis of Serum Proteins by using Biuret Method
4. Estimation of serum total Cholesterol by using Zak's Method
5. Determination of Blood creatinine by using Jaffe's Method
6. Quantitative Analysis of Urea in blood and urine sample by using Diacetyl monoxime (DAM) Method
7. Determination of Bilirubin by using Malloy and Evelyn Method
8. Qualitative analysis of abnormal constituents in urine sample
9. Quantitative Analysis of DNA in the given sample by using Diphenyl amine (DPA) method

Text Books:

1. Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, William Itinmaon Medical Books, London, 2010.
2. Oser, B.L., Harke's Physiological Chemistry XIV Edition Tata McGraw Hill Publishing Company Ltd., Bombay, 2011

Reference Books:

1. Sadasivam, S. and Manickam, A. Biochemical Method, Second Edition, New Age International P. Ltd., Publishers, New Delhi, 2013.
2. Raghuramulu, N., Madhavannair, K. and Kalyana Sundaram, National Institute of Nutrition, 2013, A Manual of Laboratory Techniques, Hyderabad, 500007

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

CLINICAL NUTRITION AND DIETETICS – I PRACTICAL**Semester III****Course Code: 23FSN282****L-T-P – 0-0-2-1****Hours of Instruction/ week – 2****No. of Credits – 1****Total 30 hrs.**

Pre requisite: Diet Planning, Therapeutic Diet

Course Objectives: To enable the students to

1. To deliver better understanding on the basic principles in diet planning.
2. To promote skills and techniques in planning and preparation of therapeutic diets for various disease conditions.

Course Outcomes:

CO1: Understand the basic principles involved in planning diets for different disease conditions.

CO2: Plan and prepare diets to meet out the quality and quantity requirements for specific disease conditions

CO3: Acquire practical knowledge of therapeutic diet to meet the requirement

Skills: Develop skills to plan and prepare therapeutic diet

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	3	-	1	-	2	1	1	3	-	1
CO2	1	3	-	1	-	2	1	2	3	-	1
CO3	1	2	-	-	-	-	2	-	1	-	2

Practical's:**30hrs.**

Planning and Preparation of diet in

1. Soft, clear and full fluid diet.
2. Low and medium cost diet for protein – calorie, vitamin A, Iron deficiency.
3. Overweight and underweight conditions.
4. Fevers of short and long duration.

5. Diarrhea, dysentery, constipation.
6. Peptic Ulcer.

Text Books:

1. Srilakshmi, V. Dietetics New Age International P. Ltd., New Delhi, 2011.
2. Dietary Guidelines of Indians – A Manual, National Institute of Nutrition, Hyderabad, 2011.
3. Garg, M. Diet, Nutrition and Health, ABD Publishers, 2006.

Reference books:

1. Krause, M.V. and Mahan, L.K. Food, Nutrition and Diet Therapy, 9th Ed., W.B. Saunders Company, Philadelphia, 2009.
2. Maimun Nisha, Diet Planning for Diseases, Kalpaz Publishers, 2006.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

BASICS OF COMPUTER APPLICATIONS

Semester III

Course Code: 23FSN203

L-T-P – 2-0-0-2

Hours of Instruction/ week – 2

No. of Credits – 2

Total - 30 hrs.

Pre requisite: Basics of computer usage, Windows, Microsoft office

Course Objectives:

1. To learn the computer peripherals in the operation of computers
2. To understand the computer network in sharing of information through computers
3. To acquire the skills in the applications of windows in documentation, data analysis and presentation

Course Outcomes:

CO1: Understanding the basic Components of Computers and Network elements.

CO2: Developing professional-looking newsletters, pamphlets, charts, simple calculations etc using the authorizing tools

CO3: Able to create and manage databases & develop a presentation skills using the authorizing tools

CO4: Elicit multimedia presentation focusing on utilization of authorizing tools.

CO5: Able to apply computer applications in meal management practices and explore the nutritional software's and e-journals in professional and academic endeavours.

Skills: Acquire the skills in exploring windows applications in development of documents, data analysis in spread sheet and power point presentation.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	-	-	2	1	-	-	2	2
CO2	1	-	1	-	-	2	1	-	-	2	2
CO3	1	-	1	-	-	2	1	-	-	2	2
CO4	1	-	1	-	-	2	1	-	-	2	2

Syllabus:

Unit I - Introduction to Computers & Networks

6hrs.

Introduction to Computers - Operating System, CPU, Input and Output Devices, Main and Auxiliary Storage Devices, Software and Hardware, Introduction to Computer Networks, Basics of HTML, WWW, URL, Email, Network Security

Unit II – Word Processing and Spreadsheets

6hrs.

Word Processing- Basics of creating a document, Formatting a document, Printing a document. Spreadsheet – Basics of creating a worksheet, Creating tables, charts, pivot table & charts, Working with formulas

Unit III – Database Management system and Presentation

6hrs.

Database Management system – Creating a database table, queries, Developing forms and reports, Presentation- Creating a presentation using slide master and template, Formatting the slides, Animations, Transitions, Slide show

Unit IV - Multimedia

6hrs.

Introduction of multimedia, Basic Elements, Hardware, Applications of Multimedia, Authorizing Tools, Introduction to Video, and Audio editing software's.

Unit V - Application of Computers in Food Science and Nutrition

6hrs.

Applications - Nutrition Education and Counselling, Nutrient and Diet calculations, Use of statistical software, Accessing Digital Library, e-Journals in Food Science and Nutrition, Relevant Nutrition software's, Applications and Webpages.

Text books:

1. Microsoft Office 2019 Complete, BPB Publications
2. Dinesh Maidasani – Learning Computer Fundamentals, MS Office and Internet and Web Technology, Laxmi Publications

Reference Books:

1. BPB's Computer Course Windows 10 with MS Office 2016.
2. John Walkenbach Herb Tyson Michael R. Groh FaitheWempen Lisa A. Bucki – Microsoft Office 2010 Bible, Wiley India.
3. Andrew S. Tanenbaum (2009) IV Edition, Computer Networks, Pearson Education and Dorling Kindersley Publishers, Delhi.
4. Ralf Steinmetz and Klara Nahrstedt (2011) Multimedia- Computing, Communications and Applications, Pearson Education and Dorling Kindersley Publishers, Delhi.
5. Learn Microsoft Office 2019: A comprehensive guide to getting started with Word, PowerPoint, Excel, Access, and Outlook by Linda Foulkes

Evaluation pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

SOFT SKILL I

Semester III

Course Code: 21SSK202

L-T-P – 1-0-2-2

Hours of Instruction/ week – 3

No. of Credits – 3

Total 45 hrs.

Pre-requisite: Team Spirit, self-confidence and required knowledge, basic English language skills, knowledge of high school level mathematics.

Course Objective: To help students understand the nuances of leadership, know the importance of working in teams, face challenging situations, crack interviews, improve communication skills and problem-solving skills.

Course Outcome:

CO1: Soft Skills - At the end of the course, the students would have understood the importance and tactics of working in teams. They would have developed the ability to communicate convincingly and negotiate diplomatically while working in a team to arrive at a win-win situation. They would further develop their interpersonal and leadership skills. They would also have acquired the necessary skills, abilities and knowledge to present themselves confidently.

CO2: Soft Skills - At the end of the course, the students would have the ability to prepare a suitable resume. They would have the ability to analyse every question asked by the interviewer, compose correct responses and respond in the right manner to justify and convince the interviewer of one's right candidature through displaying etiquette, positive attitude and courteous communication. They would be sure-footed in introducing themselves and facing interviews.

CO3: Aptitude - At the end of the course, students will be able to identify, recall and arrive at appropriate strategies to solve questions on geometry. They will be able to investigate, interpret and select suitable methods to solve questions on arithmetic, probability, statistics and combinatorics.

CO4: Verbal - At the end of the course, the students will have the ability to understand and use words, idioms and phrases, interpret the meaning of standard expressions and compose sentences using the same.

CO5: Verbal - At the end of the course, the students will have the ability to decide, conclude, identify and choose the right grammatical construction.

CO6: Verbal - At the end of the course, the students will have the ability to examine, interpret and investigate arguments, use inductive and deductive reasoning to support, defend, prove or disprove them. They will also have the ability to create, generate and relate facts / ideas / opinions and share / express the same convincingly to the audience / recipient using their communication skills in English.

Skills: Communication, teamwork, leadership, facing interviews and problem-solving.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	3	3	3	3	-	-	-	-
CO2	-	-	-	3	3	3	3	-	-	-	-
CO3	-	-	-	-	3	3	3	-	-	-	-
CO4	-	-	-	-	3	3	3	-	-	-	-
CO5	-	-	-	-	3	3	3	-	-	-	-
CO6	-	-	-	-	3	3	3	-	-	-	-

Syllabus:**Unit I - Soft Skills**

Team Work: Value of teamwork in organizations, Definition of a team. Why team? Effective team-building. Parameters for a good team, roles, empowerment and need for transparent communication, Factors affecting team effectiveness, Personal characteristics of members and its influence on team.

Leadership, Internal problem solving, Growth and productivity, Evaluation and co-ordination.

Facing an interview: Importance of verbal & aptitude competencies, strong foundation in core competencies, industry orientation / knowledge about the organization, resume writing, being professional. Importance of good communication skills, etiquette to be maintained during an interview, appropriate grooming and mannerism.

Unit II - Aptitude

Geometry: 2D, 3D, Coordinate Geometry, and Heights & Distance.

Permutations & Combinations: Basics, Fundamental Counting Principle, Circular Arrangements, and Derangements.

Probability: Basics, Addition & Multiplication Theorems, Conditional Probability, and Bayes' Theorem.

Statistics: Mean, Median, Mode, Range, and Standard Deviation.

Logical Reasoning: Blood Relations, Direction Test, Syllogisms, Series, Odd man out, Coding & Decoding, Cryptarithmic Problems and Input-Output Reasoning.

Campus recruitment papers: Discussion of previous year question papers of all major recruiters of Amrita Vishwa Vidyapeetham.

Competitive examination papers: **Discussion of previous year question papers of CAT, GRE, GMAT, and other management entrance examinations.**

Miscellaneous: Interview Puzzles, Calculation Techniques and Time Management strategies.

Unit III - Verbal Skills

Vocabulary: Create an awareness of using refined language through idioms and phrasal verbs.

Grammar (Advanced Level): Enable students to improve sentences through a clear understanding of the rules of grammar.

Reasoning Skills: Facilitate the student to tap his reasoning skills through Syllogisms, and critical reasoning arguments.

Reading Comprehension (Advanced): Enlighten students on the different strategies involved in tackling reading comprehension questions.

Public Speaking Skills: Empower students to overcome glossophobia and speak effectively and confidently before an audience.

Writing Skills: Introduce formal written communication and keep the students informed about the etiquettes of email writing.

References:

1. Adair. J., (1.986), "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
2. Gulati. S., (2006) "Corporate Soft Skills", New Delhi, India: Rupa & Co.
3. The Hard Truth about Soft Skills, by Amazone Publication.
4. Verbal Skills Activity Book, CIR, May 2018
5. Nova's GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
6. The BBC and British Council online resources
7. Owl Purdue University online teaching resources
8. www.grammarbook.com online teaching resources
9. www.englishpage.com online teaching resources and other useful websites
10. Student Workbook: Quantitative Aptitude & Reasoning, Corporate & Industry Relations, Amrita Vishwa Vidyapeetham.
11. Quantitative Aptitude for All Competitive Examinations, Abhijit Guha.
12. How to Prepare for Quantitative Aptitude for the CAT, Arun Sharma.
13. How to Prepare for Data Interpretation for the CAT, Arun Sharma.
14. How to Prepare for Logical Reasoning for the CAT, Arun Sharma.
15. Quantitative Aptitude for Competitive Examinations, R S Aggarwal.
16. A Modern Approach to Logical Reasoning, R S Aggarwal.
17. A Modern Approach to Verbal & Non-Verbal Reasoning, R S Aggarwal.

Evaluation Pattern:

Assessment	Internal	External
Continuous Assessment (CA) – Soft Skills	40	
Continuous Assessment (CA) – Aptitude	10	20
Continuous Assessment (CA) – Verbal	10	20
Total	60	40

*CA - Can be Presentations, Speaking activities and tests.

SEMESTER IV
FOOD MICROBIOLOGY

Semester IV
Course Code:23FSN211
L-T-P – 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre-requisite: Basic knowledge -microorganisms, food-based microbes.

Course Objective:

1. To obtain knowledge on morphology of microorganisms and types of microscopy
2. To understand the factors influencing the growth of microorganisms
3. To apply the preservation principles and methods to preserve the foods from microbial contamination
4. To explore the beneficial effects of microorganisms in the development of food products.

Course Outcomes:

- CO1:** Gain a better understanding of microorganisms and microscope, its vital role in the field of microbiology.
- CO2:** Understand the factors affecting the growth in controlling the growth curve of microorganisms.
- CO3:** Able to understand the chances of spoilage in plant and animal-based foods.
- CO4:** Explore the pivotal role of microorganisms in fermentation technology.
- CO5:** Able to differentiate food infection and intoxication.

Skills: Develop skills in identification, testing and control of microorganisms in relation to food safety.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	-	2	1
CO2	1	-	1	-	-	-	-	-	-	-	1
CO3	-	1	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	-	-	3	-
CO5	-	1	-	-	-	-	1	-	-	-	2

Syllabus:

Unit I: Introduction to Microbiology, Morphology and Growth factors of Microorganisms 12 hrs.

Definition and History, Microscopy, Light and electron Microscopy, General Morphology of Microorganisms Bacteria, Fungi, Algae, Yeast and Virus-Bacteriophage, Microbial Biomass, Growth Curve, Definition of Batch and Continuous culture, Factors Affecting Growth - Intrinsic Factors, Nutrient Content, pH, Redox Potential, Antimicrobial, Barrier and Water Activity, Extrinsic Factors: Relative Humidity, Temperature and Gaseous Atmosphere, Enumeration strategy of microorganisms, Simple microbial test- sampling, counting

Unit II: Microbiology of Plant based Foods 12 hrs.

Outline of Contamination, Spoilage and Preservation of Vegetables and Fruits, Cereals and Cereal Products, Pulses, Nuts and oilseeds, Sugar and Sugar Products

Unit III: Microbiology of Animal based Foods 12 hrs.

Outline of Contamination, Spoilage and Preservation of Milk and Milk Products, Canned Foods, Meat and Meat Products, Egg and Poultry

Unit IV: Beneficial Effects of Microorganisms 12 hrs.

Fermented Foods – Curd, Cheese, Sauerkraut, Meat, Soy Based Foods, Alcoholic Beverages and Vinegar

Unit V: Food Intoxication and Food Infection 12 hrs.

Food Borne Diseases – Classification- Intoxication – Botulism and Staphylococcal intoxication- Infection – Salmonellosis, Clostridium Perfringens illness, Bacillus cereus, Ecoli, Shigellosis, Yersinia and Streptococcus faecalis – Foods involved, Disease’s outbreak, Preventive and control measures.

Reference Textbooks:

1. Jay M.J (2015) Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi
2. Ramesh, K.V (2012) Food Microbiology, MJP Publishers, Chennai.
3. Tamine, A (2015) Probiotic Dairy Products, Blackwell Publishing, USA.
4. William C. Frazier (2014) Food Microbiology, Tata McGraw Hills Publishing Company Limited, Chennai.

Suggested Readings:

1. Adams, MR and Moss, MO (2015) Food Microbiology, New Age International (P) Ltd., New Delhi.
2. Cappuccino G.J and Sherman, N (2008) Microbiology – A Laboratory Manual, Pearson Education Publishers, USA,.
3. Jay M.J (2015) Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

CLINICAL NUTRITION AND DIETETICS – II

Semester IV

Course Code:23FSN212

L-T-P – 2-2-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre-requisite: Nutrition & Diseases

Course Objective:

1. To give better understanding on the role of nutrition for good health.
2. To create better knowledge on different therapeutic diets and their preparation.
3. To acquire relevant skills to develop as a dietitian.

Course Outcomes:

CO1: Understand the principles involved in menu planning, nutritional assessment, therapeutic diets and dietary calculation.

CO2: Gain core knowledge on the dietary management of metabolic syndrome and associated disorders

CO3: Gain experience on the dietary management of gastrointestinal tract disorders

CO4: Gain knowledge on the dietary planning for liver and kidney diseases

CO5: Understand the dietary management involved in neoplastic diseases

Skills:

- Develop skills and techniques in the planning and preparation of diets for various disease conditions
- Applying principles of diet therapy in planning, preparation and nutrient calculation of hospital diets, therapeutic diets for various diseases

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	-	-	-	1	1	1	-	1
CO2	2	-	-	-	-	-	1	1	1	-	1
CO3	2	-	-	-	-	-	1	1	1	-	1
CO4	2	-	-	-	-	-	1	1	1	-	1

Syllabus:

Unit I - Dietetics in Clinical Nutrition

10 hrs.

Therapeutic diets- an overview. Principle involved in planning menu of therapeutic diets. Techniques of writing menus, Food service management in hospitals- Types (centralized and decentralized systems of service), management of delivery and service of food in different systems.

Unit II - Dietary management of metabolic syndrome and associated disorders

13 hrs.

Metabolic syndrome: Concept; Pathophysiology of insulin resistance.

Obesity- introduction, etiology, clinical assessment, treatment approaches, consequences of obesity and its prevention.

Diabetes mellitus – types, etiology, symptoms and diagnosis, aims of dietary treatments, special dietary consideration for type I and II diabetics, complications of diabetes

Diseases of the heart and blood vessels- etiology, symptoms and diagnosis; atherosclerosis, lipids and other dietary factors and coronary heart diseases (CHD). Diet in CHD, hypertension, congestive heart failure and hyperlipidemia.

Unit III - Dietary management of gastrointestinal tract disorders

13hrs.

Structure and function of gastrointestinal tract, dietary treatment for constipation, diarrhea, peptic ulcer, celiac disease, tropical enteropathy, tropical sprue, inflammatory bowel disease, irritable bowel syndrome and diverticular disease.

Unit IV - Nutritional management in liver and kidney diseases

12 hrs.

Diseases of the liver - functions of liver, clinical assessment of liver function. Pathogenesis, signs and symptoms of hepatitis, acute liver failure, cirrhosis and encephalopathy. Nutritional management in liver diseases.

Dietary management in gallbladder diseases.

Diseases of the kidney - functions of kidney, clinical assessment of kidney function. Pathogenesis, signs and symptoms of acute and chronic renal failure, nephrotic syndrome and renal calculi. Nutritional management in kidney diseases and during renal replacement therapy.

Unit V - Nutritional therapy in neoplastic diseases

12hrs.

Cancer- Types, stages and markers. Nutrition in the etiology of cancer. Nutritional effects of cancer and cancer therapy, nutritional care of cancer patient. Complementary and alternative nutrition therapies.

Reference Textbooks:

1. Srilakshmi.B, Dietetics, New age International publishers, New Delhi, 2019. Seventh edition,
2. Kathleen ML and Escott S. Krause's Food, Nutrition and Diet Therapy, 9th edn, W.B. Saunders Company Pennsylvania, 2000.
3. Davidson S, Passmore R, Breck JFT. Human Nutrition and Dietetics, The English Language Book Society and Churchill Livingstone, 1975.
4. Thomas B. Manual of Dietetic Practice. Blackwell Scientific Publications, Oxford, London, 1988.
5. Robinson CH. Normal and Therapeutic Nutrition. Oxford Publishing Co, Bombay, 1972.

Suggested Readings:

1. Erdman JW, Macdonald IA and Zeisel SH. Present Knowledge in Nutrition, 10th edn, International Life Sciences Institute Press, Washington DC, 2012.
2. Shills ME, Olson JA, Moshe S and Ross CA. Modern Nutrition in Health and Disease, 9th edn, Lippincott Williams and Wilkins, 2006.
3. Gibney MJ, Macdonald IA and Roche HM. Nutrition and Metabolism, Blackwell Publishing, UK, 2003.
4. Gibney MJ, Elia M, Ljungqvist O and Dowsett J. Clinical Nutrition, Blackwell Publishing, UK, 2005.
5. Park K. Text Book of Preventive and Social Medicine. 21st edn, Banarsidas Bhanot Publishers, Jabalpur, India, 2011.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD MICROBIOLOGY PRACTICAL

Semester IV

Course Code:23FSN283

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30 hrs.

Course Objectives :

1. Understand the different methods of sterilization and disinfection
2. Impart knowledge on different aseptic and pure culture techniques for enumeration of microbes

Course Outcomes:

CO1: Acquire knowledge on different microbial techniques associated with food samples.

CO2: Gain practical experience on microscopic examination of bacteria, yeast and molds in foods samples

CO3: Gain hands on experience in biochemical tests for identification of bacteria

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	2	-	-	-	-	-	-	-	1
CO2	-	1		-	-	-	-	-	-	2	-
CO3	-	-	2	-	-	-	-	-	-	-	1

Practicals:

1. Instruments used in microbiological laboratory, their principles and working
2. Methods of sterilization and disinfection
3. Media preparation
4. Preparation of samples for microbial analysis using different dilents
5. Aseptic Culture Techniques
6. Isolating bacteria: Pure culture techniques
7. Enumeration of bacteria from different food sample
8. Microbial staining techniques
9. Microbial examination of processed foods
10. Biochemical tests for identification of bacteria.
11. Assessment of microbiological quality of milk sample using Methylene Blue Dye Reduction Test
12. Microscopic examination of yeast and molds in foods samples

Text Books:

1. Silva N.D, Taniwaki M.H., Valéria C.A. Junqueira V.C.A, Silveira N., Okazaki M.M., Gomes R.A.R. (2018). Microbiological Examination Methods of Food and Water- A Laboratory Manual, 2nd Edition. CRC Press, USA.
2. Waite-Cusic J.G., Yousef A.E. and Jennifer J. Perry J.J. (2022). Analytical Food Microbiology. A Laboratory Manual. Wiley Publishers, USA.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

CLINICAL NUTRITION AND DIETETICS – II PRACTICAL

Semester IV

Course Code:23FSN284

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30 hrs.

Pre requisite: Diet Planning, Therapeutic Diet

Course Objectives:

1. To give insights on the basic principles in diet planning
2. To correlate between different disease conditions and the dietary recommendations
3. To aid in developing skills and techniques in planning and preparation of therapeutic diets for various disease conditions

Course Outcomes:

CO1: Understand the basic principles involved in planning diets for liver diseases.

CO2: Plan and prepare diets to meet out the quality and quantity requirements of renal diseases

CO3: Understand the calculations of nutritive value of the planned and prepared diet for a cardiovascular patient

CO4: Expertise in planning and preparation of therapeutic diets for diabetic mellitus

CO5: Modify the dietary pattern for the cancer and HIV patient based on the treatment and other conditions

Skills: Develop skills to plan and prepare diets for specific disease conditions

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	2	1	-	1	2	2	-	2
CO2	2	1	-	2	1	-	1	2	2	-	2
CO3	2	1	-	2	1	-	1	2	2	-	2
CO4	2	1	-	2	1	-	1	2	2	-	2
CO5	2	1	-	2	1	-	1	2	2	-	2

Practical's

30hrs.

1. Modifications of Diets in Liver Diseases – Jaundice, Hepatitis and Cirrhosis
2. Diets for Nephritis, renal Failure and renal Calculi, Protein Restricted Diets
3. Diets for Cardiovascular diseases – Sodium Restricted, Hypertension, atherosclerosis, Fat Controlled
4. Modification of Diets in Diabetes Mellitus
5. Modification of Diet for Cancer Patients and HIV Infected Person

Text Books:

1. Srilakshmi, V. Dietetics New Age International P. Ltd., New Delhi, 2011.
2. Dietary Guidelines of Indians – A Manual, National Institute of Nutrition, Hyderabad, 2011.
3. Garg, M. Diet, Nutrition and Health, ABD Publishers, 2006.

Reference books:

1. Krause, M.V. and Mahan, L.K. Food, Nutrition and Diet Therapy, 9th Ed., W.B. Saunders Company, Philadelphia, 2009.
2. Maimun Nisha, Diet Planning for Diseases, Kalpaz Publishers, 2006.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

ENVIRONMENT AND SUSTAINABILITY

Semester IV
Course Code:21ENV211
L-T-P – 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total – 45 hrs.

Course Objectives:

1. Understand the basic facts related to the environment including components of the environment, nutrient recycling, biodiversity and ecosystem services.
2. Identify various interactions between society and the environment, including overpopulation, urbanization, resource exploitation, habitat destruction, consumerism, environmental protection, activism, regulation.
3. Characterize some important environmental issues from environmental and social perspectives.
4. Assess integrated approaches for solving socio-environmental problems and sustainable living, including indigenous and traditional approaches.
5. Identify attitudinal factors and specifically, the ethical issue that lies at the root of social and environmental problems and the necessity for individual attitudinal change and sustainable action to attain global sustainability.

Course Outcomes:

- CO1: Integrate facts and concepts from ecological, physical and social sciences to characterize some common socio-environmental problems.
- CO2: Develop simple integrated systems and frameworks for solving common interconnected socio-environmental problems.
- CO3: Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.
- CO4: Identify the ethical underpinnings of socio-environmental issues in general.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	1	-	-	-	1	-	-	-	-
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	-	2	-	-	-	1	-	-	-	-
CO4	-	-	1	1	-	-	1	-	-	-	-

Syllabus:

Unit 1

State of Environment and Unsustainability, Need for Sustainable Development, Traditional conservation systems in India, People in Environment, Need for an attitudinal change and ethics, Need for Environmental Education, Overview of International Treaties and Conventions, Overview of Legal and Regulatory Frameworks.

Environment: Abiotic and biotic factors, Segments of the Environment, Biogeochemical Cycles, Ecosystems (associations, community adaptations, ecological succession, Food webs, Food chain, ecological

pyramids), Types of Ecosystems – Terrestrial ecosystems, Ecosystem Services, Economic value of ecosystem services, Threats to ecosystems and conservation strategies.

Biodiversity: Species, Genetic & Ecosystem Diversity, Origin of life and significance of biodiversity, Value of Biodiversity, Biodiversity at Global, National and Local Levels, India as a Mega-Diversity Nation (Hotspots) & Protected Area Network, Community Biodiversity Registers. Threats to Biodiversity, Red Data book, Rare, Endangered and Endemic Species of India. Conservation of Biodiversity. People’s action. Impacts, causes, effects, control measures, international, legal and regulatory frameworks of: Climate Change, Ozone depletion, Air pollution, Water pollution, Noise pollution, Soil/land degradation/pollution

Unit 2

Linear vs. cyclical resource management systems, need for systems thinking and design of cyclical systems, circular economy, industrial ecology, green technology. Specifically apply these concepts to: Water Resources, Energy Resources, Food Resources, Land & Forests, Waste management.

Discuss the interrelation of environmental issues with social issues such as: Population, Illiteracy, Poverty, Gender equality, Class discrimination, Social impacts of development on the poor and tribal communities, Conservation movements: people’s movements and activism, Indigenous knowledge systems and traditions of conservation.

Unit 3

Common goods and public goods, natural capital / tragedy of commons, Cost benefit analysis of development projects, Environment Impact Assessment (EIA), Environment Management Plan (EMP), Green business, Eco-labeling, Problems and solutions with case studies.

Global and national state of housing and shelter, Urbanization, Effects of unplanned development case studies, Impacts of the building and road construction industry on the environment, Eco-homes /Green buildings, Sustainable communities, Sustainable Cities.

Ethical issues related to resource consumption, Intergenerational ethics, Need for investigation and resolution of the root cause of unsustainability, Traditional value systems of India, Significance of holistic value-based education for true sustainability.

Textbooks and References

1. <https://www.sites.google.com/site/amritaevs/home>
2. R. Rajagopalan, Environmental Studies: From Crisis to Cure. Oxford University Press, 2011, 358 pages. ISBN: 9780198072089.
3. Daniel D. Chiras, Environmental Science. Jones & Bartlett Publishers, 01-Feb-2012, 669 pages. ISBN: 9781449645311.
4. Andy Jones, Michel Pimbert and Janice Jiggins, 2011. Virtuous Circles: Values, Systems, Sustainability. IIED and IUCN CEESP, London. URL:<http://pubs.iied.org/pdfs/G03177.pdf>
5. Annenberg Learner, The Habitable Planet, Annenberg Foundation 2015. URL: <http://www.learner.org/courses/envsci/unit/pdfs/textbook.pdf>

Evaluation Pattern:

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

SOFT SKILLS II

Semester IV

Course Code:21SSK212

L-T-P – 1-0-2-2

Hours of Instruction/ week – 3

No. of Credits – 3

Total 45 hrs.

Pre requisite: Willingness to learn, communication skills, basic English language skills, knowledge of high school level mathematics.

Course Objective:

To help students understand the corporate culture and assist them in improving their group discussion skills, communication skills, listening skills and problem-solving skills.

Course Outcomes:

CO1: Soft Skills - At the end of the course, the students will have a clear understanding of the corporate culture, professional etiquette, professional grooming and would have understood the nuances of smooth transition from academic to the corporate. They would further develop their inter-personal and leadership skills.

CO2: Soft Skills - At the end of the course, the students shall learn to examine the context of a Group Discussion topic and develop new perspectives and ideas through brainstorming and arrive at a consensus.

CO3: Aptitude - At the end of the course, the student will be able to interpret, critically analyze and solve questions under arithmetic, algebra and logical reasoning and solve them employing the most suitable methods.

CO4: Verbal - At the end of the course, the students will have the ability to relate, choose, conclude and determine the usage of right vocabulary according to the context.

CO5: Verbal - At the end of the course, the students will have the ability to utilise prior knowledge of grammar to recognise structural instabilities and modify them.

CO6: Verbal - At the end of the course, the students will have the ability to comprehend, interpret, deduce and logically categorise words, phrases and sentences. They will also have the ability to theorise, discuss, elaborate, criticise and defend their ideas.

Skills: Communication, etiquette and grooming, inter-personal skills, listening skills, convincing skills, problem-solving skill.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-		-	3			3				
CO2	-		-	3			3				
CO3	-		-	-			3				
CO4	-		-	-			3				
CO5	-		-	-			3				
CO6	-		-	-			3				

Syllabus:

Unit I – Soft Skills

Professional Grooming and Practices: Basics of corporate culture, key pillars of business etiquette: socially acceptable ways of behavior, body language, personal hygiene, professional attire and cultural adaptability. Handling pressure, multi-tasking. Being enterprising. Adapting to corporate life:

Emotional Management (EQ), Adversity Management, Health Consciousness. People skills, Critical Thinking and Problem solving.

Group Discussions: Advantages of group discussions, Types of group discussion and Roles played in a group discussion. Personality traits evaluated in a group discussion. Initiation techniques and maintaining the flow of the discussion, how to perform well in a group discussion. Summarization/conclusion.

Unit I – Aptitude

Equations: Basics, Linear, Quadratic, Equations of Higher Degree, and Problems on Ages.

Logarithms, Inequalities and Modulus: Basics

Sequence and Series: Basics, AP, GP, HP, and Special Series.

Time and Work: Basics, Pipes & Cistern, and Work Equivalence.

Time, Speed and Distance: Basics, Average Speed, Relative Speed, Boats & Streams, Races, and Circular Tracks.

Logical Reasoning: Arrangements, Sequencing, Scheduling, Venn Diagram, Network Diagrams, Binary Logic, and Logical Connectives, Clocks, Calendars, Cubes, Non-verbal reasoning and Symbol based reasoning.

Unit I – Verbal Skills

Vocabulary: Help students understand the usage of words in different contexts.

Grammar (Medium Level): Train Students to comprehend the nuances of Grammar and empower them to spot errors in sentences and correct them.

Reading Comprehension (Basics): Introduce students to smart reading techniques and help them understand different tones in comprehension passages.

Reasoning: Enable students to connect words, phrases and sentences logically.

Oral Communication Skills: Aid students in using the gift of the gab to interpret images, do a video synthesis, try a song interpretation or elaborate on a literary quote.

References:

1. Adair. J., (1986), "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
2. Gulati. S., (2006) "Corporate Soft Skills", New Delhi, India: Rupa & Co.
3. The Hard Truth about Soft Skills, by Amazon Publication.
4. Verbal Skills Activity Book, CIR, May 2018
5. Nova's GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
6. The BBC and British Council online resources
7. Owl Purdue University online teaching resources
8. www.thegrammarbook.com online teaching resources
9. www.englishpage.com online teaching resources and other useful websites
10. Student Workbook: Quantitative Aptitude & Reasoning, Corporate & Industry Relations, Amrita Vishwa Vidyapeetham.
11. Quantitative Aptitude for All Competitive Examinations, Abhijit Guha.
12. How to Prepare for Quantitative Aptitude for the CAT, Arun Sharma.
13. How to Prepare for Data Interpretation for the CAT, Arun Sharma.
14. How to Prepare for Logical Reasoning for the CAT, Arun Sharma.

15. Quantitative Aptitude for Competitive Examinations, R S Aggarwal.
16. A Modern Approach to Logical Reasoning, R S Aggarwal.
17. A Modern Approach to Verbal & Non-Verbal Reasoning, R S Aggarwal.

Evaluation Pattern

Assessment	Internal	External
Continuous Assessment (CA) – Soft Skills	40	
Continuous Assessment (CA) – Aptitude	10	20
Continuous Assessment (CA) – Verbal	10	20
Total	60	40

*CA - Can be Presentations, Speaking activities and tests

LIVE-IN LAB

Semester III

Course Code: 23FSN290

L-T-P – 0-0-3-3

Course Objectives

- Identify and analyse the various challenge indicators present in the village by applying concepts of Human Centered Design and Participatory Rural Appraisal.
- User Need Assessment through Quantitative and Qualitative Measurements
- Designing a solution by integrating Human Centered Design concepts
- Devising proposed intervention strategies for Sustainable Social Change Management

Course Outcome

CO1: Learn ethnographic research and utilise the methodologies to enhance participatory engagement.

CO2: Prioritize challenges and derive constraints using Participatory Rural Appraisal.

CO3: Identify and formulate the research challenges in rural communities.

CO4: Design solutions using human centered approach.

CO-PO Mapping

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO							
CO1		3	2	1	3	2	2
CO2		3	2	1	3	2	2
CO3		3	2	1	3	2	2
CO4		3		1	3	2	2

Syllabus

This initiative is to provide opportunities for students to get involved in coming up with technology solutions for societal problems. The students shall visit villages or rural sites during the vacations (after 4th semester) and if they identify a worthwhile project, they shall register for a 3-credit Live-in-Lab project, in the fifth semester.

Thematic Areas

- Agriculture & Risk Management
- Education & Gender Equality
- Energy & Environment
- Livelihood & Skill Development
- Water & Sanitation
- Health & Hygiene
- Waste Management & Infrastructure

The objectives and the projected outcome of the project will be reviewed and approved by the department chairperson and a faculty assigned as the project guide.

Evaluation Pattern:

Assessment	Marks
Internal (Continuous Evaluation) [75 marks]	
Workshop (Group Participation)	15
Village Visit Assignments & Reports	15
Problem Identification and Assessment	15
Ideation: Defining the Needs, Proposed Designs & Review	20
Poster Presentation	10
External [25 marks]	
Research Paper Submission	25
Total	
	100
Attendance (To be added separately)	5
Grand Total	105

SEMESTER V

FOOD PRODUCT DEVELOPMENT AND MARKETING

Semester V

Course Code:23FSN301

L-T-P – 3-1-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre requisite: Product development, consumer view on food products, product testing, sensory evaluation

Course Objectives:

1. To make a better understanding on new food products to support nutri enterprise.
2. To create entrepreneurship skills for setting up small scale food industries
3. Understand sustainable packaging and labelling for different food products

Course Outcomes:

1. Learn the trends and dimensions in food consumption pattern
2. Understand and apply the principles in food processing and food product development
3. Develop the principles involved in the preparation of convenience foods
4. Gain knowledge on different steps involved in food testing, evaluation and packaging
5. Develop entrepreneurship skills and to plan financial and marketing strategies

Skills:

- Develop skills and process in new food product development.
- Develop skills in Marketing of Food Products.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	1	1	-	1	-	-	1	-
CO2	-	3	2	1	-	-	-	-	-	1	-
CO3	-	3	2	2	-	-	-	-	-	1	-
CO4	-	3	-	2	2	-	1	-	-	1	1
CO5	-	2	-	2	2	-	-	-	-	1	-

Syllabus:

Unit I - Food consumption pattern

10hrs.

Trends in Food Consumption pattern. Economical, Psychological and Sociological Dimensions of Food Consumption patterns. Trends in Social Change as a Base for New Product Development

Unit II - Introduction to Food Processing and Product Development

13hrs.

Food Components, Types of Food Processing, Status of Food Processing Industry in India and Scope of Growth in Future, Principles and Purpose of New Product Development, Product Design and Specifications.

Unit III – Development of Convenience Foods**13hrs.**

Traditional Foods, Weaning Foods, Convenience Foods, RTE, RTS, Extruded foods, IMF Foods, Speciality Products, Health foods, Nutritional Supplements, Functional Foods, Nutraceuticals and Designer Foods, Sports Foods, Foods for Defence Services, Space foods, flight foods.

Unit IV - Testing, Evaluation and Packaging of Products**12hrs.**

Standardization, Portion size, Portion Control, Quantity Cooking, Shelf Life Evaluation- Sensory and Microbial Testing of Processed Foods, Nutrient Analysis. Suitable Packaging Materials for Different Foods, SWOT Analysis, labelling information and designing, misbranded foods and loss.

Unit V Financial Management and Marketing of Food Products**12hrs.**

Institutional Support (Training and Finance) for Entrepreneurship Development. Financial Institutions (Central and State Government) banks/Funding

Agencies, Financial Accounting Procedures, Book Keeping, Market Research, Marketing Strategies, digital marketing, Cost Calculation , Advertising Methods, Product sales, Product License, Legal specifications, Consumer Behaviour and Food Acceptance, data sciences.

Text Books:

1. Sudhir Gupta (2017) Handbook of Packaging Technology, Engineers India Research Institute, New Delhi
2. Khanaka, S.S., Entrepreneurial Development, S. Chand and Company Ltd, New Delhi, 2016.

Reference Books:

1. Suja, R. Nair (2014) Consumer Behaviour and Marketing Research, 1st Edition, Himalaya Publishers.
2. Hmacfie,(2017) Consumer led Food Product Development, Weedhead Publishing Ltd., UK
3. Fuller, Gordon, W(2015)New Food Product Development, 2nd Edition, CRC Press, Boca Raton, Florida,
4. Schaffner .D,J, Schroder , W.R.(2010)Food Marketing and International Perspectives, Web/McGraw Hill Publication

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD SERVICE MANAGEMENT

Semester V

Course Code: 23FSN302

L-T-P – 3-1-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre requisite: Food service, food production, menu planning, purchase and storage, institutional food service.

Course Objectives:

1. To create a better understanding on the approaches, tools, management and resources of institutional food service.
2. To make better learning on planning and organizing space, personal and hygiene management.
3. To give knowledge in financial management and marketing skills.

Course Outcome:

CO1: Gain experience in principles and functioning of food service system

CO2: Understand about food service management and unit operations.

CO3: Apply knowledge on personnel management, sanitation and hygiene in food service institutions.

CO4: Understand about financial management and marketing skills

CO5: Acquire technical skills to develop quantitative and qualitative styles of food service.

Skills: Develop skills in bulk food production and institutional food service.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	1	-	1	-	-	1	-	-	1	-
CO2	-	2	-	1	-	-	1	-	-	1	-
CO3	-	2	-	1	1	-	-	-	-	1	-
CO4	-	2	-	1	1	-	-	-	-	1	-
CO5	-	2	-	1	1	-	-	-	-	1	-

Syllabus:

UNIT I - Introduction to Food Service system

12hrs.

Food Service

Types of food service systems, Approaches to management, Principles of management, Tools of management, Management of resources.

Kitchen space, storage space, service areas.

Equipment: Types, selection, purchase, design, installation, operation and maintenance

UNIT II - Food Management

12hrs.

Food management- Characteristics of foods, nutritional knowledge, food purchase, inventory management, menu planning, food production, food service, waste management.

Need based specific units- Dietary, catering, institutional food service.

UNIT III - Personal Management and Hygiene

12hrs.

Personnel Management: concepts, staff employment, employee benefits, staff training and development, legal aspects of personal management.

Sanitation and safety- Hygiene, Sanitation and Safety in Food Service Institutions: Definition, importance, environmental hygiene and sanitation; hygiene in food handling; personnel hygiene of personnel; importance of pest and rodent control in food services.

Safety: Accidents in food service establishments, safety procedure, training, Educating, legal responsibilities of food service manager.

Unit IV - Financial management and marketing

12hrs

Definition, application of management Accounts of catering operators, cost concepts, book keeping and accounting – systems of book keeping, book of account maintenance of account books, balance sheets, inventor budgetary control. Marketing the products, challenges ahead

UNIT V - Food Services and its Trends

12hrs.

Styles of food service – Color, Table service, furnishing, packing services, service stations – hospitals, restaurants, hotels, Motels, food courts and catering services. Services - banquet and party setting and services, therapeutic diets, home remedies, traditional cookery, international cushiness, current trends- air catering, food service at old age homes, community kitchens, railway catering, robotic food service, virtual food service.

Reference Books:

1. Mohini Shetty, Institutional food management, New age International Publishers, 2016.
2. West ,BB, Wood “Food service in Institutions” ,Johnwiley & Sons,New York
3. Khan MA “Food service operations”, AVI publishing Company Inc.1987.
4. Sethi and Mahan S.-Catering Management and integrated approach, Johnwiley & Sons,New York .
5. Kotas R and Davis B “food cost control” Billing & Sons Ltd, Great Britian ,1976
6. Dr. B.K. Chakravati, “ A Technical guide to Hotel operation” , Metropolitan, New Delhi India.
7. Earl R. Palan and Judity A. Stadler (1986) Preparing for the food service Industry, AVI - Publishing& co
8. Mickey Warner (1989) Recreational food service Management Van Nostrand Reinhold, Newyork.
9. J.M. Diwan (1997) Catering and food service Management, Common Wealth publishers.
10. Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

PACKAGING AND LABELLING OF FOOD PRODUCTS

Semester V

Course Code: 23FSN303

L-T-P – 2-1-0-3

Hours of Instruction/ week – 3

No. of Credits – 3

Total 45 hrs.

Pre requisite: Packaging methods, packaging materials, Food product labelling

Course Objectives:

1. To relate between packaging design and the chemistry of the food packaged.
2. To give a better understanding on the influence of oxygen in storage materials.
3. To create knowledge on the different types of materials used in food packaging.
4. To give an understanding on the principles of labeling

Course Outcomes:

CO1: Demonstrate knowledge of the material involved in packaging with the chemistry of the food packaged.

CO2: Describe the influence of oxygen in different types of packaging materials.

CO3: Demonstrate the advantages and disadvantages involved with different packaging material.

CO4: Acquire knowledge on the factors and regulations considered while packaging and labelling.

Skills: Develop skills in food packaging based on the chemistry of food and packaging material's used.

CO PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	2	1	-	-	-	1	-	-	2	-
CO2	-	1	1	-	-	-	1	-	-	2	-
CO3	-	1	2	-	-	-	-	-	-	2	-
CO4	-	1	2	-	-	-	-	-	-	2	-
CO5	-	1	2	-	-	-	-	-	-	2	-

Syllabus:

Unit I - Packaging design and chemistry of food products

9 Hrs

Food Packaging- Definition, Principles of packaging, Importance, relationship between Packaging and food, functional requirements for food packaging- preservation and protection, transport and storage, operational, communication, appellative function, persuasive function, informative function, environmental requirements. Integrated food packaging systems- Types, Food packaging and environmental ethics, sustainability in food packaging, packaging design.

Unit II - Oxygen scavenging Packaging

9 Hrs

Active Packaging, oxygen scavengers, moisture control, gas permeability control, ethylene scavengers, odour removers, antimicrobial packaging, carbon dioxide absorbers.

Unit III - Food packaging Materials

9 Hrs

Chemical features of food packaging materials, characteristics, Ceramic packaging materials, metal packaging materials, cellulosic packaging materials, plastic packaging materials, multilayer packaging, testing and analysis.

Unit IV Labeling of Food Products

9 Hrs

Components- Nutritional information, factors to be considered, design and graphics, nutrition facts
Labelling- Purpose, type, regulations, market survey on food labelling

Unit V Regulations

9 Hrs

Laws and regulatory compliances, Understanding Bar codes- Where to Get Barcodes, Creating your own Barcodes, Incorporating Barcodes.

References:

1. Giovanni brunazzi, Salvatore Parisi and Amina Pereno, The importance of packaging design for the chemistry of food products, Springer, 2014.
2. Aaron L. brody, Eugene R. Strupinsky and Lauri R. Kline, Active packaging for food applications, CRC Press LLC, 2001.
3. Luciano piergiovanni and Sara limbo, food packaging materials, springer briefs in molecular science-chemistry of foods, Springer 2016.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD PRODUCT DEVELOPMENT PRACTICAL

Semester V

Course Code: 23FSN381

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30hrs

Pre requisite: Product Development Standardization, Organoleptic Evaluation.

Course Objectives

1. To develop skills in product development
2. To create awareness on the steps involved in costing
3. To create learning on the sales techniques

Course Outcomes:

CO1: Identify and categorize suitable foods for developing products, preparation of a new food product and Standardization of food products for large scale cooking

CO2: Gain knowledge on marketing techniques and launching the developed products

Skills: Develop Skills for new food product development and standardization

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	1	1	3	-	2	2	2	2	2
CO2	3	3	-	-	3	-	2	1	2	2	2

Practical's

1. Product Development and Standardization
2. Sensory evaluation of developed products using hedonic scales.
3. Development of Cereal and Pulse Based Foods
4. Fruit Juices, Squash , Jams and Preserves
5. Pickles, Ketchup, Sauce
6. Development of Weaning Foods
7. Health Foods and Nutritional Supplements
8. Convenience foods, RTS and RTE foods
9. Marketing of a Food Product
10. Selection of a Product, Preparation, Standardization and Quantity Cooking
11. Selection of Packaging Material, Labelling , Cost Calculation and Marketing
12. Presentation of Report
13. Visit to food production and packaging unit of food industry

Text Books:

1. Sudhir Gupta (2007) Handbook of Packaging Technology, Engineers India Research Institute, New Delhi
2. Khanaka, S.S., Entrepreneurial Development, S. Chand and Company Ltd, New Delhi, 2006.

Reference Books:

1. Suja, R. Nair(2014) Consumer Behaviour and Marketing Research, 1st Edition, Himalaya Publishers.
2. Hmacfie,(2007) Consumer led Food Product Development, Weedhead Publishing Ltd., UK
3. Fuller, Gordon, W(2005) New Food Product Development, 2nd Edition, CRC Press, Boca Raton, Florida,
4. Schaffner .D,J, Schroder , W.R.(2010)Food Marketing and International Perspectives, Web/McGraw Hill Publication

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

FOOD SERVICE MANAGEMENT PRACTICAL

Semester V

Course Code: 23FSN382

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30hrs

Prerequisite: Food service, food production, menu planning, purchase, storage, Institutional food service.

Course Objectives:

1. To make an understanding the approaches, tools, management and resources of institutional food service.
2. To learn planning and organizing space.
3. To learn the principles of food, personal and hygiene management.

Course Outcome:

CO1: Gain experience in principles, designing and functioning of food service and hospital service system.

CO2: Apply knowledge on Family meal & functions menu & service planning

CO3: Acquire technical skills in food service management and hospitality management .

Skills: Develop skills in bulk food production and institutional food service.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	1	3	-	2	1	-	2	1
CO2	2	2	-	1	3	-	1	1	-	2	1
CO3	2	2	-	1	3	-	1	1	-	2	1

Practical's

30 hrs.

1. Lay out planning for different food service system.
2. Learn to setup different styles of food service
3. Family meal & functions menu & service planning
4. Lay out plan for hospital dietary service
5. Quality standards and control
6. Process of standardization of recipes
7. Portion control: Management of left-over foods.
8. Creating good ambiance in food service (Interior decoration)
9. Informal and formal service styles (Table Service)
10. Traditional food service systems
11. Roles and Responsibilities of front office and house keeping
12. A visit to food service points and exposure to online food service system

Reference Books:

1. Mohini Shetty, Institutional food management, New age International Publishers, 2016.
2. West ,BB, Wood “Food service in Institutions” ,Johnwiley & Sons,New York
3. Khan MA “Food service operations”, AVI publishing Company Inc.1987.
4. Sethi and Mahan S.-Catering Management and integrated approach, Johnwiley & Sons,New York .
5. Kotas R and Davis B “food cost control” Billing & Sons Ltd, Great Britian ,1976
6. Dr. B.K. Chakravati, “ A Technical guide to Hotel operation” , Metropolitan, New Delhi India.
7. Earl R. Palan and Judity A. Stadler (1986) Preparing for the food service Industry, AVI -Publishing& co
8. Mickey Warner (1989) Recreational food service Management Van Nostrand Reinhold, Newyork.
9. J.M. Diwan (1997) Catering and food service Management, Common Wealth publishers.
10. Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York

Evaluation Pattern

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

SOFT SKILL III

Semester V

Course Code: 21SSK302

L-T-P – 1-0-2-2

Hours of Instruction/ week – 3

No. of Credits – 3

Total 45 hrs.

Pre requisite: Team Spirit, self-confidence and required knowledge, basic English language skills, knowledge of high school level mathematics.

Course Objective:

To help students understand the nuances of leadership, know the importance of working in teams, face challenging situations, crack interviews, improve communication skills and problem-solving skills.

Course Outcomes:

CO1: Soft Skills - At the end of the course, the students would have understood the importance and tactics of working in teams. They would have developed the ability to communicate convincingly and negotiate diplomatically while working in a team to arrive at a win-win situation. They would further develop their interpersonal and leadership skills. They would also have acquired the necessary skills, abilities and knowledge to present themselves confidently.

CO2: Soft Skills - At the end of the course, the students would have the ability to prepare a suitable resume. They would have the ability to analyse every question asked by the interviewer, compose correct responses and respond in the right manner to justify and convince the interviewer of one's right candidature through displaying etiquette, positive attitude and courteous communication. They would be sure-footed in introducing themselves and facing interviews.

CO3: Aptitude - At the end of the course, students will be able to identify, recall and arrive at appropriate strategies to solve questions on geometry. They will be able to investigate, interpret and select suitable methods to solve questions on arithmetic, probability, statistics and combinatorics.

CO4: Verbal - At the end of the course, the students will have the ability to understand and use words, idioms and phrases, interpret the meaning of standard expressions and compose sentences using the same.

CO5: Verbal - At the end of the course, the students will have the ability to decide, conclude, identify and choose the right grammatical construction.

CO6: Verbal - At the end of the course, the students will have the ability to examine, interpret and investigate arguments, use inductive and deductive reasoning to support, defend, prove or disprove them. They will also have the ability to create, generate and relate facts / ideas / opinions and share / express the same convincingly to the audience / recipient using their communication skills in English.

Skills: Communication, teamwork, leadership, facing interviews and problem-solving.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	3	3	3	-	-	-	-
CO2	-	-	-	-	3	3	3	-	-	-	-
CO3	-	-	-	-	3	-	3	-	-	-	-
CO4	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	-	-	-	-

Syllabus:

Unit I – Soft Skills

Team Work: Value of teamwork in organizations, Definition of a team. Why team? Effective team-building. Parameters for a good team, roles, empowerment and need for transparent communication, Factors affecting team effectiveness, Personal characteristics of members and its influence on team.

Leadership, Internal problem solving, Growth and productivity, Evaluation and co-ordination.

Facing an interview: Importance of verbal & aptitude competencies, strong foundation in core competencies, industry orientation / knowledge about the organization, resume writing, being professional. Importance of good communication skills, etiquette to be maintained during an interview, appropriate grooming and mannerism.

Unit II – Aptitude

Geometry: 2D, 3D, Coordinate Geometry, and Heights & Distance.

Permutations & Combinations: Basics, Fundamental Counting Principle, Circular Arrangements, and Derangements.

Probability: Basics, Addition & Multiplication Theorems, Conditional Probability, and Bayes' Theorem.

Statistics: Mean, Median, Mode, Range, and Standard Deviation.

Logical Reasoning: Blood Relations, Direction Test, Syllogisms, Series, Odd man out, Coding & Decoding, Cryptarithmic Problems and Input-Output Reasoning.

Campus recruitment papers: Discussion of previous year question papers of all major recruiters of Amrita Vishwa Vidyapeetham.

Competitive examination papers: **Discussion of previous year question papers of CAT, GRE, GMAT, and other management entrance examinations.**

Miscellaneous: Interview Puzzles, Calculation Techniques and Time Management strategies.

Unit II – Verbal Skills

Vocabulary: Create an awareness of using refined language through idioms and phrasal verbs.

Grammar (Advanced Level): Enable students to improve sentences through a clear understanding of the rules of grammar.

Reasoning Skills: Facilitate the student to tap his reasoning skills through Syllogisms, and critical reasoning arguments.

Reading Comprehension (Advanced): Enlighten students on the different strategies involved in tackling reading comprehension questions.

Public Speaking Skills: Empower students to overcome glossophobia and speak effectively and confidently before an audience.

Writing Skills: Introduce formal written communication and keep the students informed about the etiquettes of email writing.

References:

1. Adair, J., (1.986), "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
2. Gulati. S., (2006) "Corporate Soft Skills", New Delhi, India: Rupa & Co.
3. The Hard Truth about Soft Skills, by Amazone Publication.
4. Verbal Skills Activity Book, CIR, May 2018
5. Nova's GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
6. The BBC and British Council online resources

7. Owl Purdue University online teaching resources
8. www.thegrammarbook.com online teaching resources
9. www.englishpage.com online teaching resources and other useful websites
10. Student Workbook: Quantitative Aptitude & Reasoning, Corporate & Industry Relations, Amrita Vishwa Vidyapeetham.
11. Quantitative Aptitude for All Competitive Examinations, Abhijit Guha.
12. How to Prepare for Quantitative Aptitude for the CAT, Arun Sharma.
13. How to Prepare for Data Interpretation for the CAT, Arun Sharma.
14. How to Prepare for Logical Reasoning for the CAT, Arun Sharma.
15. Quantitative Aptitude for Competitive Examinations, R S Aggarwal.
16. A Modern Approach to Logical Reasoning, R S Aggarwal.
17. A Modern Approach to Verbal & Non-Verbal Reasoning, R S Aggarwal.

Evaluation Pattern:

Assessment	Internal	External
Continuous Assessment (CA) – Soft Skills	40	
Continuous Assessment (CA) – Aptitude	10	20
Continuous Assessment (CA) – Verbal	10	20
Total	60	40

*CA - Can be Presentations, Speaking activities and tests

LIVE-IN-LAB

COURSE CODE:23FSN390

L-T-P-C: 0-0-3-3

Course Objective:

- Proposal writing in order to bring in a detailed project planning, enlist the materials required and propose budget requirement.
- Use the concept of CoDesign to ensure User Participation in the Design Process in order to rightly capture user needs/requirements.
- Building and testing a prototype to ensure that the final design implementation is satisfies the user needs, feasible, affordable, sustainable and efficient.
- Real time project implementation in the village followed by awareness generation and skill training of the users (villagers)

Course Outcome

CO1: Learn co-design methodologies and engage participatorily to finalise a solution

CO2: Understand sustainable social change models and identify change agents in a community.

CO3: Learn Project Management to effectively manage the resources

CO4: Lab scale implementation and validation

CO5. Prototype implementation of the solution

CO-PO Mapping

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO							
CO1	2	3	3		3		3
CO2	2	3	3		3		3
CO3	2	3	3		3		3
CO4	2	3	3		3		3
CO5	2	3	3		3		3

Syllabus

The students shall visit villages or rural sites during the vacations (after 6th semester) and if they identify a worthwhile project, they shall register for a 3-credit Live-in-Lab project, in the fifth semester.

Thematic Areas

- Agriculture & Risk Management
- Education & Gender Equality
- Energy & Environment
- Livelihood & Skill Development
- Water & Sanitation
- Health & Hygiene
- Waste Management & Infrastructure

Evaluation Pattern

Assessment	Marks
Internal (Continuous Evaluation) [63 marks]	
1. Proposed Implementation	2
Presentation Round 1	
2. Proposal Submission + Review	6
3. Co-design	6
i. Village Visit I (Co-Design Field Work Assignments)	4
ii. Presentation of Co- design Assessment	2
4. Prototype Design	14
i. Prototype Design	4
ii. Prototype Submission	8
iii. Sustenance Plan	2
5. Implementation	35
i. Implementation Plan Review	3
ii. Implementation	24
iii. Testing & Evaluation	4
iv. Sustenance Model Implementation	4
External [37 Marks]	
6. Research Paper	18
7. Final Report	15
8. Poster Presentation	4
Total	100

SEMESTER VI
COMMUNITY NUTRITION

Semester VI

Course Code:23FSN311

L-T-P – 3-1-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Course Objectives:

1. Understand various nutritional problems prevailing globally and in India communities
2. Gain insight on various nutritional organizations combating malnutrition
3. Apply the principles of supplementary feeding interventions in community

Course Outcomes:

1. Understand the basic concepts of community nutrition in globalized world
2. Gain knowledge on nutritional problems of the community with its nutritional recommendations
3. Learn skills for assessing nutritional status in the community
4. Acquire skills on strategies to combat nutritional problems

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	1	-	3	1	1	-	-	1
CO2	1	-	1	1	-	-	1	1	-	-	1
CO3	-	-	1	-	-	3	1	1	-	-	1
CO4	-	-	1	1	-	3	1	1	-	-	1

Syllabus:

Unit I –Community Nutrition- An Overview

14 Hrs.

Community nutrition- Definition. Role of nutrition in community development. Methods of improving nutritional quality. Nutritional and infection interrelationship. Present trends and focus on community nutrition.

Unit II –Nutritional Problems of the Community

14 Hrs.

Nutritional Problems- PEM, obesity, vitamin A deficiency diseases, anaemia, iodine deficiency disorders, fluorosis and life style disorders. Malnutrition- Definition, prevalence, causes, consequences. Ecological factors leading to malnutrition. Vicious cycle of malnutrition. Strategies to overcome malnutrition. Nutritional recommendations during nutritional deficiencies, disorders and pandemic. Principles of planning diets during malnourishment. Complementary Nutrition. Role of functional foods in health promotion and disease prevention.

Unit III- Assessment of Nutritional Status

14hrs.

Different methods for assessing nutritional status. Direct methods- Anthropometric assessments, biochemical assessments, clinical observations, dietary assessments. Indirect methods- economic factors, cultural and social factors, ecological variables, vital health statistics and other records.

Unit IV- Strategies to Combat Nutritional Problems

14hrs.

Strategies to mitigate nutritional problems. Food Security and Nutritional security- concept and measurement. Factors affecting food security and nutritional security. Management of food insecurity-Food Fortification and enrichment. Governmental Policies and Programmes - Food Assistance and Food Supplementation Programmes- Public Distribution System (PDS), Food For Work (FFW), Special Nutrition Programme (SNP), School Lunch Programme (SLP), Mid Day Meal Programme (MMP), Balawadi Nutrition Programme (BNP), Integrated Child Development Services (ICDS). Nutrition Education - Importance - Approaches Media and Methods.

Text Books:

1. Boyle M.A.(2021). Community Nutrition in Action. 8th Edition. Cengage Learning, USA.
2. Steyn N. and Temple N.J. (2016). Community Nutrition for Developing Countries. Athabasca University Press, Canada.

Reference Books:

1. Nutrition- Concepts and Controversies, bySizer F.S. and Whitney E, 15th Edition, 2016, Wadsworth Cengage Learning, USA.
2. Understanding Nutrition, by Whitney E. and Rolfe S.R,11th Edition, 2018, Wadsworth Cengage Learning, USA.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

ANALYTICAL INSTRUMENTATION

Semester VI
Course Code:23FSN312
L-T-P – 2-0-0-2

Hours of Instruction/ week – 2
No. of Credits – 2
Total 30 hrs.

Pre requisite: Basic knowledge on instruments used in food analysis

Course Objectives:

1. To create awareness on different analytical techniques used in food analysis
2. To give an understanding on the principles and applications of various analytical instruments used in food analysis.

Course Outcomes:

CO1: Familiarized to various instrumental techniques in food analysis

CO2: Understand the principles and applications of chromatographic methods

CO3: Familiarize with hyphenated techniques in chromatography

CO4: Gain knowledge in spectroscopic methods used in food analysis

CO5: Understand the principles and applications behind thermal analysis

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	1	-	-	3	-
CO2	2	1	-	-	-	-	1	-	-	3	-
CO3	2	1	-	-	-	-	1	-	-	3	-
CO4	2	1	-	-	-	-	1	-	-	3	-
CO5	2	1	-	-	-	-	1	-	-	3	-

Syllabus:

Unit I - Introduction to Food Analysis

5hrs.

Need for food analysis, need for Instrumentation in Food Analysis, Criteria for Selecting a Technique, Instrumental Techniques in Food Analysis, Transition of food analysis.

Unit II Chromatographic Techniques

7hrs.

Gas chromatography, Liquid chromatography, Thin Layer Chromatography, High Performance Thin Layer Chromatography – Principles and applications

Unit III Hyphenated Techniques

6hrs.

Gas Chromatography-Mass Spectrometry (GC-MS), Liquid Chromatography-Mass Spectrometry (LC-MS) -
– Principles and applications- Principles and applications.

Unit IV - Spectroscopic Techniques**6hrs.**

Visible Spectroscopy, Atomic-Absorption Spectroscopy (AAS), Inductively Coupled Plasma – Optical Emission Spectrophotometry (ICP- OES/MS), Nuclear Magnetic Resonance Spectroscopy (NMR), Fourier Transform Infrared Spectroscopy (FT-IR) –Principles and applications.

Unit V Thermal Methods of Analysis**6hrs.**

Thermogravimetry, Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC) – principles and applications

Text books:

1. Manual in Instrumentation in Food Analysis, IGNOU University

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD PRODUCT EVALUATION

Semester VI

Course Code:23FSN313

L-T-P – 1-1-0-2

Hours of Instruction/ week – 2

No. of Credits – 2

Total 30 hrs.

Pre

requisite: Basic knowledge on food product evaluation

Course Objectives:

1. To give a better knowledge about different techniques for food product development and evaluation
2. To create insights on various methods of evaluating the quality and safety of foods.

Course Outcomes:

CO1: Gain knowledge on the importance of evaluation of food quality

CO2: Interpret the evaluation techniques and tests used in analyzing food quality

CO3: Identify the sensory characteristics of different foods

CO4: Understand the physical, chemical and microscopic methods used in the evaluation of food quality

CO5: Ascertain the role of microorganisms in food quality

Skills: Develop skills in food product development and evaluation

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	3	-	1	-	-	1	1	-	3	1
CO2	1	3	-	1	-	-	1	1	-	3	1
CO4	1	3	-	1	-	-	1	1	-	3	1
CO5	1	3	-	1	-	-	1	1	-	3	1

Syllabus:

Unit I - Introduction to Food Evaluation Quality

5hrs.

Definition, Objectives and Need for Evaluation of Food Quality

Factors Affecting the Evaluation of Food Quality – Psychological and Physiological

Unit II Methods of Evaluation of Food Quality – Subjective Methods

8hrs.

Sensory Characteristics of Food - Appearance, Colour, Flavour, Taste, Texture and Consistency, Conducting Sensory Tests – Training Panel Members, Testing Laboratory – Preparation of Samples, Techniques of Smelling and Tasting, Testing time, Design of Experiment, Reasons for Testing Food Quality

Tasting procedures- Chewing, nibbling, slurping, mouth rinsing

Organoleptic Evaluation- Flavour, Colour, Clarity, Viscosity, texture, smelling procedures

Unit III Sensory Tests used for Food Evaluation

6hrs.

Types of Tests, Difference Tests, Rating Tests, Sensitivity Tests, Descriptive Tests, Interpretation of scores, Application of softwares in interpreting scores

Threshold tests- Absolute, Recognition, Differential, Terminal

Discrimination tests- paired comparison, duo trio difference, triangular difference, single sample test, two alternative forced choice test

Descriptive tests- Simple descriptive, Descriptive with rating, Flavour profile, Dilution profile technique

Unit IV - Methods of Evaluation of Food Quality – Objective Methods

6hrs.

Basic Guidelines, Advantages and Disadvantages, Tests Used, Chemical, Physico-chemical, Microscopic, Physical Method- grading, Instruments used for Evaluation.

Unit V Evaluation of Microbial Quality of Foods

5hrs.

Methods, Assays used to assess the Microbial Loads of different foods, Permitted levels of Microbial Load in different foods, Microbes responsible for Food Quality, Microbiological evaluation standards.

Text books:

1. Srilakshmi, B. Second Edition, Food Science, New Age International (P) Limited Publishers, New Delhi. 2016
2. Harry T. Lawless, Hildegarde, Sensory Evaluation of Food Principles and Practices, Second Edition, Springer Science, 2010.
3. Joshi, V.K Sensory Science: Principles and Applications in Food Evaluation, 2016.

Reference books:

1. Huttenwigs, B.J. Food Color and Appearance, Published by Blackie Academic and Professional, London, 2010.
2. Howard R. Beckley, Jacqueline, H. Sensory and Consumer Research in Food Product Design and Development, 2016
3. Bi, Jian, Sensory Discrimination Tests and Measurements: Statistical Principles, Procedures and Tables, 2016.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

RESEARCH METHODOLOGY AND BIO STATISTICS

Semester VII

Hours of Instruction/ week – 4

Course Code: 23FSN314

No. of Credits – 4

L-T-P – 2-2-0-4

Total 60 hrs.

Course Objectives :

1. Understand different types of research, merits and demerits of each research types
2. Analyse the competence for selecting methods and tools appropriate for carrying out experimental research
3. Develop a research proposal and evaluate statistical methods to assess the outcome of the research

Course Outcomes:

CO1: Understand the purpose, types, designs and hypothesis of research

CO2: Analyse systematic methods for data collection, data processing and data analysis

CO3: Design a research proposal in the appropriate scientific style

CO4: Develop skills for scientific research writing based on critical interpretation.

CO5: Interpret the results of statistical analysis of data and summarize data using tabulation and graphs.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	1	-	-	-	1	-	-	-	-	-
CO2	-	1	-	-	-	1	-	-	-	-	-
CO3	-	-	-	-	-	1	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-

Syllabus:

Unit I - Research Types, Designs and Hypothesis

12 Hrs

Research – Types, objectives, approaches and significance. Research process, Criteria of good research, Research design- Types, characteristics and significance. Basic principles of experimental designs. Nutrition Intervention studies – pilot study, randomized controlled trial , nutritional biomarkers. Research hypothesis- Null Hypothesis and Alternative Hypothesis, Type I and Type II Errors. Testing of hypothesis. Characteristics of good hypothesis.

Unit II- Methods of Data Collection and Sampling designs

12 Hrs

Methods of data collection- Primary and secondary data, Selection of appropriate method for data collection. Sampling designs - Probability sampling and Non-probability sampling. Sampling and Non-sampling Errors.

Measurement and Scaling techniques- Quantitative and Qualitative Data, Goodness of Measurement Scales.

Unit III- Bio Statistics and Descriptive Methods

12 Hrs

Bio Statistics- Concept and its scope in public health research. Descriptive methods, Measures of central tendency - Arithmetic mean, median and mode. Measures of dispersion- Range, Mean Deviation and Standard Deviation. Measures of Skewness and Kurtosis. Measures of Relationship- Covariance, Karl Pearson's Coefficient of Correlation and Rank Correlation.

Unit IV- Processing and Analysis of Data

12 Hrs

Processing Operations. Problems in Processing data. Analysis of data- Elements of data analysis, statistical measures in Research- Student's t- test, Analysis of variance- One way ANOVA and two way ANOVA. Duncan's test. Multivariate analysis of variance (MANOVA), Chi-square test and Regression Analysis. Biostatistics with statistical software- MS-Excel, SPSS, Graph pad prism software and other statistical calculators available in web.

Unit V- Interpretation and Scientific Research Writing

12 Hrs

Interpretation- Techniques and Precautions. Preparation of a Research Proposal. Report Writing- steps, types and significance. Mechanics and Precautions for Writing a Research Report. Presentation of research report- Tabulation and organization of data, Graphical presentation of data.

Text Books:

1. Kothari C.R. (2019), Research Methodology: Methods and Techniques 4th Edition, New Age International Publishers, New Delhi.
2. Pounis G. (2018), Analysis in Nutrition Research: Principles of Statistical Methodology and Interpretation of the Results, Academic Press Publishers, USA.

Reference Books:

1. Trochim W., Donnelly J.P. and Arora K., (2015), Research Methods: The Essential Knowledge Base, Cengage Learning. USA.
2. Blaxter L, Hughes C and Tight M (2010), How to Research – 4th edition. McGraw Hill UK.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Seminar, Projects and Reports.

FOOD ANALYSIS PRACTICAL

Semester IV

Course Code:23FSN383

L-T-P – 0-0-2-1

Hours of Instruction/ week – 2

No. of Credits – 1

Total 30 hrs.

Course Objectives:

1. To create learning on the qualitative and quantitative analytical tests in foods.
2. To give a better understanding on the principles of reaction in the identification of nutritional constituents of foods.

Course Outcomes:

CO1: Acquire knowledge on different analytical techniques associated with food samples

CO2: Gain hands on experience in qualitative and quantitative estimations of proximate constituents.

Skills: Acquire skills to quantify proximate nutrients in foods

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	-	-	3	-	1	2	-	3	-
CO2	2	-	-	-	3	-	1	2	-	3	-
CO3	2	-	-	-	3	-	1	2	-	3	-

Practical's:

30hrs.

1. Determination of Moisture content of different food samples
2. Qualitative analysis of Carbohydrates, Proteins, Fats and Oils in given food samples
3. Estimation of Total Sugars using Anthrone Method
4. Estimation of Proteins using Biuret method
5. Determination of Crude Fat using soxhlet extraction method
6. Estimation of Minerals- Calcium, Phosphorus and Iron in the food samples using Spectrophotometric Methods
7. Estimation of Vitamins- Vitamin A and Vitamin C and in the food samples using Spectrophotometric and Dichloroindophenol Titrimetric Methods

Text Books:

1. Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, William Itinmaon Medical Books, London, 2010.
2. Oser, B.L., Harke's Physiological Chemistry XIV Edition Tata McGraw Hill Publishing Company Ltd., Bombay, 2011.

Reference Books:

1. Sadasivam, S. and Manickam, A. Biochemical Method, Second Edition, New Age International P. Ltd., Publishers, New Delhi, 2013.
2. Raghuramulu, N., Madhavannair, K. and Kalyana Sundaram, National Institute of Nutrition, 2013, A Manual of Laboratory Techniques, Hyderabad, 500007

Evaluation Pattern

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

**SEMESTER VII
PUBLIC HEALTH NUTRITION**

Semester VII
Course Code:23FSN401
L-T-P-C 2-2-0-4

Hours of Instruction/ week – 4
No. of Credits – 4
Total 60 hrs.

Course Objectives:

1. Gain insight into the public health problems and their implications
2. Acquire skills in organizing and evaluating nutrition projects in the community
3. Appreciate the national and international contribution towards national development

Course Outcomes:

CO1: Understand the basic concepts of public health nutrition

CO2: Gain knowledge in assessing and evaluating nutritional epidemiological studies

CO3: Design strategies and approaches for managing public health problems

CO4: Gain insight into national and international organizations to combat malnutrition

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	1	-	-	-	1	-	1	-	-	-
CO2	-	1	-	-	-	1	-	2	-	-	-
CO3	-	2	-	-	-	1	-	-	-	-	1
CO4	-	1	-	-	-	-	2	-	-	-	1

Syllabus:

Unit I- Public Health Nutrition- An Overview

14Hrs

Public health nutrition -Concept and importance. Concept of health and disease. Dimensions, determinants and indicators of health. Public health and nutritional issues- Global and Indian perspectives. Health care system in India. Role of public nutritionist in health care delivery.

Unit II- Nutritional Epidemiology

14Hrs

Epidemiology –Concept, approaches, types and significance. Principles of Nutritional Epidemiology. Measurement issues. Epidemiology of communicable and non-communicable diseases. Design and planning of nutritional epidemiological studies- Assessing and evaluating epidemiological studies.

Unit III- Public Health Nutrition - Strategies and Approaches

16Hrs

Global and national public health nutrition approaches. Theories of behaviour change and their application to public health nutrition. Developing public health nutrition strategies in the community. Evaluation of public health interventions and policies. Formative research approaches to develop malnutrition interventions. Nutrition education- principle, methods and significance in maintaining public health nutrition.

Unit-IV: National and International Organizations to Combat Malnutrition

16Hrs

National organizations- ICMR-NIN, ICAR, ICAR, CHEB, CSWB, SSWB, NNMB, CFTRI, DFRL, NFI and NIPCCD. International organizations- FAO, WHO, UNICEF, WFP, CARE, GAIN, AFPRO, CWS, CRS, and World Bank. Economics of Nutrition. Malnutrition and its economic consequences. Food security. Food production and food pricing.

Text Books:

1. Park K. (2021). Textbook Of Preventive And Social Medicine, 26th Edition. Banarsidas Bhanot Publisher, Madhya Pradesh, India.
2. Welch A.A., Kearney J.M., Buttriss J.L. and Lanham S.A. (2017). Public Health Nutrition, 2nd Edition. Wiley, U.K.

Reference Books:

1. Stein N. (2014). Public Health Nutrition- Principles and Practice in Community and Global Health. Jones and Bartlett Learning, LLC Publishers, U.S.A.
2. Gibney M.J., Margetts B.M., Kearney J.M., Arab L. (2015). Public Health Nutrition. John Wiley and Sons, New York.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Seminar, Projects and Reports.

NUTRACEUTICALS AND FUNCTIONAL FOODS

Semester VII

Course Code:23FSN402

L-T-P – 3-1-0-4

Hours of Instruction/ week – 4

No. of Credits – 4

Total 60 hrs.

Pre- requisite: Nutraceuticals, bioactive components, dietary supplements, genetically modified foods

Course Objectives:

1. To develop comprehensive understanding of different nutraceuticals and Functional foods, and understand the phytochemical components its potentials and management on health and diseases.
2. Understanding the molecular level interaction between nutrients and other dietary bioactive with human genome and be acquainted with the applications of nutrigenomics in wellness and disease management.

Course Outcomes:

CO1: Understand the basic concepts of nutraceuticals and functional foods.

CO2: Acquire knowledge on the bioactive carbohydrates, peptides and lipids

CO3: Gain knowledge on the prebiotics, probiotics, synbiotics and postbiotics

CO4: Comprehend the significance of nutraceuticals on human health.

CO5: Apply good manufacturing practices and safety issues in functional food industries

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	2	2	2	-	-
CO2	2	2	-	-	-	-	2	2	2	-	-
CO3	2	2	-	-	-	-	2	2	2	-	-
CO4	2	2	-	-	-	-	2	2	2	-	-

Syllabus:

Unit I - Nutraceuticals and Functional Foods

12hrs

Nutraceuticals- definition and classification. Functional foods: Types- Cereal and cereal products; Milk and milk products; Meat, poultry and sea foods; nuts and oilseeds, Functional fruits and vegetables; Herbs and spices; Beverages. Designer foods. Market demand for nutraceuticals and functional foods. Role of Nutraceuticals in Maternal Nutrition, Medical Foods and Infant Formulas.

Unit II- Bioactive carbohydrates, peptides, lipids

12hrs

Sources and biological activities of bioactive carbohydrates, peptides, lipids. Bioactive carbohydrates from plants, animal products, microorganisms. Biological roles of bioactive carbohydrates- antioxidant, immunomodulatory, antitumor, anti-diabetic, antimicrobial. Sources of bioactive peptides- from meat, dairy, collagen, egg, plant, marine and fungi. Fats and Oils as sources of bioactive molecules.

Unit III- Prebiotics, Probiotics, Synbiotics and Postbiotics

12hrs

Prebiotics, probiotics, synbiotics and postbiotics- concept, functions, mechanism of action. Clinical applications of prebiotics, probiotics and synbiotics: gastrointestinal system, respiratory system, cardiovascular system, urinary system, reproductive system, immune system.

Unit IV - Role of Nutraceuticals in Health and Disease

12hrs

Concept of dietary supplements, FOSHU foods – concepts, regulatory aspects Food component – approved health claims, labeling considerations for functional ingredients, Permissible and impermissible functional claims, Role of biotechnology in the development of functional foods.

Unit V -Good Manufacturing Practices and Safety Issues in Functional Food Industries

12hrs

HACCP in functional food industries. Product specifications and conformance. Equipment's and maintenance. Safety assessment: nutritional and toxicological. Market of functional foods- Challenges for Functional food delivery, Customer and manufacturer issues- product information and customer awareness. Factors affecting consumer interest.

Text Books:

1. Handbook of Nutraceuticals and Functional Foods, Robert E.C. Wildman, Richard S. Bruno, Taylor and Francis, *CRC Publications*, 2020
2. Mahtab, S, Bamji, Kamala Krishnasamy, G.N.V. Brahman, Text Book of Human Nutrition, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi, 2015.
3. Srilakshmi, B. Second Edition, Food Science, New Age International (P) Limited Publishers, New Delhi, 2017
4. Simopoulos, A.P. and Ordovas, K.J.M., 2004, Nutrigenetics and Nutrigenomics, Vol. 93, Karger, Switzerland.

Reference Books:

1. Aluko, Rotimi, Functional Foods and Nutraceuticals, Springer-Verlag New York Inc., 2012
2. Satinder Kaur Brar, Surinder Kaur and Gurpreet Singh Dhillon, Nutraceuticals Functional Foods, 2014.
3. Functional Foods and Nutraceuticals,
https://www.researchgate.net/publication/343982518_PREFACE_Functional_Foods_and_Nutraceuticals

4. Watson, David, H., 2013, Performance Functional Foods, CRC Press, Wood Head Publishing Ltd., England
5. Tamine, A., 2015, Probiotic Dairy Products, Blackwell Publishing Ltd., UK
6. Narasinga Rao, B.S., 2015, Nutrition Research in India – A Country Report, Published by INSA, New Delhi.
7. Webb, G.P., 2016, Dietary Supplementations and Functional Foods, Blackwell Publishing Ltd., New York.
8. Tai, E.S. and Gillies, P.J., 2007, Nutrigenomics – Opportunities in Asia, Karger, Singapore. 2013.

Evaluation Pattern:

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD AND NUTRITION RESEARCH TECHNIQUES

Semester VII

Hours of Instruction/ week – 4

Course Code: 23FSN403

No. of Credits – 4

L-T-P – 3-1-0-4

Total 60 hrs.

Course Objectives:

1. Acquire knowledge on trends in food and nutritional research
2. Understand research in novel food product development and its significance in health promotion and disease prevention
3. Gain scientific knowledge on growth, metabolic and nitrogen balance studies in animals and human trials

Course Outcomes:

CO1: Understand the basic concepts of food and nutritional research and ethical issues

CO2: Analyse different innovative Food products and its significance in human health

CO3: Acquire knowledge on significance of animals models in nutritional research and growth studies in animal models

CO4: Design growth, metabolic and nitrogen balance research using human models.

CO5: Apply tools and techniques in manuscript writing and publication ethics

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	3	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	1
CO3	-	-	-	1	-	-	-	-	-	-	2
CO4	-	-	-	3	-	-	-	-	-	-	2

Syllabus:

Unit I - Food and Nutritional Research and Ethical Issues

12Hrs

Trends in food and nutrition research- Global and Indian perspective, Thrust areas in food and nutritional research. Food and Nutritional research- In vitro and in vivo studies. Nutrition intervention studies- principles, merits and demerits. Ethical issues in nutritional research- Rights of the research participant, Physical and psychological risks, Ethical issues regarding copyright. Human and animal ethical committees.

Unit II- Research in Novel Food Product Development

12Hrs

Food products- the basis of innovation- 3D food printing, cultured meats, food nano materials, nano tooled bug boosters. Measures of food products success and failure. Product development process- the basis for success.

Prototype. Developing an innovative strategy. Managing and improving product development process. Case studies- product development in food systems. Patent in food sectors. Significance of research in food products development in health promotion and disease prevention.

Unit III- Growth Studies in Animal Models

12Hrs

Animal models in nutrition research, Need for extrapolation research in animal models. Maintenance of animal laboratory, maintenance of records. Growth and development of rats- role of different protein levels in diet formulation, feeding techniques, Biological assays with animal models- metabolic and nitrogen balance studies.

Unit IV- Biological Assays in Human Trials

12Hrs

Research studies among humans-Principles and objectives. Growth studies among infants, children and adolescents-Effect of supplementation of different protein sources in managing nutritional status. Metabolic and nitrogen balance studies among children, adolescents and adults and interpretation of results. Nutritional research in vulnerable sector of society and innovation in dietary supplement delivery.

Unit V Manuscript Writing and Publication Ethics

12Hrs

Manuscript writing-tools and techniques. Manuscript preparation- steps. Guidelines for preparing for publication- Scientific papers writing. Indexed journals-types and its significance. Publication ethics. Perspectives of plagiarism- techniques to avoid plagiarism. Internet plagiarism and Plagiarism detection software- Turnitin, Copyleaks, Plagiarism Checker, Dupli Checker, PlagScan, Pro Writing Aid and White Smoke.

Text Books:

1. Bamiji M.S., Rao P.R. and Reddy V. (2017), Text Book of Human Nutrition Oxford and IBFI Publishing Co. Pvt. Ltd., New Delhi.
2. Gopaldas T. and Seshadri S.(2015), Nutrition, Monitoring and assessment, Oxford University Press, New Delhi .

Reference Books:

1. Whitney E.N, and Rolfes S.R. (2015). Understanding Nutrition, 11th Edition, Chap. 6 and Appendix `J'. Measures of Protein Quality – West Wadsworth.
2. Pyke R.L. and Brown. M.L. (2019). Nutrition an Integrated approach, Chapter 15, Wiley eastern Publications, New York.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Seminar, Projects and Reports.

TECHNIQUES OF EXPERIMENTAL NUTRITION

Semester VII

Hours of Instruction/ week – 3

Course Code: 23FSN481

No. of Credits – 2

L-T-P – 0-0-3-2

Total 30 hrs.

Course Objectives:

1. Understand the chemical composition of different foods using colorimetric and spectrophotometric and chromatography techniques
2. Impart knowledge on qualitative and quantitative estimation of nutrients, antioxidants and phytochemicals in different food samples

Course Outcomes:

CO1: Acquire knowledge on different analytical techniques associated with food samples

CO2: Gain hands on experience in qualitative and quantitative estimations of proximate constituents, antioxidants and phytochemicals in different food samples.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	2	-
CO2	-	-	-	-	-	-	-	-	-	2	-

Practicals:

1. Instrumentation techniques – Brookfield Viscometer, Abbe's Refractometer, pH meter, Colorimeter, Spectrophotometer and chromatography-principle and working.
2. Determination of Moisture content using hot air oven drying technique
3. Qualitative analysis of Carbohydrates, Proteins, Fats and Oils in given food samples
4. Estimation of Total Sugars using Anthrone Method
5. Determination of reducing sugars using Dinitrosalicylic acid (DNSA) Method
6. Estimation of Dietary Fiber using AOAC Method
7. Estimation of Proteins using Biuret / Lowry method
8. Determination of Amino acids by Sorensen's Formal Titration
9. Determination of Crude Fat using soxhlet extraction method

10. Determination of Total ash content using dry ashing and wet ashing methods
11. Estimation of Minerals- Calcium, Phosphorus and Iron in the food samples using Spectrophotometric Methods
12. Estimation of Vitamins- Vitamin A and Vitamin C and in the food samples using Spectrophotometric and Dichloroindophenol Titrimetric Methods
13. Determination of Phytochemicals - Phytates, Oxalates and Tannins using AOAC Methods
14. Estimation of total antioxidants using FRAP (ferric reducing-antioxidant power) assay- Spectrophotometric Technique.

Text Books:

1. Nielsen S.S. (2015), Introduction to the chemical analysis of foods, CBS Publishers and Distributers, Pvt. Ltd, New York.
2. Ranganna S. (2019). Handbook of analysis and quality control for fruits and vegetables, 2nd Edition. Tata McGraw Hill, USA.

Reference Books:

1. Suzanne Nielsen S.S. (2017). Food Analysis Laboratory Manual. Springer, USA.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

SEMESTER VIII

NUTRITION IN HEALTH AND FITNESS

Semester VIII

Hours of Instruction/ week – 3

Course Code: 23FSN411

No. of Credits – 3

L-T-P – 3-1-0-4

Total 45 hrs.

Course Objectives:

1. Understand the basic concepts of health, physical activity and physical fitness
2. Comprehend energy metabolism in physical activity and weight management
3. Gain knowledge on significance of nutrition in health and fitness

Course Outcomes:

CO1: Understand the components, evaluation and health benefits of physical fitness

CO2: Gain scientific knowledge on energy metabolism during physical activity

CO3: Acquire knowledge on Nutritional recommendations during exercises and ergogenic aids

CO4: Analyse biological effect of physical fitness on health status and managing diseases.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	1	-	-	-	-	2	-	2	-	-
CO2	-	1	-	-	-	-	1	-	1	-	-
CO3	1	1	-	-	-	-	2	-	3	-	-
CO4	1	2	-	-	-	-	3	-	3	-	1

Syllabus:

Unit I- Health, Physical Activity and Physical Fitness

11Hrs

Health- definition and dimensions. Spectrum of health. Physical activity- Concept, types, health benefits and recommendations. Exercise- concept and types, Physical Fitness- Components, principles and evaluation of physical fitness, FITT Principles. Energy Systems and fuels to support physical activity.

Unit II- Energy Metabolism in Physical Activity and Weight Management

11Hrs

Energy homeostasis in the cell. Integration of carbohydrate, protein and fat metabolism. Muscle ATP production during exercise- Aerobic and Anaerobic metabolic pathways. Energy requirements based on physical activity.

Components and assessment of energy expenditure. The Fed-Fast cycle. Regulation of energy balance and body weight. Health implications of altering body weight. Interrelation between Physical activity and weight management.

Unit III- Nutritional Recommendation and Physical Fitness

11Hrs

Nutritional requirements during exercises- Carbohydrate, protein, fat, vitamins and minerals recommendations. Fluids and electrolytes to support physical activity. Diets for physically active people. Ergogenic aids- nutritive and non-nutritive aids, merits and demerits of ergogenic aids.

Unit-IV: Physical Activity and Disease Prevention

12 Hrs

Physiological and biological effect of physical fitness on health status and vital systems. Role of physical activity and exercise on prevention and management of cardiovascular diseases, obesity, cancer, diabetes, healthy aging, musculoskeletal health, cognitive health and degenerative diseases.

Text Books:

1. A Jackson A.W., Morrow J.R., Dishman R.K., Hill D. (2015). Physical Activity for Health and Fitness. Human Kinetics, USA.
2. Gropper S.S., Jack L. Smith J.L., Carr T.P. (2018). Advanced Nutrition and Human Metabolism 7th Edition. Cengage Learning, USA.

Reference Books:

1. Whitney E.N, and Rolfes S.R. (2015). Understanding Nutrition, 11th Edition, Chap. 6 and Appendix `J'. Measures of Protein Quality – West Wadsworth.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Seminar, Projects and Reports.

PROFESSIONAL ELECTIVES

ELECTIVES A

Food Hygiene and Sanitation

Course Code:23FSN231
L-T-P – 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre requisite: Food safety, Hygiene, WASH, FNHW

Course Objectives:

To expertise the food hygienic, sanitary and clening practices and to familiarize the physical nd chemical pest and insect control measures.

Course Outcome:

- CO1: Comprehends the knowledge of food hygiene and sanitation.
- CO2: Expertise the insect and pest control methods
- CO3: Understand the sanitary aspects of water.
- CO4: Knowledge on cleaning and sanitary practices in food industry.

Skills: Develop skills in maintaining sanitary practices in food industry

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	1	-	-	-	-	2	-	-	1	3
CO2	-	-	-	-	-	-	-	-	-	2	1
CO3	-	1	-	-	-	-	2	-	-	1	2
CO4	-	-	-	-	-	-	-	-	-	3	1

Syllabus:

Unit I - Food hygiene

9hrs.

General principle of food hygiene. Hygiene in rural and urban areas in relation to food preparation, personal hygiene and food handling habits. Place of sanitation in food plants. Sanitary aspects of building and equipment: Plant layout and design, Comparative studies on sanitary fabrication of different types of processing equipment's.

Unit II - Safe and effective insect and pest control

9hrs.

Extraneous materials in foods, Principles of Insects and pest's control. Physical and chemical methods of control. Effective control of micro-organisms: microorganisms important in food sanitation, micro-organisms as indicator of sanitary quality.

Unit III - Sanitary aspects of water supply

9hrs.

Source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water, preventing contamination of potable water supply.

Unit IV - Cleaning practices

9hrs.

Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices.

Unit V - Sanitation practices

9hrs.

Sanitary aspects of waste disposal. Establishing and maintaining sanitary practices in food industry, sanitation principle and the requirements for a food sanitation program, role of sanitation, general sanitary consideration and sanitary evaluation of food plants.

References:

1. Guide to Improve Food Hygiene - Gaston and Tiffney
2. Practical Food Microbiology & Technology - Harry H. Weiser, Mounthey, J. and Gord, W.W.
3. Food Poisoning and Food Hygiene - Betty C. Hobbs
4. Principles of Food Sanitation - Marriott and Norman, G.
5. Hygiene and Sanitation in Food Industry - S. Roday

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

ADOLESCENCE HEALTH AND LIFESTYLE

Course Code:23FSN232
L-T-P – 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs

Pre-requisite: Health, Lifestyle changes, adolescence needs.

Course Objectives:

This course will provide better understanding of significance in adolescent's health and nutrition and relationship between lifestyle practices and health outcomes.

Course Outcome:

CO1: Expertise stages of adolescence, significance of maintenance of health and nutrition.

CO2: Gained information on the impact of long-term good lifestyle practices on health.

CO3: Knowledge on promotion of good eating habits, physical activity, resting pattern, personal habits and hygiene.

CO4: Gain knowledge on role of lifestyle practices on mental health.

Skills: Develop skills to overcome lifestyle changes during adolescence

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	-	2	-	1	-	1
CO2	2	2	-	-	-	-	2	-	1	-	1
CO3	1	1	-	-	-	-	1	-	2	-	1
CO4	-	-	-	-	-	-	1	-	1	-	-

Syllabus:

Unit 1 – Introduction to Adolescent Health and Lifestyle

9hrs.

Significance of Adolescent Health- stages of adolescence, physical, social, emotional, spiritual and intellectual well-being, sedentary lifestyle, reproductive health and factors influencing, integration of knowledge and skills to develop a healthy lifestyle plans, parent's adolescence communication

Unit II – Promotion of Good Eating Habits

9hrs.

Food choices- Skipping Breakfast- Factors, impact on health, Measures to overcome
Junk Food Consumption - Factors, impact on health, Measures to overcome
Eating White Products- Factors, impact on health, Measures to overcome
Water and Fluid intake- Significance on health

Unit III – Resting pattern and physical activity

9hrs.

Postures – Ergonomics, Good and Bad postures, Advantage and Disadvantages

Degenerative Disc Disease – Causes, types, Consequences to human health

Sleeping Pattern – Types, advantages and disadvantages, circadian rhythm, nocturnal habits, consequences to human health,

Physical activity, obesity and weight management- Types and significance, weight management,

Unit IV – Supporting Mental Health

9hrs.

Stress- Causes, types, signs and symptoms, coping with emotions and stress, impact of Stress on adolescent health

Depression and Suicidal tendency- Causes and impact of Depression on adolescent health

Peer pressure- Causes, types and impact of peer pressure and ways to overcome on adolescent health

Procrastination- Causes, types and impact of peer pressure and ways to overcome on adolescent health

Violence – Types, causes and effects, rehabilitation measures

Unit V – Personal habits and hygiene

9hrs.

Personal Habits:

Alcohol addiction, Smoking, Substance Abuse, Electronic addiction - Factors, symptoms, types health impact, measures to overcome

Personal hygiene:

General hygiene, menstrual hygiene, dental hygiene

Text Books:

1. An Introduction to Lifestyle Management: Facilitator's Handbook, Dr.Anja Morris-Paxton, 2019
2. Food Science- Srilakshmi, Prosper Montague Publishing Group Ltd., Hamlyn, London. 2015.
3. Internet Addiction: The Ultimate Guide for How to Overcome An Internet Addiction For Life (Gaming Addiction, Video Game, TV, RPG, Role-Playing, Treatment, Computer) Paperback Caesar Lincoln, 2014.
4. Food & Nutrition- Swaminathan (1995), The Bangalore Printing & publishing co ltd., Vol I, Second Edition, Bangalore
5. The New Rules of Posture: How to Sit, Stand, and Move in the Modern World, Mary Bond, 2006
6. Stress Management: A Wellness Approach First Edition by Nanette E. Tummers, ISBN-13: 978-1450431668

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

NUTRITION FOR ATHLETES

Course Code:23FSN233
L-T-P – 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre-requisite: Health and fitness knowledge, practice.

Course Objectives:

1. Understand the dietary recommendations for athletes
2. Acquire knowledge on dietary supplements & ergogenic aids for athletes
3. Gain scientific knowledge on medical nutrition therapy for nutritional disorders among athletes

Course Outcomes:

CO1: Understand the Nutritional Requirement for Athletes

CO2: Gain knowledge on the Nutrition for Special groups and Sports injuries

CO3: Acquire knowledge on significance dietary supplements & ergogenic aids for athletes

CO4: Gain scientific knowledge athletes with nutrition related disorders

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO3	PSO 4
CO1	1	-	-	-	-	-	-	1	1	-	1
CO2	1	-	-	-	-	-	-	1	-	-	-
CO3	1	2	-	-	-	-	-	1	1	-	2
CO4	1	-	-	-	-	-	-	1	2	-	1

Syllabus:

Unit I- Athletes and their Nutritional Requirement

11 Hrs

Athletics- Definition, classification. National and international organizations. Athletics vs nutrition.

Children and adolescent athletes- Growth and development, Nutritional issues commonly faced; Eating habits and addiction; Nutritional requirements for growth and training.

Female athletes- Vulnerability to nutrition assault and insufficiency; Differences in fuel or nutrient utilisation among female athletes; Female athletic triad (FAT) including eating disorder, menstrual irregularity and poor bone mineral density; Dietary guidelines and suggestions for FAT.

Male Athletes -Dietary recommendations for male athletes.

Vegetarian athletes- Classification; Nutritional status and dietary considerations; Nutritional gaps currently identified and suitable dietary modification for fueling during training, competitions and traveling.

Unit II- Nutrition for Special groups and Sports injuries

11Hrs

The Paralympic Athlete- Athletes with physical or intellectual impairments. Eating difficulties and behaviours observed in some athletes with impairments. Paralympic athletes and nutritional demands- Dietary intakes and potential issues. Sport

injury and rehabilitation- Type of injury and rehabilitation required, Physiological and metabolic changes during injury and rehabilitation. Eating habits commonly followed during an injury. Overweight among injured athletes. Role of nutrition and dietary guidelines in recovery from an injury.

Unit III- Dietary supplements & Ergogenic Aids for Athletes

11Hrs

Dietary supplement for athletes. Significance of nutritional supplements complementing nutrient-dense diets. Macronutrient Supplements. Protein supplements- Whey, casein, egg albumen, soy protein, pea protein & other vegan proteins, protein bars, protein shakes, amino acid supplements. Carbohydrate Supplements- Carbo loading, Sports Drinks, Bars and Gels. Fat supplements- Omega fatty acids and fish oils. Vitamin, minerals and antioxidants supplements.

Ergogenic aids for Athletes- Definition and Classifications. Metabolite and Botanical Ergogenic Supplements- Wheat germ oil, beetroot, green tea extract, phytosterols, bio flavonoids, herbal testosterone-booster, beta-alanine.

Unit IV- Athletes with Nutrition related disorders

12Hrs

Nutritional disorders among athletes- Diabetes, Cardiovascular disease- Problems of athletes with type 1 diabetes and cardiovascular diseases. Physical activity prescription for athletes with type 1 diabetes and cardiovascular disease. Acute effects of exercise in athletes with Type 1 diabetes and cardiovascular disease; Medical nutrition therapy for athletes with type-1 diabetes and cardiovascular disease. Athletes with gastrointestinal disorders, osteoporosis, anaemia, food related adverse reactions (FRAR). Medical nutrition therapy during nutritional disorders.

Text Books:

1. McArdle W. D. (2018). Sports and Exercise Nutrition, 5th Edition, Lippincott Williams and Wilkins, North America.
2. Burke L. (Author), Deakin V. (2015). Clinical Sports Nutrition. McGraw Hill, Australia.

Reference Books:

1. McGinnis P.M. (2020). Biomechanics of Sport and Exercise. 4th Edition Human Kinetics, USA.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

ELECTIVES B
HOME SCALE PRESERVATION OF FOODS

Course Code:23FSN241
L-T-P – 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre-requisite: Food processing, preservation, additives, preservatives

Course Objectives:

1. To give an understanding on the methods of home scale food preservation
2. To relate to preservation on sugar, salt, drying and chemicals preservative
3. Learnt the importance of moisture removal and fermentation in home scale preservation

Course Outcomes:

- CO1: Gain expertise on the preservation methods of surplus fruits and vegetables at home scale level
 CO2: Enhance the knowledge related to sugar preservation methods
 CO3: Understand the preservation method using different drying methods
 CO4: Gain knowledge on the chemical and salt preservation methods
 CO5: Empower on the different fermentation methods and fermented products

Skills: Develop skills in food processing and preservation at home scale level

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	-	-	-	1	1	1	1	-
CO2	1	-	1	-	-	-	1	1	1	1	-
CO3	1	-	1	-	-	-	1	1	1	1	-
CO4	1	-	1	-	-	-	1	1	1	1	-
CO5	1	-	1	-	-	-	1	1	1	1	-

Syllabus:

Unit 1- Introduction to Food Preservation

9hrs.

Basic Principles of Food Preservation, Types of Spoilage, Importance of Food Preservation Different Methods of Food Preservation. Management of surplus foods.

Unit II- Preservation by using Sugar

9hrs.

Sugar concentrates, Preparation of Jam, Jelly, Marmalades, Preserves, Candied, Glazed, Crystallized Fruits, FPO Specification, Problems Encountered, Spoilages

Unit III - Preservation by Removal of Moisture**9hrs.**

Sun drying Drying, Dehydration, Method of Drying, Preparation of Vegetable Vathals - Ladies Finger, Brinjal, Beans, Cluster Beans, Preparation of Vadams – Rice vadam, Sago Vadam, Rice Flakes Vadam, Tomoto Vadam

Unit IV-Preservation by using Chemicals and Salts**9hrs.**

Chemical Preservatives – Definition, Types of Preservatives, Preparation and Preservation of Fruit Juices, pickling – Principles Involved, Process, Types
Preparation of Various Types of Pickles – Lime, Mango, Ginger, Capsicum, Mixed Vegetables, Brinjal, Onion, Garlic

Unit V- Fermentation**9hrs.**

Definition, Types of Fermentation, Common Fermented Foods – Cheese Making, Dokhla, Wine

Text books:

1. Adams, M.R. and Moss, M.O. (2005) Food Microbiology, New Age International (P) Ltd., New Delhi,.
2. Usha Chandrasekhar, (2002) Food Science and Applications in Indian Cookery, Phoenix Publishing House Pvt. Ltd., New Delhi,.
3. Srilakshmi, B.(2013) Food Science, New Age International (P) Ltd., New Delhi,

Reference Books:

1. Fellows, P. (2000) Food Processing Technology, Principles and Practice, 2nd Edition, CRC Press, Woodland Publishing Ltd., Cambridge, England.
2. Sommers, C.H. and Xveteng Fan, (2006) Food Irradiation Research and Technology, Blackwell Publishing, 2006.
3. Swaminathan, M. Food Science, Chemistry and Experimental Foods, Bappco Publishers, 2013.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

BASICS OF FOOD ENGINEERING

Course Code:23FSN242

Hours of Instruction/ week –3

L-T-P – 3-0-0-3

No. of Credits – 3

Total 45 hrs.

Course Objectives:

1. Understand the basic principles of food engineering
2. Comprehend the types and properties of Refrigeration systems
3. Gain knowledge on processing equipment and maintenance of processing equipment

Course Outcomes:

CO1: Understand the significance of food engineering and its principles

CO2: Acquire knowledge on steam generation, utilization and evaporation

CO3: Gain knowledge on refrigeration and freezing in food industry

CO4: Design plant location and equipment layout for establishing a food industry

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	1	-	-	-	-	-	-	1	-
CO2	-	-	1	-	-	-	-	-	-	1	-
CO3	-	-	1	-	-	-	-	-	-	3	-
CO4	-	-	1	-	-	-	-	-	-	3	-

Unit I- Food Engineering- An Overview

11 Hrs

Food Engineering -Historical background. Food Engineering as a distinct discipline. Basic food engineering principles - physical, thermal, aerodynamic, mechanical, optical and electromagnetic properties.

Unit II- Steam Generation, Utilization and Evaporation

11 Hrs

Properties of steam. Steam tables and their application. Boilers operation. Maintenance of boilers. Utilization of steam in food processing. Pressure vessels. Evaporators-Types, principles and equipment. Vapour compression evaporation systems.

Unit III- Refrigeration and Freezing in Food Industry

11 Hrs

Refrigerator- parts and functions. Classification of refrigerants. Refrigeration Cycle. Refrigerator Load. Condenser, Evaporator and compressor. Application of refrigeration in food processing. Cryogenic Freezing and Individual Quick Freezing (IQF).

Unit IV- Plant Designs, Location and Equipment Layout

12 Hrs

Plant designs- design and construction of building, functionality of the building, design and fabrication equipment. Plant location. Cost benefit analysis. Food process economics. Plant layout. Factors to be considered for location and layout of food plants. Regulatory requirements of food industries.

Text Books:

1. C. and S. Padma Ishwarya S.P. (2019). Essentials and Applications of Food Engineering. CRC Press, USA.
2. Rao D.G. (2018). Fundamentals of Food Engineering. Prentice Hall India Private Limited, New Delhi.

Reference Books:

1. Toledo R.T. 2020. Fundamentals of Food Process Engineering 3rd Edition. CRC Press, USA.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Seminar, Projects and Reports.

CAREER OPPORTUNITIES IN FOOD SCIENCE AND NUTRITION

Course Code:23FSN243
L-T-P – 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre requisite: Biological sciences, food science, dietetics, community nutrition, food industry

Course Objectives:

1. To extend higher learning opportunities for UG Food Science and Nutrition graduates.
2. To make better understanding on various career opportunities pertaining to graduates in UG Food Science and Nutrition.
3. To build capacity and Learning skill for competitive examination opening into government and non-government sectors

Course Outcome:

CO1: Awareness built on the preparation for higher learning opportunities

CO2: Building appropriate skills and capacity to open careers in various hospital sector.

CO3: Gain knowledge on the suitable skills for career opportunities in government sector and community

CO4: Develop skills for career opportunities in food and entrepreneur sector

CO5: Building knowledge and skills for the competitive exam preparations.

Skills: Strengthen technical and develop exam preparedness skills

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	1	-	3	3	-	-	2	-
CO2	-	-	-	1	-	3	3	-	-	2	-
CO3	-	-	-	1	-	3	3	-	-	2	-
CO4	-	-	-	1	-	3	3	-	-	2	-
CO5	-	-	-	1	-	3	3	-	-	2	-

Unit I - Preparation for higher learning & research

9hrs.

Understanding the domains of higher learning, Opportunities for higher learning, thrust areas of exchange studies, possible interdisciplinary courses and learning opportunities.

Unit II - Career opportunities in hospitals

9hrs.

Registered Dietitian Examination, preparation, how to apply, syllabus, technical knowledge and skills required.

Unit III - Career opportunities in government sector & community**9hrs.**

Various Ministry, National and state government departments open for recruiting officers and staff with food science and nutrition background.

Unit IV - Career opportunities in food industry & as entrepreneur**9 hrs.**

Required Education & Training for a career in the Food Industry, Opportunities as a Food technologist Product/process development scientist, Quality manager, Regulatory affairs officer, Know about the Recruiters and roles and responsibilities. Small- and large-scale food-based business, how to initiate startups, applying for FSSAI, setting quality standards roles and responsibilities.

Unit V – Preparation for competitive exams**9hrs.**

Various resources web links and websites for various relevant job applications. State employment Exchange registration.

Registered Dietitian Exam- Eligibility, registration, application, Syllabus.

NET /SLET Exams– Interior design, resource management, textiles and clothing, human development, extension education

Text books/ References:

1. Premalata, M, (2007), 'Text Book of Home science', Kalyani Publishers, Chennai.
2. Online resources

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

ELECTIVE C

BAKERY AND CONFECTIONERY

Course Code:23FSN431

L-T-P – 2-0-1-3

Hours of Instruction/ week – 3

No. of Credits – 3

Total 45 hrs.

Pre-requisite: Baking principles & bakery products

Course Objectives:

1. To create knowledge on the role of science and technology in baking
2. To integrate the role of different ingredients in bakery
3. To familiarize with skills in planning and establishing a bakery unit.

Course Outcomes:

CO1: Improved knowledge on principles of baking and appropriate sanitation, hygiene and safety practices during baking

CO2: Understanding the role of ingredients in baking quality.

CO3: Gain knowledge to set up a bakery unit.

CO4: Increased knowledge on the complete process of baking and presentation of baked products

CO5: Gain knowledge on the processing and preparation of confectionary products

Skills: Learned various baking skills to bake different products

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	1	-	-	-	1	1	-	1	-
CO2	1	2	-	-	-	-	1	1	-	1	-
CO3	1	-	-	-	-	-	1	1	-	2	-
CO4	1	1	1	-	-	-	1	1	-	2	-
CO5	1	1	1	-	-	-	1	1	-	2	-

Syllabus:

Unit I

8hrs.

Introduction to baking:

Baking - Definition, History, Principles of baking, classification of baked foods. Types of equipment's in baking industry, cleaning and sanitizing methods of baking equipment's, baking temperature of different products, operation techniques of different baking equipment's.

Unit II**8hrs.****Role of Ingredients:**

Ingredients and Their Role in Baking - Flour, Yeast, sugar, egg, butter, salt, baking powder, colouring, flavouring agents. List of standard colouring and flavouring agents

Unit III**10hrs.****Factors for setting up a bakery unit:**

Factors to be considered for Setting up a Bakery Unit

Types of Ovens – Construction and Working of Conventional and Modern Ovens, Study and Maintenance of Major and Minor Equipment's.

Bread Making – Steps and Methods, Role of Ingredients, Variety Breads, Qualities of a Good Loaf, Bread Faults, bread diseases.

Unit IV**10hrs.****Preparation and Decoration of baked foods**

Cake Making – Functions of Ingredients

Cake Mixing Methods, Types of Cakes, Cake Judging, Cake Faults and remedies Biscuit, Cookie and Pastry Making, Types and techniques of Icing,

Frosting and fillings. Sensory evaluation of baked products- objective and subjective methods

Unit V**9hrs.****Confectionery**

Processing of Raw Materials -Cocoa and Chocolate. Making of Toffee, Chocolates, Fruit Drops, Hard Boiled Candies (clear, hard, pulled, grained, filled), Soft candies (fondant, modified fondants like toffee, fudge, marshmallows, gums, jellies, chocolates) Bars, Chewing Gums, Special Confectionery Foods- tablets, Lozenges.

Practicals:

1. Introduction of tools and equipment's of bakery products.
2. Preparation of rich yeast fermented breads
3. Preparation of biscuits and cookies.
4. Preparation of pizza.
5. Preparation of various types of cakes.
6. Preparation of filling and icings.
7. Visit to a Professional Bakery

Reference Books:

1. Potter, N. Food Science, The AVI Publishing Co., Inc., West Port, Connecticut, 1975.
2. Baker's Handbook on practical Baking. Wheat Associates, USA, New Delhi.
3. Dubey, SC, Basic Baking Science and Craft, Jwalmukhi Job Press, Bangalore, 1979.
4. Modern Pastry Chab, Vol.I and II, A VI Publishing Co., Inc., West Port, Connecticut, 1977.

Evaluation Pattern:

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD BIOTECHNOLOGY

Course Code:23FSN432
L-T-P –C 3 0 0 3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre requisite: Genetic engineering, enzymes and microbes, fermentation

Course Objectives:

1. To give an understanding on the role of enzymes as a tool in genetic engineering and biotechnology
2. To make learners aware on the principles of genetic engineering, plant tissue culture and molecular cloning
3. To enable learners to understand the concept of fermentation biotechnology
4. To delineate the role of microbes in the application of biotechnology in Food Science and Nutrition

Course Outcomes:

- CO1: Gain knowledge on the enzymes as tools used in genetic engineering
CO2: Expand the knowledge of food biotechnology in relation to genetic engineering and plant tissue culture.
CO3: Understand on the basic principles of fermentation technology and the application of fermentation in biotechnological industry.
CO4: Helps to keep abreast application of microbes in food industry.
CO5: Understanding the role of enzymes in food industry.

Skills: Develop appropriate skills involved in food biotechnology and genetic engineering

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	-	-	-	-	-	-	1	1
CO2	1	1	-	-	-	-	-	-	-	1	1
CO3	1	1	-	-	-	-	-	-	-	1	1
CO4	-	1	-	-	-	-	-	-	-	1	-
CO5	1	1	-	-	-	-	-	-	-	1	-

Syllabus:

Unit I - Introduction and Tools of Genetic Engineering

10hrs.

Definition, enzymes as tools - exonucleases, endonucleases, ligases, reverse transcriptase and alkaline phosphatase, cloning vectors-plasmids, bacteriophage, cosmids and phasmids. Nutrigenomics and its nutritional implications.

Unit II Genetic Engineering and Plant Tissue Culture

10hrs.

Outline of genetic engineering in prokaryotes (microbial cells), concepts of molecular cloning, plant tissue culture, micro propagation, transgenic plants, genetically modified foods-golden rice, flavr savr tomato and Bt brinjal; enlisting applications of genetic engineering, isolation of DNA and Plasmids.

Unit III - Fermentation Biotechnology

8hrs.

General structure of bioreactors and listing types, bacterial growth curve, batch and continuous culture, environmental factors, basic concepts of downstream processing, definition of biochips and biosensors

Unit IV- Use of Microbes in Food Industry

8hrs.

Primary metabolites, secondary metabolites, synthesis of citric acid, glutamate, xanthan gum, vitamin B12, riboflavin and Single Cell Protein – spirulina and yeast biomass

Unit V - Enzyme Biotechnology

9hrs.

Soluble enzymes, immobilization of enzymes – methods of immobilization, role of enzymes in food industry, safety assessment of transgenic crops

Text Books:

1. Dubey, R.C., 2014, A Text Book of Biotechnology, 5th revised edition, S. Chand and Company Ltd., New Delhi.
2. Green, P.J., 2010, Introduction to Food Biotechnology, CRC Press, USA.

Reference Books:

1. Dietrich Knorr, 2017, Food Biotechnology, Marcel Dekker Inc., New York.
2. Owen, P. Ward, 2018, Fermentation Biotechnology, Principles, Processes and Products, Prentice Hall, Advanced Reference Series, New Jersey, 07632

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD SAFETY AND QUALITY CONTROL

Course Code: 23FSN433
L-T-P – 2-1-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre –requisite: Food safety, Consumer awareness, Nutrition information and labelling

Course Objectives:

1. To impart the better understanding on the role of sanitization and hygiene to produce quality food.
2. To get familiarize with standards for quality assessment and food safety and critical assessment and control points for quality assurance.

Course Outcome:

CO1: Basic understanding of sanitization, hygiene, safety and quality.

CO2: Grasping the principles of food quality control and additives used in industry.

CO3: Proficient in food standardization system, laws, sensory assessment and methods of determination of quality.

CO4: Expertise food safety management, hazards analysis and control measurements.

Skills: Develop skills in food safety and food quality management

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	2	-	1	-	-	-	-	-	2	2
CO2	-	2	-	1	-	-	-	-	-	3	-
CO3	-	2	-	1	-	-	-	-	-	2	-
CO4	-	2	-	1	-	-	-	-	-	3	-

Syllabus:

Unit I

8hrs.

Water, Sanitation, Hygiene, Food quality, Food selection, Food Safety, House hold hygiene, Food safety measures during food production, Organization of quality control function in the food industry.

Unit II

10hrs.

Principles of Quality control of food –Raw material control, processed control and finished product inspection. Leavening agents, classification, uses and optimum levels.

Food additives - Preservatives, colouring, flavouring, sequestering agents, emulsifiers and antioxidants.

Unit III

8hrs.

Standardization systems for quality control of foods-National and International standardization system, Food grades, Food laws-compulsory and voluntary standards.

Food adulteration - Common adulterants in foods and tests to detect common adulterants.

Unit IV

10hrs.

Methods for determining quality - Subjective and objective methods.

Sensory assessment of food quality-appearance, color, flavour, texture and taste, different methods of sensory analysis, preparation of score card, panel criteria, sensory evaluation room.

Unit V

9hrs.

Food safety: The concept of food safety and its definition. Elements of food safety management. Challenges in management of food safety and outlook. Hazards associated with foods – Milk and dairy products; meat, egg and poultry; fruits and vegetables; nuts and oil seeds. Control of hazards and management of safety of foods at raw and processed stage.

Hazard Analysis and Critical Control Point System (HACCP): Introduction, the need for HACCP, Principles of the HACCP System and application of HACCP, microbiological criteria in food packaging.

PRACTICALS

Assessment of quality parameters and adulterants in different foods

1. Survey of label information of foods in market
2. Cereals, Pulses and Flours – Label information, detection of adulterants
3. Fats and oils – Label information, Adulterant tests, Iodine number and FFA Value
4. Fruit and vegetable products – Label information, Acidity , TSS, Sugars
5. Coffee and Tea, Honey – Label information, Detection of Adulterants
6. Milk and milk products- Label information, COB test, Acidity, MBRT, Detection of adulterants.
7. Spices and Condiments- Label information, Detection of adulterants.

Reference Books:

1. Jay M.J (2015) Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi
2. Mahirdra-S.N.-Food safety –A techno-legal analysis-Tata McGrawhill publishers 2018.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

CORE ELECTIVE

FOOD FORTIFICATION

Semester VI
Course Code: 23FSN331
L-T-P –3 0 0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs

Course objectives:

1. Understand the principles, importance and methods of food fortification.
2. Learn various aspects of fortified food products.

Course outcomes:

1. Acquire knowledge on different techniques used for fortifying foods.
2. Gain precise knowledge on various fortificants and vehicles
3. Generate cost-effective and safe fortified foods for target populations.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	1	-	1	2	1	1	2
CO2	2	1	-	-	1	-	1	2	1	1	2
CO3	2	1	-	-	1	-	1	2	1	1	2

Syllabus

Unit I: Food Fortification

15hrs

Food fortification: Definition, types, Legal considerations, Mandatory vs. Voluntary fortification, importance and health benefits; Food vehicles and Fortificants: Selection of food vehicles, criteria for selection of food fortificants, Bioavailability, Stability and interaction of fortificants in the foods.

Unit II: Nutrients as Fortificants

10hrs

Vitamins (A, B, C and D) and minerals (iron, iodine, zinc and calcium) – Sources, Physical characteristics and choice of fortificant methods to increase absorption of fortificants/prevention of loss, Fortification premixes - design and composition of premixes.

UNIT III: Foods as Vehicles for Fortification

10hrs

i) Rice, Cereal flours, cereal products (bread, pasta, noodles, biscuits and ii) Salt and sugar, iii) edible oils, iv) Beverages; v) Candies, Nutri- bars, and Granola bars, vi) Snack food, water and other foods. Technology of fortification, challenges (safety, technological and cost limits), packaging and shelf life quality of fortified foods.

Unit IV: Guidelines for Fortification

10hrs

Merits and demerits of fortification, choice of products and selection of micronutrients, Setting level of fortification, Safety limits, Technological and cost limits, Challenges in fortifying snack products, Nutrient interaction and bioavailability.

REFERENCES

1. Handbook of Food Fortification and Health: From Concepts to Public Health Applications Volume 2 (Nutrition and Health), 2016.
2. Preedy VR, Srirajavenkathan R and Patel VB. Handbook of Food Fortification and Health, Vol. 1 & 2, Springer Publications. 2013.
3. Stakeholder consultation on Regulation for staple food Fortification: 15 April 2011: National Institute of Nutrition and Indian Council of Medical Research, Hyderabad, working paper
4. Food Fortification and Supplementation: Technological, Safety and Regulatory Aspects (Woodhead Publishing Series in Food Science, Technology and Nutrition) Hardcover – Import, 31 March 2008.
5. Guidelines on Food Fortification with Micronutrients. Allen L, Benoist BD, Dary O and Hurrell R WHO and Food and Agricultural Organization, USA. 2006.
6. Lindsay Allen, Bruno de Benoist, Omar Dary and Richard Hurrell (Eds.) 2006 Guidelines on food fortification with micronutrients: World Health Organization and Food and Agriculture Organization of the United Nations

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Seminar, Projects and Reports

FOOD INDUSTRY MANAGEMENT

Semester: VI

Hours of Instruction/ week –4

Course Code: 23FSN332

No. of Credits – 4

L-T-P – 3 0 0 3

Total 60 hrs.

Course Objectives:

1. Understand the basic concepts of food industry and future priorities in food production
2. Comprehend the guidelines for good maintenance & safety precautions in food industry
3. Gain knowledge on improving sustainability in food sector

Course Outcomes:

- CO1: Understand the components, organization of food industry and future challenges in food production sector
- CO2: Acquire knowledge on food industry maintenance
- CO3: Gain knowledge on food safety and assurance system in food industry
- CO4: Analyse different aspects of sustainability and ethics in food industry
- CO5: Design of food business proposals, start a food industry with respect to nutritional trends

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	-	3	-
CO2	-	-	-	-	-	-	-	-	-	3	-
CO3	-	-	-	-	-	-	-	-	-	3	-
CO4	-	-	-	2	-	-	-	-	-	3	-
CO5	-	-	-	1	-	-	-	-	-	3	-

SYLLABUS

Unit I- Food Industry - An Overview

14 Hrs

Food Industry- Trends in food industry- Global and Indian perspective. Components of Food Industry. Organization in food industry. Operations of food industry. Deteriorative factors and hazards during processing, storage, handling and distribution. Food regulatory bodies and mechanisms, certification process to set up micro, macro model food industries. Future priorities in food production and challenges.

Unit II - Food Industry Maintenance

14 Hrs

Food Industry -Maintenance of staff and plant operators; Preventive maintenance; Guidelines for good maintenance & safety precautions; Work place improvement through '5S'. Wastewater and solid waste treatment. Financial management & financing for food industries. Marketing and E-Trading. Handling customers' complains, evaluation and solution of problems, Report making. Corrective action preventive action (CAPA) in food industry.

Unit III- Food Safety and Assurance System in Food Industry

16 Hrs

Principles and systems for quality and food safety management. Hygienic designs and maintenance of equipments in food industry. HACCP and its misconception in food industry. Management of hazards. Assessment of food safety management systems. Incident management and root cause analysis. Crisis management in food industry. Significance of international, regional and national organisation in food production sector.

Unit IV – Sustainability and Ethics in Food Industry

16 Hrs

Sustainability and food production in future. Food safety and sustainability. Social, economic and environmental aspects of sustainability and food production. Food Industry waste management. Improving sustainability in food sector. Impact of climatic change in food safety. Nutritional trends and health claims. Preparation of business proposals. Starting a Food Industry. Case studies on project formulation in various types of food industries. Ethics in food safety management- Ethical issues in food production and food safety. Ethical decision-making.

Text Books:

1. Jordan L. (2015). Food Industry: Food Processing and Management. Callisto Publishers, USA.
2. Swainson M. (2018). Swainson's Handbook of Technical and Quality Management for the Food Manufacturing Sector, Woodhead Publishing, UK.

Reference Books:

1. Lelieveld H. and Motarjemi Y. (2013). Food Safety Management: A Practical Guide for the Food Industry. Elsevier Science. Academic Press, USA.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Seminar, Projects and Reports

GENERIC ELECTIVE

ELECTIVE –A

FOOD TOXICOLOGY

Hours of Instruction/ week – 3

Course Code:23FSN251

No. of Credits – 3

L-T-P-C 3-0-0-3

Total 45 hrs.

Prerequisite: Basic Food Groups, Food Additives, Food Microbiology

Course Objectives:

1. To obtain basic knowledge on the principles of food toxicology and the impact of natural toxins in foods.
2. To analyze and study the influencing factors like environment, toxins, drugs, and additives on food allergens and sensitivity.

Course Outcomes:

CO1: Acquire knowledge of the principles of food toxicology.

CO2: Gain knowledge on the impacts of natural toxins in foods.

CO3: Understand the relationship between food allergens and sensitivity

CO4: Gain knowledge on Environmental contaminants and drug residues in food

CO5: Develop food processing skills and understand the role of food additives and toxicants.

Skills:

- Develop skills on the identification of food allergens
- Acquire skills in understanding toxins, harmful additives

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-
CO3	1	-	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-
CO5	1	-	-	-	-	-	-	-	-	1	-

Syllabus:

Unit I- Principles of Toxicology

9Hrs

Classification of toxic agents. Characteristics of exposure. The spectrum of undesirable effects. Interaction

and tolerance. Biotransformation and mechanisms of toxicity. Evaluation of toxicity- risk vs. benefit. Experimental design and evaluation- Prospective and retrospective studies. Controls: Statistics (descriptive and inferential). Animal models as predictors of human toxicity. Legal requirements and specific screening methods as per OECD guidelines in vitro and in vivo studies. Clinical trials.

Unit II -Natural Toxins in Food

9Hrs

Natural toxins of importance in food- toxins of plant and animal origin. Microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins)- Natural occurrence, toxicity and significance. Determination of toxicants in foods and their management.

Unit III- Food Allergies and Sensitivities

9Hrs

Natural sources and chemistry of food allergens, True/untrue food allergies. Handling of food allergies. Food sensitivities (anaphylactoid reactions, metabolic food disorders, and idiosyncratic reactions). Safety of genetically modified food- potential toxicity and allergenicity of GM foods. Safety of children's consumables.

Unit IV- Environmental Contaminants and Drug Residues in Food

9Hrs

Fungicide and pesticide residues in foods; heavy metal and their health impacts. Use of veterinary drugs (e.g. Malachite green in fish and β agonists in pork). Radioactive contamination of food, Food adulteration and potential toxicity of food adulterants. Endocrine disrupters in food. Microplastics in food: Health risks and solutions.

UNIT V- Toxins generated during Food Processing

9Hrs

Safety of food additives. Toxicological evaluation of food additives. Food processing generated toxicants- Nitroso-compounds, heterocyclic amines. Dietary Supplements and toxicity related to dose- common dietary supplements. Relevance of the dose. Possible toxic effects.

Textbooks:

1. Klaassen, Curtis K., Watkins III, John B. (2021). Essentials of Toxicology, 4th Edition, McGraw-Hill Medical, USA.
2. Casarett & Doull's. (2019). Toxicology: The Basic Science of Poisons, 9th Edition. Mcgraw-Hill Medical, New York.
3. Galanakis C.M. (2020). Food Toxicology and Forensics. Academic Press, USA.

Reference Books:

1. Fletcher M. and Netzel G. (2020). Food Safety and Natural Toxins. Mdpi AG publishers, Switzerland.

Evaluation Pattern:

Assessment	Internal	External
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Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

NUTRITION IN EMERGENCIES AND DISASTER MANAGEMENT

Course Code:23FSN252
L-T-P-C 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Prerequisite: Basic food groups and functions; Significance of macro and micronutrients

Course Objectives:

1. Understand the emergency, nutrition surveillance, and treatment during disasters and pandemic
2. Gain knowledge on relief and rehabilitation during nutritional emergencies

Course Outcomes:

CO1 Acquire knowledge in nutritional problems in natural and man-made disasters and emergencies

CO2 Assess the nutritional status in emergency and plan surveillance and treatment to the affected

CO3 Acquire knowledge on nutritional relief and rehabilitation

CO4 Gain insight on nutrition recommendation of special environments

CO5 Plan and execute rehabilitation during nutritional emergencies-endemic, epidemics and pandemics

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	2	-	1	-	1
CO2	-	1	-	-	-	-	2	-	1	-	-
CO3	1	2	-	-	-	-	3	-	3	-	2
CO4	-	-	-	-	-	-	2	-	1	-	1
CO5	-	-	-	-	-	-	2	-	1	-	1

Syllabus:

UNIT I – Disaster and Nutritional Emergencies- An Overview

9 Hrs

- **Natural/Manmade disasters resulting in emergency situations-** Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies. Factors giving rise to emergency situations in these disasters. Nutritional management during disaster.
- **Nutritional problems in emergencies among vulnerable groups-** Causes of malnutrition in emergency situations, Major deficiency diseases in emergencies, Protein Energy Malnutrition, Starvation, Under Nutrition. Dietary and medical treatment during nutritional emergencies.
- **Communicable disease evolving emergency situations-** Surveillance, medical and dietary treatment. Role of immunization and sanitation.

UNIT II -Need Based Assessments

9 Hrs

- Assessment and surveillance of Nutritional status in emergency affected populations: Scope of assessment of malnutrition in emergencies, Indicators of malnutrition. Clinical signs for screening acute malnutrition, Anthropometric assessment and biochemical examination during nutritional emergencies.
- Disaster and emergencies specific assessment tool construction
- Organization of nutritional surveillance and individual screening.

UNIT III- Nutritional Relief and Rehabilitation

9 Hrs

- Assessment of food needs in emergency situations, Food distribution strategy – Identifying and reaching the vulnerable group – Targeting Food Aid.
- Mass and Supplementary Feeding, Therapeutic Feeding, Special foods/rations for nutritional relief, Local production of special foods, Local foods in rehabilitation
- Organization of mass feeding/general food distribution, Feeding centers, Transportation and food storage, Sanitation and hygiene, Evaluation of feeding programmes, Household food security and nutrition in emergencies
- Public nutrition approach to tackle nutritional problems in emergencies

Unit IV- Nutrition Recommendation of Special Environments

9 Hrs

- **Nutritional requirement in High altitudes and Low temperatures-** Oxidative stress at High altitudes and Low temperatures. Muscle metabolism during cold stress and high altitudes. Dietary supplements and superfoods. Nutrients and cognitive functioning at high altitudes and low temperatures.
- **Human health and performance risk at space exploration and submarines-** Human Metabolism during space exploration and underwater. Energy utilization in space flights. Protein and muscle homeostasis. Fluid and electrolyte homeostasis during space exploration. Calcium and related nutrients in bone metabolism. Iron metabolism and changes in RBCs metabolism. Antioxidants- Radiation and stress. Nutritional recommendation at space exploration and submarines.

Unit V - Nutritional Emergencies during Endemic, Epidemics and Pandemics

9 Hrs

- **Endemic, Epidemics and Pandemics** -Globally and Indian scenario. Escalation of an epidemic to a pandemic. Stages of pandemic. Impact of endemic, epidemics and pandemics on human health.
- **Diet and Nutritional Emergencies-** Dietary treatment during endemic, epidemics and pandemics. Role of antioxidants and superfoods during these nutritional emergencies.

Practicals/ Assignments:

1. Collection of epidemiological data-a hands-on experience.
2. Selection and Rapid assessment of nutritional status in a community.
3. Case study approach on causative factors and management of communicable diseases.
4. Planning and formulation of nutrient-dense foods.
5. Survey on adherence to immunization schedule and vaccines.

Reference Books:

1. World Disasters Report (2020). Focus on Public Health, International Federation of Red Cross and Red Crescent Societies.
2. Disasters – International Public Nutrition and Emergencies: The Potential for improving practice. Special Issue – Vol.23/4, Dec. 1999.
3. Guidelines and Research publications of OXFAM, WFP, Rome. 1999. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of the Expert Group of ICMR. 2010.
4. Dr.M Swami Nathan. (2010). Food and Nutrition Volume-2 Second Edition the Bangalore Printing and Publishing Co Ltd Bangalore 560018.
5. ShubhanginiA.Joshi. (2010). Nutrition and Dietetics Third Edition Tata Mecgraw Hill Education Private Limited New Delhi.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

PHYSICAL CHEMISTRY OF FOOD CONSTITUENTS

Semester III
Course Code: 23FSN253
L-T-P – 3-0-0-3

Hours of Instruction/ week – 3
No. of Credits – 3
Total - 45 hrs.

Pre requisite: Basics of Bonding, thermodynamics, kinetics and surface chemistry.

Course Objective: To impart knowledge on the basic physical chemistry aspects with respect to food

Course Outcomes:

CO1: To relate the application of thermodynamics in understanding the chemistry of food

CO2: To understand the concept of solutions of solid in liquid and liquid in liquid and the properties related to the concentration of solute.

CO3: To gain knowledge on the colloids and the special properties of colloids

CO4: To understand the basics on surface activity and surface reactions

CO5: To provide knowledge on the rheological properties, its measurement and its application to food

Skills: Develop skills in the application of physical properties of foods in product development

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	1	-	-	-
CO3	1	1	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-

Syllabus:

Unit I- Thermodynamics

12 hrs

System and surrounding, homogenous and heterogeneous system, Intensive and extensive properties, Entropy, Enthalpy, Gibb's free energy, stable- unstable systems. Heat capacity, specific heat capacity- measurement of specific heat capacity using Bomb calorimeter

Unit II- Solutions

12 hrs

Solubility-relative solubility, Concentration of solutions, Solutions of solid in liquid, Factors influencing solubility, Energy of hydration, Solvation, solutions of liquid in liquid. Colligative properties-Lowering of vapour pressure, elevation of boiling point, depression of freezing point and osmotic pressure.

Unit III- Colloidal chemistry

12 hrs

Types of colloids-Lyophilic and Lyophobic colloids, classification of colloids, stability of lyophobic and lyophilic sol, emulsification, foaming, light scattering, destabilization of emulsions and foams. Isoelectric point, protection of colloids - protective colloids, Gold Number, Hofmeister series, coagulation or flocculation, coacervation, sensitization, micelle and critical micellation concentration, application of colloids. Sedimentation, Coalescence, gelatinization.

Unit IV- Surface chemistry

12 hrs

Surface tension, interface tension, capillary effects, surface activity, surfactants, wetting, contact angle, adsorption-types and mechanism, catalysis- bio catalyst- enzymes, self-assembly of macromolecules, thermodynamics of self-assembly.

Unit V- Rheology

12 hrs

Rheological classification of foods. Rheology of solid foods, rheology of liquid foods, Hooke's law, Newtonian flow, non-Newtonian flow, gel flow- viscoelasticity, methods of viscoelasticity. Factors influencing rheological properties, measurement of rheology, application of study of rheology in food industry.

Text Books:

1. Physical chemistry of foods- Pieter Walstra, Marcel Dekker Incorporation, The Netherlands, 2003.
<https://www.dekker.com>
2. Principles of food chemistry, John M Deman, 3rd edition, An Aspen publication, Maryland, 1999

Reference book

1. Introduction to the physical chemistry of food, Christos Ritzoulis, 1st edition, CRC press, 2013

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

GENERIC ELECTIVE –B

POST-HARVEST TECHNOLOGY

Semester V

Course Code: 23FSN261

L-T-P – 3 0 0-3

Hours of Instruction/ week – 3

No. of Credits – 3

Total 60 hrs.

Pre-requisite: Post-harvest loss, processing methods, storage, handling, transportation of commodities.

Course Objectives:

1. To give a better understanding on the importance and methods of post-harvest techniques for foods
2. To create enhanced knowledge in food processing and food conservation

Course Outcome:

CO1: Gain understanding on significance of post-harvest technology and factors associated with post harvest technology

CO2: Understand different processing methods used in cereals (wheat, rice, maize), breakfast cereals, pulses, fruits and vegetables, meat, fish, poultry, egg and sugars

CO3: Gain knowledge on different postharvest processing methods in oil seeds, milk and milk products, condiments and spices, Beverages, tea, coffee and cocoa (SS).

CO4: Understand the factors involved in post-harvest loss

CO5: Gain knowledge on the methodologies used in storage structures

Skills: To develop skills in food processing and Food conservation

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	-	-	-	-	1	-	1	-
CO2	2	-	1	-	-	-	-	1	-	1	-
CO3	2	-	1	-	-	-	-	1	-	1	-
CO4	2	2	1	1	-	-	-	1	1	1	-
CO5	-	1	1	1	-	-	-	-	-	1	-

Syllabus:

Unit I - Introduction to Post Harvest Technology

14hrs.

Introduction to Post Harvest Technology - Definition, importance and problem encountered.

Buffer stock – definition, quantity of stores available. Governmental measures to augment food production- need for food conservation. Food loss in the post-harvest period, extent of losses, loss in the field, threshing yard, storage, marketing loss. Role of Post-Harvest Technology in combating malnutrition in India.

Unit II- Processings and its Significance

14hrs.

Importance of processing- methods of processing cereals (wheat, rice, maize), breakfast cereals, pulses, fruits and vegetables, meat, fish, poultry, egg and sugars. Processing of oil seeds, milk and milk products, condiments and spices, Beverages, tea, coffee and cocoa.

Unit III- Factors Influencing Quality of Foods

16hrs.

Agents Causing Food Losses - Physical agents, (moisture, temperature), Chemical losses, biological losses- insects- insects-microorganisms.

Control of Spoilage Agents - Importance and methods of sanitary handling, physical, chemical, biological and other means of control of insects, rats and rodents and birds. Insect control methods- Physical methods and chemical methods including fumigation techniques.

Handling and Transport of Food Commodities - Traditional and improved methods. Nutrient losses in spoiled foods and national program to save various food produce.

Unit IV- Food Storage and its Significance

16hrs.

Storage - Importance of storage structures- requirements, traditional & modern and underground & above ground storage and their improvements, Cold storages, FCI godowns. PDS. Agencies Controlling Food Losses - Role of SGC, FCI, CWC, SWC, IGSI in controlling food losses.

Related Experiences:

1. Visit to FCI
2. Visit to Processing Mill (Cereal & Pulse)
3. Food park with cold storage

Reference Books:

1. Handling and storage of food grains- S V Pingale ICAR, New Delhi, 1976.
2. Handling and storage of food grains in tropical and subtropical areas- D W Hall, FAD, Rome, 1970.
3. Food Science, N.W.Potter- The A VI Publishing Co., The Westport, 1973.
4. Food Technology, Prescott and Proctor.B.B.Mc Graw Hill Book Co., New York, 1937.
5. Gordon G Birth, Food science, Pub in New York.
6. Robins M Philip Convenience food- Recent Technology 1976.
7. Technology of cereals by NL Kent and JAD Evers.
8. Food protection technology by Charles W., Felix Havis Pub.1987.
9. John A Troller, 1983, Sanitation in food processing, Academic press

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	

*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD BIOTECHNOLOGY

Course Code:23FSN262
L-T-P –C 3 0 0 -3

Hours of Instruction/ week – 3
No. of Credits – 3
Total 45 hrs.

Pre requisite: Genetic engineering, enzymes and microbes, fermentation

Course Objectives:

1. To give an understanding on the role of enzymes as a tool in genetic engineering and biotechnology
2. To make learners aware on the principles of genetic engineering, plant tissue culture and molecular cloning
3. To enable learners to understand the concept of fermentation biotechnology
4. To delineate the role of microbes in the application of biotechnology in Food Science and Nutrition

Course Outcomes:

- CO1: Gain knowledge on the enzymes as tools used in genetic engineering
CO2: Expand the knowledge of food biotechnology in relation to genetic engineering and plant tissue culture.
CO3: Understand on the basic principles of fermentation technology and the application of fermentation in biotechnological industry.
CO4: Helps to keep abreast application of microbes in food industry.
CO5: Understanding the role of enzymes in food industry.

Skills: Develop appropriate skills involved in food biotechnology and genetic engineering

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	-	-	-	-	-	-	1	1
CO2	1	1	-	-	-	-	-	-	-	1	1
CO3	1	1	-	-	-	-	-	-	-	1	1
CO4	-	1	-	-	-	-	-	-	-	1	-
CO5	1	1	-	-	-	-	-	-	-	1	-

Syllabus:

Unit I - Introduction and Tools of Genetic Engineering

10hrs.

Definition, enzymes as tools - exonucleases, endonucleases, ligases, reverses transcriptase and alkaline phosphatase, cloning vectors-plasmids, bacteriophage, cosmids and phasmids. Nutrigenomics and its nutritional implications.

Unit II Genetic Engineering and Plant Tissue Culture**10hrs.**

Outline of genetic engineering in prokaryotes (microbial cells), concepts of molecular cloning, plant tissue culture, micro propagation, transgenic plants, genetically modified foods-golden rice, flavr savr tomato and Bt brinjal; enlisting applications of genetic engineering, isolation of DNA and Plasmids.

Unit III - Fermentation Biotechnology**8hrs.**

General structure of bioreactors and listing types, bacterial growth curve, batch and continuous culture, environmental factors, basic concepts of downstream processing, definition of biochips and biosensors

Unit IV- Use of Microbes in Food Industry**8hrs.**

Primary metabolites, secondary metabolites, synthesis of citric acid, glutamate, xanthan gum, vitamin B12, riboflavin and Single Cell Protein – spirulina and yeast biomass

Unit V - Enzyme Biotechnology**9hrs.**

Soluble enzymes, immobilization of enzymes – methods of immobilization, role of enzymes in food industry, safety assessment of transgenic crops

Text Books:

2. Dubey, R.C., 2014, A Text Book of Biotechnology, 5th revised edition, S. Chand and Company Ltd., New Delhi.
2. Green, P.J., 2010, Introduction to Food Biotechnology, CRC Press, USA.

Reference Books:

1. Dietrich Knorr, 2017, Food Biotechnology, Marcel Dekker Inc., New York.
2. Owen, P. Ward, 2018, Fermentation Biotechnology, Principles, Processes and Products, Prentice Hall, Advanced Reference Series, New Jersey, 07632

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

NUTRITION EDUCATION AND COMMUNICATION

Course Code:23FSN263
L-T-P – 3 0 0 -3

Hours of Instruction/ week – 3

No. of Credits – 3

Total 30 hrs.

Pre requisite: Nutrition & counseling.

Course Objectives:

1. To expose on the methods of nutrition education
2. Understand the significance of Information Education and Communication (IEC) tools for nutrition education
3. Develop skills on how to plan, execute and evaluate a nutrition education programme.

Course Outcomes:

CO1: Understand appropriate skills for developing nutrition education materials

CO2: Gain knowledge on mass communication, media and aid tools for nutrition education

CO3: Utilize different communication tools for nutrition education

CO4: Gained knowledge to organize nutrition education programmes

CO5: Understand the various approaches and strategies for improving nutritional status and health

Skills: Develop skills in organizing nutrition education programmes

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	3	3	-	1	-	-	1
CO2	1	-	-	1	3	3	-	1	-	-	1
CO3	1	-	-	1	3	3	-	1	-	-	1
CO4	1	-	-	1	3	3	-	1	-	-	1
CO5	1	-	-	1	3	3	-	1	-	-	1

Syllabus:

Unit I - Nutrition Education

6hrs.

Nutrition Education Meaning, nature and importance of nutrition education to the community and the lessons to be taught. Training workers in nutrition education programs, integration of nutrition education with education and extension work. Principles of planning, executing and evaluating nutrition education programs, problems of nutrition education, Nutrition education approaches

Methods of Nutrition Education - Direct and Indirect Methods , Individual and Group Contacts, Types, Methods (Participatory Learning Method, Village Resource mapping, Focus group discussion), Merits and Demerits

Unit II - Mass Communication in Nutrition Education

6hrs.

Definition, Merits and Demerits, Types – Print Media, Newspapers, Magazine, Leaflets, Pamphlets, Radio, Television, Films, Film Strips

Unit III - Tools in Nutrition Education

6hrs.

IEC Materials - Significance of IEC materials, types, Advantages and Limitations, Design and development of IEC materials

Related Experiences

Preparation of chart or poster or leaflets

Digital Health Interventions: Mobile Health, Mobile App, online communication, Dietary survey, Web sources

Uses of Folk Media in Nutrition Education - Types of Folk Media, Merits and Demerits

Related Experiences

Preparation of Skits or Puppet Shows or Villupattu

Unit IV - Organizing Programmes in Nutrition Education

6 hrs.

Introduction – Selection of Theme, Planning the Programme, Executing the Programme, Evaluation of the Programme

Unit V Approaches and Strategies for improving nutritional status and health

6 hrs.

Approaches and Strategies for improving nutritional status and health, Health-based interventions, Food-based interventions including fortification and genetic improvement of foods, supplementary feeding, Nutrition education for behaviour change, environmental sanitation, Food Nutrition and health WASH interventions, National and state governmental nutrition education intervention programmes.

Text books:

1. Adivi Reddy, A. Extension Education, Srilakshmi Press, Bapatla, 2001.
2. Srilakshmi, B., Nutrition Science, 6th Edition, New Age International (P) Ltd., New Delhi, 2017.

Reference books:

1. John Antony, D. Skills of Counseling, Micro Skill Model, Includes Kinetics and Focusing, Anugraha Publications, 2003.
2. Venkataiah, S.E.D, New Dimensions of Extension Education, Anmol Publications, New Delhi, 2001.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar
