



AMRITA

VISHWA VIDYAPEETHAM

A Multi Campus University with 'A++' Grade Accreditation by NAAC

AMRITA SCHOOL OF MEDICINE

Amrita Centre for Allied Health Sciences

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CURRICULUM

MSc Clinical Nutrition and Food Science (With effect from 2024 onwards)

A Super Specialty Tertiary Care Hospital Accredited by ISO 9001-2008, NABL & NABH

Our Chancellor



SPIRITUAL PRINCIPLES IN EDUCATION

“In the gurukulas of ancient rishis, when the master spoke it was love that spoke; and at the receiving end disciple absorbed of nothing but love. Because of their love for their Master, the disciples’ hearts were like a fertile field, ready to receive the knowledge imparted by the Master. Love given and love received. Love made them open to each other. True giving and receiving take place where love is present. Real listening and ‘sradd-ha’ is possible only where there is love, otherwise the listener will be closed. If you are closed you will be easily dominated by anger and re-sentment, and nothing can enter into you”.

“Satguru Mata Amritanandamayi Devi”

Introducing AIMS

India is the second most populous nation on earth. This means that India's health problems are the world's health problems. And by the numbers, these problems are staggering 41 million cases of diabetes, nearly half the world's blind population, and 60% of the world's incidences of heart disease. But behind the numbers are human beings, and we believe that every human being has a right to high-quality healthcare.

Since opening its doors in 1998, AIMS, our 1,200 bed tertiary care hospital in Kochi, Kerala, has provided more than 4 billion rupees worth of charitable medical care; more than 3 million patients received completely free treatment. AIMS offers sophisticated and compassionate care in a serene and beautiful atmosphere, and is recognized as one of the premier hospitals in South Asia. Our commitment to serving the poor has attracted a dedicated team of highly qualified medical professionals from around the world.

The Amrita Institute of Medical Sciences is the adjunct to the term "New Universalism" coined by the World Health Organization. This massive healthcare infrastructure with over 3,330,000 sq. ft. of built-up area spread over 125 acres of land, supports a daily patient volume of about 3000 outpatients with 95 percent inpatient occupancy. Annual patient turnover touches an incredible figure of almost 800,000 outpatients and nearly 50,000 inpatients. There are 12 super specialty departments, 45 other departments, 4500 support staff and 670 faculty members.

With extensive facilities comprising 28 modern operating theatres, 230 equipped intensive-care beds, a fully computerized and networked Hospital Information System (HIS), a fully digital radiology department, 17 NABL accredited clinical laboratories and a 24/7 telemedicine service, AIMS offers a total and comprehensive healthcare solution comparable to the best hospitals in the world. The AIMS team comprises physicians, surgeons and other healthcare professionals of the highest caliber and experience.

AIMS features one of the most advanced hospital computer networks in India. The network supports more than 2000 computers and has computerized nearly every aspect of patient care including all patient information, lab testing and radiological imaging. A PET(Positron Emitting Tomography) CT scanner, the first of its kind in the state of Kerala and which is extremely useful for early detection of cancer, has been installed in AIMS and was inaugurated in July 2009 by Dr. A. P. J. Abdul Kalam, former President of India. The most recent addition is a 3 Tesla Silent MRI.

The educational institutions of Amrita Vishwa Vidya Peetham, a University established under section 3 of UGC Act 1956, has at its Health Sciences Campus in Kochi, the Amrita School of Medicine, the Amrita Centre for Nano sciences, the Amrita School of Dentistry, the Amrita College of Nursing, and the Amrita School of Pharmacy, committed to being centres of excellence providing value-based medical education, where the highest human qualities of compassion, dedication, purity and service are instilled in the youth. Amrita School of Ayurveda is located at Amritapuri, in the district of Kollam. Amrita University strives to help all students attain the competence and character to humbly serve humanity in accordance with the highest principles and standards of the healthcare profession.

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Part I

Rules and Regulations

I.2. Medium of Instruction:

English shall be the medium of instruction for all subjects of study and for ex-aminations.

II.3. Eligibility:

Candidates for admission to the **M.Sc., CLINICAL NUTRITION and FOOD SCIENCE DEGREE COURSE UNDER ALLIED HEALTH SCIENCES** should have passed Degree in any of the following courses from a recognized University B.Sc., Nutrition Dietetics and Food Service Management/ Food Science and Nutrition/ Clinical Nutrition and Dietetics/ Food Service Management and Dietetics/ Home Science (with majors in Nutrition and Dietetics)/ Human Science (with majors in Nutrition and Dietetics)

II. General Rules:

Admissions to the courses will be governed by the conditions laid down by the University from time to time and as published in the Regulations for admissions each year.

I.1. Duration of the Course

Duration details are mentioned under clause No.I of this booklet. Duration of the course:

Mentioned under clause no. I

Duration of the Course : 2 Years

Weeks available per year: 52 weeks

Holidays : 5 weeks

Examination (including preparatory) : 6 weeks Extra-curricular activities : 2 weeks

available : 39 weeks

Hours per week : 40 hours

Hours available per academic year : 1560 (39 weeks x 40 hours)

Internship wherever specified are integral part of the course and needs to be done in Amrita Institute of Medical Sciences, Centre for Allied Health Sciences, Kochi itself.

II.2. Discontinuation of studies

Rules for discontinuation of studies during the course period will be those decided by the Chairman / Admissions, and is published in the “Terms and Conditions” every year.

II.3. Educational Methodology

Learning occurs by attending didactic lectures, as part of regular work, from co-workers and senior faculty, through training offered in the workplace, through reading or other forms of self-study, using materials available through work, using materials obtained through a professional association or union, using materials obtained on students own initiative, during working hours at no cost to the student.

II.4. Academic Calendar

SEMESTER SCHEME

FIRST SEMESTER

Commencement of classes – August Sessional exam – October

Pre-University Examination - 01 January – 15 January University exam (with practical) –15

January - 30 January

SECOND SEMESTER

Commencement of classes – February Sessional exam – May

Pre-University Exam - 01 July – 15 July University exam (with practical) – 15 July – 30 July

THIRD SEMESTER

Commencement of classes – August Sessional exam – October

Pre-University Examination - 01 January – 15 January University exam (with practical) –15

January - 30 January

FOURTH SEMESTER

Commencement of classes – February Sessional exam – May

Pre-University Exam - 01 July – 15 July University exam (with practical) – 15 July – 30 July

III. Examination Regulations:

III.1. Attendance: 75% of attendance (physical presence) is mandatory. Medical leave or other types of sanctioned leaves will not be counted as physical presence. Attendance will be counted from the date of commencement of the session to the last day of the final examination in each subject.

III.2. Internal Assessment:

1. Regular periodic assessment shall be conducted throughout the course. At least one sessional examination in theory and preferably one practical examination should be conducted in each subject. The Pre-University examination should be of the same pattern of the University Examination. The marks obtained in assignments / oral / viva / practical shall be taken to calculate the internal assessment.
2. A candidate should secure a minimum of 50% marks in the internal assessment in each subject (separately in theory and practical) to be eligible to appear for the University examination.
3. The internal assessment will be done by the department once during the course and final model exam which will be the same pattern of University Examination.
4. Each student should maintain a logbook and record the procedures they do and the work patterns they are undergoing. It shall be based on periodical assessment, evaluation of student assignment, preparation for seminar, clinical case presentation, assessment of candidate's performance in the sessional examinations, routine clinical works, logbook and record keeping etc.
5. Day to day assessment will be given importance during internal assessment and weightage for internal assessment shall be 20% of the total marks in each subject.

6. Sessional examination as mentioned above and the marks secured by the students along with their attendance details shall be forwarded to the Principal.

III.3. University Examinations:

- University Examination shall be conducted at the end of every semester.
- A candidate who satisfies the requirement of attendance and internal assessment marks, as stipulated by the University shall be eligible to appear for the University Examination.
- One semester will be 6 months including the days of the University Examination. Year will be counted from the date of commencement of classes, which will include the inauguration day.
- The minimum pass for internal assessment is 50% and for the University Examination is 50%. However, the student should score a total of 50% (adding the internal and external examination) to pass in each subject (separately for theory and practical)
- If a candidate fails in either theory or practical paper, he/she has to re-appear for both the papers (theory and practical)
- Maximum number of attempts permitted for each paper is five (5) including the first attempt.
- The maximum period to complete the course shall not exceed 4 years.
- Number of candidates for practical examination should be maximum 12 to 15 per day
- One internal and external examiner should jointly conduct the theory evaluation and practical examination for each student during the final semester.

III.4. Eligibility to appear university Examination:

A student who has secured 50% marks for Internal Assessment is qualified to appear for University Examination provided he/she satisfies percentage of attendance requirement as already mentioned at the III (1) of the clause.

III.5. Valuation of Theory – Revaluation Papers:

1. Valuation work will be undertaken by the examiners in the premises of the Examination Control Division in the Health Sciences Campus.
2. There will be Re-Valuation for all the University examinations. Fees for re-valuation will be decided by the Principal from time to time.
3. Application for revaluation should be submitted within 10 days from date of result of examination declared and it should be submitted to the office with payment of fees as decided by the Principal.

III.6. Supplementary Examinations:

Every regular University examination will be followed by a supplementary examination, which will normally be held within four to six months from the date of completion of the regular examination.

As stipulated under clause No. 2 under Internal Assessment, HOD will hold an internal examination three to four weeks prior to the date of the University Examination. Marks secured in the said examination or the ones secured in the internal examination held prior to the earlier University Examination whichever is more only will be taken for the purpose of internal assessment. HODs will send such details to the Principal ten days prior to the date of commencement of University examination.

Students who have not passed / cleared all or any subjects in the University examination will be permitted to attend the next semester classes. However, he / she can appear for the final semester University Examination, only if he / she clear all the subjects in the previous semester University examinations.

Same attendance and internal marks of the regular examination will be considered for the supplementary examination, unless the HOD furnishes fresh internal marks and attendance after conducting fresh examination.

Students of supplementary batches are expected to prepare themselves for the University Examinations. No extra coaching is expected to be provided by the Institution. In case at any time the Institution has to provide extra coaching, students will be required to pay fees as fixed by the Principal for the said coaching.

III.7. Rules regarding carryover subjects:

A candidate will be permitted to continue the next semester of the course even if he/she has failed in the previous semester University Examinations. However, he / she can appear for the final semester University Examination, only if he / she clear all the subjects in the previous semester (first, second and third semester) University examinations.

IV. Criteria for Pass in University Examination - Regulations:

IV.1. Eligibility criteria for pass in University Examination:

In each of the subjects, a candidate must obtain 50% in aggregate for a pass and the details are as follows:

- A separate minimum of 50% for Internal Assessment
- 50% in Theory & 50% in Oral / Viva
- A separate minimum of 50% in aggregate for Practical / Clinics (University Examinations)
- Overall 50% is the minimum pass in subject aggregate (University Theory + Viva / Oral + Practical + Internal Assessment)

IV.2. Evaluation and Grade:

1. Minimum mark for pass shall be 50% in each of the theory and practical papers separately (including internal assessment) in all subjects.
2. A candidate who passes the examination in all subjects within aggregate of 50% marks and above and less than 65% shall be declared to have passed the examination in the second class.

3. A candidate who passes the examination in all subjects in the first attempt obtaining not less than 65% of the aggregate marks for all the three years shall be declared to have passed the examination with First Class.
4. A candidate who secures an aggregate of 75% or above marks is awarded distinction. A candidate who secures not less than 75% marks in any subject will be deemed to have passed the subject with distinction in that subject provided he / she passes the whole examination in the first attempt.
5. A candidate who takes more than one attempt in any subject and passes subsequently shall be ranked only in pass class.
6. A Candidate passing the entire course is placed in Second class / First class / Distinction based on the cumulative percentage of the aggregate marks of all the subjects in the I and final University Examinations
7. Rank in the examination: - Aggregate marks of all two-year regular examinations will be considered for awarding rank for the M.Sc. Graduate Examination.

V. General considerations and teaching / learning approach:

There must be enough experience to be provided for self-learning. The methods and techniques that would ensure this must become a part of teaching-learning process. Proper records of the work should be maintained which will form the basis for the students' assessment and should be available to any agency that is required to do statutory inspection of the school of the course.

Research Activities:

The candidate has to maintain a record of research activities done by him/her and keeps a project record (to be submitted to the Principal before Part II examination).

Credits

The term credit is used to describe the quantum of syllabus for various programmed in terms and hours of study. It indicates differential weightage given according to the contents and duration of the courses in the curriculum design.

The minimum credits requirement for a M.Sc Clinical Nutrition programme shall be 97.

Credits will be assigned on the basis of the lectures (L) / tutorials (T) / Clinical Rotation (CR) / laboratory work (P) / Research Project (RP).

L - One credit for one-hour lecture per week (1 credit = 15 hours)

T/P - One credit for every two hours of laboratory or practical (1 credit = 30 hours)

CT - One credit for three hours of clinics (1 credit = 45 hours)

CR - One credit for two hours of clinical rotation (1 credit = 30 hours)

RP - One credit for two hours of dissertation or Project work per week - max credit 20-25 (1 credit = 30 hours)

	Lecture -L	Tutorial -T	Practical -P	Clinical Training/Rotation - CR	Research Project - RP
1 Credit	1 Hour	2 Hours	2 hours	3 Hours	1 hour
15 weeks	15 Hours	30 Hours	30 Hours	45 Hours	15 Hours

The UGC recommended 10-point grading system with the following letter grades are given below:

CBCS Grading System - Marks equivalence table of Grades and Grade Points

Letter Grade	Grade Point	Range of Marks
O (Outstanding)	10	86-100
A+ (Excellent)	9	70-85
A (Very Good)	8	60-69
B+ (Good)	7	55-59
B Pass	6	50-54
Ab (Absent)	0	-
F (Fail)	0	-

A student obtaining Grade F/Ab shall be considered failed and will be required to reappear in the examination.

SCHEME OF CURRICULUM AND EXAMINATION

FIRST YEAR SEMESTER I													
Course number	Course code	Category	Course Title	Credits	Lecture	Tutorial/Clinical training	practical/research project	Total Hours	Attendance (%)	Continuous Internal assessment CIA- Theory/ Practical	End semester Assessment		Grand Total
											Theory (b)	Practical/viva(c)	
1	24CNF501	L1	Medical Nutrition Therapy	4	60		-	60	80	50	100	-	100
2	24CNF502	L2	Nutritional Biochemistry-I	2	30		-	30	80	50	100	-	100
3	24CNF503	L3	Research Methodology and Biostatistics	2	30		-	30	80	50	100	-	100
4	24CNF504	L4	Pharmacology	4	60		-	60	80	50	100	-	100
5	22AVP103	L5	Mastery Over Mind	2	30		-	30	80	50	100	-	100
6	24CNF581	CT1	Clinical Rotations	10		300	-	300	80	50	-	50	100
Total				24	210	300		510					600

FIRST YEAR SEMESTER II													
Course number	Course code	Category	Course Title	Credits	Lecture	Tutorial/Clinical training	practical/research project	Total Hours	Attendance (%)	Continuous Internal assessment CIA- Theory/ Practical(a)	End semester Assessment		Grand Total
											Theory (b)	Practical/viva(c)	
7	24CNF511	L6	Advanced Nutrition	4	60		-	60	80	50	100	-	100
8	24CNF512	L7	Applied Nutrition	4	60		-	60	80	50	100	-	100
9	24CNF513	L8	Nutritional Biochemistry-II	2	30		-	30	80	50	100	-	100
10	24CNF514	L9	Elective Paper-I Precision Nutrition	1	15		-	15	80	50	100	-	100
11	24CNF599	RP1	Dissertation I	2			60	60	80	50	-	50	100
12	24CNF582	CT2	Clinical Rotation	10		300	-	300	80	50	-	50	100
Total				23	165	300	60	525					600

SECOND YEAR SEMESTER III													
Course number	Course code	Category	Course Title	Credits	Lecture	Tutorial/Clinical training	practical/research project	Total Hour	Attendance (%)	Continuous Internal assessment CIA-	End semester Assessment		Grand Total Theory +(b÷2) =100 Practical :a+c=100
											Theory (b)	Practical/viv a(c)	
13	24CNF601	L10	Critical Care Nutrition	4	60		-	60	80	50	100	-	100
14	24CNF602	L11	Public Health Nutrition	2	30		-	30	80	50	100	-	100
15	24CNF603	L12	Compulsory Elective Paper-II Sports Nutrition	2	30			30	80	50	100	-	100
16	24CNF681	CT3	Research Internship	2			90	90	80	50	-	50	100
17	24CNF682	RP2	Amrita Serve Project	3			135	135	80	50	-	50	100
18	24CNF698	RP3	Dissertation II	2		300	60	60	80	50	-	50	100
19	24CNF683	CT4	Clinical Rotation	10				300	80	50	-	50	100
Total				25	120	300	285	705					700

SECOND YEAR SEMESTER IV														
Course number	Course code	Category	Course Title	Credits	Lecture	Tutorial/Clinical training	practical/research project	Total Hours	Attendance (%)	Continuous assessment CIA- Practical (a)	Internal Theory/ Theory/ Practical (a)	End semester Assessment		Grand Total Theory +(b÷2) =100 Practical: a+c=100
												Theory (b)	Practical/viva (c)	
20	24CNF699	RP4	Dissertation III	10			300	300	80	50		50	100	
21	24CNF684	CT5	Clinical Rotation	10		300		300	80	50		50	100	
22	24CNF611	L13	Elective paper-III -Nutrigenetics	1	15			15	80	50	100	-	100	
Total				21	15	300	300	615					300	

Semester 1	Credits	Lecture	Tutorial/Clinical training	practical/research project	Hours
Medical Nutrition Therapy	4	60			60
Nutritional Biochemistry-I	2	30			30
Research Methodology and Biostatistics	2	30			30
Pharmacology	4	60			60
MAOm mastery	2	30			30
Clinical Rotations	10		300		300
Semester 2					
Advanced Nutrition	4	60			60
Applied Nutrition	4	60			60
Nutritional Biochemistry-II	2	30			30
Elective Paper-I Precision Nutrition	1	15			15
Dissertation	2			60	60
Clinical Rotation	10		300		300
Semester 3					
Critical Care Nutrition	4	60			60
Public Health Nutrition	2	30			30
Compulsory Elective Paper-II Sports Nutrition	2	30			30
Research Internship	2			90	90
Amrita Serve Project	3			135	135
Dissertation	2			60	60
Clinical Rotation	10		300		300
Semester 4					
Dissertation	10			300	300
Clinical Rotation	10		300		300
Elective paper- III Nutri-genetics	1	15			15
Total	93				2355

Semester	Credits	Lecture	Tutorial/Clinical training	practical/research project	Hours	Total Marks
Semester 1	24	210	300	-	510	600
Semester 2	23	165	300	60	525	600
Semester 3	25	120	300	285	705	700
Semester 4	21	15	300	300	615	300
Total	93	510	1200	645	2355	2200

PART II

SYLLABUS

SEMESTER I

24CNF501

Medical Nutrition Therapy

4

1. **Medical Nutrition Therapy for Anaemia: Iron – related blood disorders** - Iron deficiency anaemia; Hemochromatosis; Iron toxicity. **Megaloblastic Anaemias** - Pernicious and other Vitamin B12 deficiency anaemias; Folic acid deficiency anaemia. **Other Nutritional Anaemias** - Copper deficiency anaemia; Anaemia of protein-energy malnutrition; Sideroblastic(pyridoxine-responsive) anaemia. **Non-nutritional Anaemias** - Sports anaemia (hypochromic microcytic transient anaemia); Anaemia of pregnancy; Anaemia of inflammation, infection or malignancy; Sickle cell anaemia; Thalassemias
2. **Medical Nutrition Therapy for gastrointestinal disorders** - Disorders of the oesophagus; Disorders of the stomach; Common Intestinal problems; Diseases of the small intestine; Intestinal Brush-Border Enzyme deficiencies; Inflammatory Bowel Diseases; Disorders of the large intestine.
3. **Medical Nutrition Therapy for pancreatic and liver disorders** - Physiology and functions of the liver; Laboratory assessment of liver function; Diseases of the liver; Physiology and functions of the gall bladder; Diseases of the gall bladder; Physiology and functions of the exocrine pancreas
4. **Medical Nutrition Therapy for cardiovascular disorders** - Prevalence and incidence; Pathophysiology and etiology; Atherosclerosis; Dietary lipids and coronary heart disease; Plasma lipoproteins; Lipoprotein metabolism; Dietary factors and coronary heart disease; Diet and hypertension; Diet and stroke; Diet and peripheral vascular disease; Diet and chronic heart failure; Micronutrients and cardiovascular disease
5. **Medical Nutrition Therapy for pulmonary disorders** - Relationships between nutrition and the pulmonary system; Overview of medical nutrition therapy in pulmonary disease; Aspiration; Asthma; Chronic obstructive pulmonary disease; Cystic fibrosis; Lung cancer; Pneumonia; Respiratory failure; Tuberculosis
6. **Medical Nutrition Therapy for renal disorders:** Physiology and function of the kidneys; Renal disease; Glomerular diseases; Diseases of the tubules and interstitium; Progressive nature of renal disease; End-stage renal disease; Nephrolithiasis

7. **Medical Nutrition Therapy for endocrine disorders** – Pathophysiology, diagnostic and screening criteria, management of diabetes mellitus, diabetes and age-related issues, implementing nutrition, self-management, acute complications, long-term complications, preventing diabetes, hypoglycemia of non-diabetic origin
8. **Nutritional care for weight management:** body weight components, regulation of body weight; weight management throughout life; weight imbalance: overweight and obesity; management of obesity in adults; common problems encountered in obesity management; weight management in children; weight imbalance: excessive leanness.
9. **Medical Nutrition Therapy for febrile and surgical conditions:** Fevers of short duration, chronic fevers and infections, pre-operative and post-operative nutrition
10. **Nutritional aspects of disease affecting the skeleton** – Overview of mineral ion homeostasis and bone metabolism; age-appropriate biochemical reference ranges; pharmaceutical agents commonly used in bone disease; rickets/osteomalacia; mineral ion homeostasis in preterm infants; corticosteroid-induced bone disease; osteoporosis associated with chronic disease; anorexia nervosa; senile osteoporosis
11. **Medical Nutrition therapy for metabolic disorders** – Newborn screening; goals of medical nutrition therapy; disorders of amino acid metabolism; disorders of organic acid metabolism; disorders of urea cycle metabolism; disorders of carbohydrate metabolism; glycogen storage diseases; disorders of fatty acid oxidation; role of nutritionist in medical nutrition therapy for metabolic disorders
12. **Medical Nutrition Therapy for neurological disorders:** Neurologic disease classification, nervous system wiring and lesions, medical nutrition therapy, problems with procurement of food, nutritional deficiencies or excesses

Reference Books:

1. Shils, Olson, Shike and Ross (1999). “*Modern Nutrition in Health and Disease*”, 9th edition, Williams & Wilkins
2. Marcia Nahikian Nelms and Sara Long, “*Medical Nutrition Therapy (Case study)*”, 2004, 2nd ed, Thomson Wadsworth Publications.
3. Whitney EN and Rolfes SR. “*Understanding Nutrition*”, 10th ed. West Publishing Co., 2004.
4. Marcia Nelms, Kathryn Sucher, “*Nutrition Therapy and Pathophysiology*”, 2007

5. Gottschlich M – *“The science and practice of nutrition support”*
6. Staci Nix, *“William’s Basic Nutrition and Diet Therapy”*, 12th ed, Mosby 2005.
7. Mahan and Escott- Stump, *“Krause’s Food, Nutrition and Diet Therapy”*, 12th ed WB Saunders.
8. Laura E Mataresse – *“Contemporary Nutrition Practice”* 2003, 2nd edition Saunders Publications
9. Srivastava, RK, *“Current Nutritional Therapy Guidelines in Clinical Practice”*, 2008
10. Grodner, *“Foundations and Clinical Applications of Nutrition”*, 2000.
11. Gibney M, *“Clinical Nutrition” Blackwell Publishing”*, 2005

Total Hours-30

1. Carbohydrate Metabolism:

Glycolysis, Cori's Cycle, Oxidation of pyruvates. Citric Acid Cycle, Hexose Mono Phosphate Shunt Pathway, Glucuronic acid Pathway, Gluconeogenesis, Glycogenolysis, Regulation of Glycogen Metabolism, Fructose Metabolism, Galactose Metabolism, Glyoxlate Cycle, Hormonal regulation of Blood Glucose, Hyperglycemia & Diabetes Mellitus, Diabetic Ketoacidosis, Glycosuria, Hypoglycemia, Pentosuria, fructosuria, galactosemia & Glycosycated Haemoglobin. Investigation of disorders of carbohydrate metabolism: glucose, Glucose tolerance tests & other tolerance tests

2. Metabolism of Proteins & Amino Acids:

Metabolism of individual amino acids, Catabolism of Amino Acids, Formation of Ammonia, Transamination and Oxidative deamination. Urea Cycle. Formation of Creatine and Creatinine. One Carbon Metabolism, Conversion of amino acids to specialized products.

Principles and methods for the estimation of Urea, creatine, creatinine, Total protein and Albumin

3. Common Inborn Errors of Metabolism:

Disorders of Carbohydrates metabolism - Glycogen storage diseases, galactosemia, fructose & Lactose intolerance.

Disorders of lipid metabolism-DYSLIPOPROTEINEMIA- Hypolipoproteinaemia, Hyper lipo proteinemia, Atherosclerosis and sphingolipidosis.

Disorders of Amino Acid metabolism, Cystinuria, Homocystinuria, Cystathionuria, Phenyl ketonuria, Alkaptonuria, Albinism. Maple Syrup Urine diseases, Hartnups's diseases.

Disorders of Nucleic acid metabolism - Gout, Lesch-Nyhan Syndrome,
Laboratory diagnosis of Inborn errors of metabolism

4. Vitamins and Co-Enzymes:

Vitamins- water Soluble-Chemistry, sources, RDA, Biochemical role, Deficiency and assay
Vitamins Fat soluble-chemistry, sources, RDA, biochemical role, Deficiency, toxicity and assay, Estimation of Vitamin A, C, E and B.

5.C.S.F and Other Body Fluids:

Physical and chemical examinations. Estimation of sugar, protein and chloride.

Composition and Chemical analysis of Synovial, Pleural, Peritoneal, Pericardial, Amniotic fluid etc., Estimation of sugar, protein and chloride in CSF Common Laboratory methods, estimation and its interpretation of Glucose, protein, Cholesterol (total & HDL), Uric Acid, Creatine, Creatinine, Urea, Triglyceride, phospholipids, Total lipids, Glycosylated Haemoglobin and tests for inborn errors of Amino acid metabolism.

6. Enzymes:

Classification, Co-enzymes, Co factors, Mechanism of enzyme action, factors affecting in Enzyme action, Enzyme Kinetics, Michaelis Menton constant, Enzyme Inhibition, Regulatory enzymes, Immobilization of enzymes.

7. Clinical Enzymology

Enzyme activity determinations-End point assay and Kinetic assay. Principles & Methods for the estimation of Phosphatases, Trasaminases, Amylase, lipase, Lactate dehydrogenase, Cretine kinase, Ceruloplsmin, Glucose 6 phosphate dehydrogenase, Aldolase, 5'Nucleotidase, Leucine Amino peptidase, Gamma gluta-myl transpeptidase, Cholin esterase, Enolase, Isocitrate dehydrogenase, Isoenzymes in Diagnostic Biochemistry. Plasma enzyme pattern in diseases- MI, Liver disease, Muscle disease etc

8. Mineral Metabolism and Estimation

Calcium, phosphate, magnesium, sodium, potassium, Chloride, Iron, Copper, Zinc, Iodine: metabolism and disorders. Methodology of the estimation of the above minerals in blood, plasma and other body Fluids

9.Function Tests

Liver function tests: Disease of the liver-Jaundice,acute and chronic hepatitis, Cirrhosis, Cholestasis etc. ,Kidney function tests -Glomerular function and measurements, clearance tests, Tubular function tests, clinical syndromes, Gastro intestinal function tests . Collection ofGastric Juice. Tests for Gastric Function, Stimulation methods-Test Meals, Measurements of other Gastric Components, Malabsorption, Tests for occult blood in faces, Tests for malabsorption studies, Schilling test, D-xylose absorption tese, faecal fat estimation. -

Estimation of free and total acidity. Pancreatic function tests -Tests in Pancreatic diseases, Serum Enzymes and Urinary Enzymes -Direct stimulation tests and indirect stimulation of the pancreas-Sweat tests. Thyroid function tests-hyperthyroidism and hypothyroidism. Gonadal function tests –disorders in males and females. Fetal placental function tests -Hemolytic disease of New-borns, biochemical assay for fetal lung maturity, Biosynthesis of Estriol , measurements and clinical applications.

10. Acid-Base Balance

Body buffer system. Respiratory regulation of PH, renal regulation of PH. Disturbance in acid base balance, Anion gap, metabolic acidosis, metabolic alkalosis, Respiratory acidosis, Respiratory alkalosis, Fluid and Electrolyte balance, osmolality, methodology of Blood PH and Gases estimation.

Total hours- 30

- 1. Introduction to research and types of research:** Meaning of research, objectives of research, significance of research, research process, criteria of research
- 2. Defining research problem:** Selection of the problem, necessity of defining the problem, techniques in selecting a problem, examples
- 3. Research design:** Meaning of design, need for a research design, different research designs, basics of experimental designs, developing research plan, strengths and weakness, experimental, quasi experimental and correlational
- 4. Sampling Design:** Sample and universe, sampling, different methods of sampling, selection of a random sample, census and survey
- 5. Measurement and scaling techniques:** Measurement in research, measurement tools, scaling and scaling techniques
- 6. Data collection:** Methods of data collection, questionnaires/schedule, selection of appropriate method for data collection, guidelines for constructing questionnaire, guidelines for interviewing, sample questionnaires
- 7. Data Analysis:** Introduction to data analysis, demo with SPSS software
- 8. Dissertation/Report writing:** Technique of interpretation, report writing/dissertation writing, how to critique an article

Biostatistics/Statistics

- 1. Introduction:** Basic concepts (data, sources of data, variable), objectives, role of biostatistics/statistics, summary
- 2. Descriptive Statistics:** Ordered array, frequency distribution, measures of central tendency, measures of dispersion, summary
- 3. Basic probability concepts:** Introduction, elementary properties of probability, probability distributions (binomial, poisson, normal distribution) applications

4. Sampling: Sampling distributions, sample means and difference between two means, sample proportion and difference between two sample proportion, sampling, sampling methods (SRS, Sys, SrRs, cluster sampling), sample size and sample calculation

5. Testing of hypothesis and estimation: Testing of hypothesis, Type I and Type II error (critical region and power of the test), applications of testing of hypothesis, confidence interval for population mean, confidence interval for population proportion.

6. Analysis of variance (ANOVA): I-Introduction, CRD, RBD, LSD, factorial experiment, Summary

7. Correlation and Regression: Introduction, correlation, correlation co-efficient, Regression(model) using the regression equation, Summary

8. Non-parametric tests: Introduction, sign test, Wilcoxon signed rank test, median test, Mann-Whitney test and rank correlation, summary

9. Multiple regression and correlation; Logistic regression; ANCOVA: Introduction, Methods and application

10. Vital Statistics: Introduction, death rates and ratios, measures of fertility, measures of morbidity, measures of mortality, indicators of levels of health

Reference Books:

- 1.Kothari CR, "Research Methodology, Methods and Techniques", Wiley Eastern Ltd, New Delhi, 2004.
- 2.Gupta. S.P., "Statistical Methods", Sultan Chand & sons, New Delhi, 2002.

1. **General Pharmacology** – Evaluation of drugs in man, drug prescribing and drug interactions Sedatives, hypnotics and pharmacotherapy of insomnia.
2. **Drugs effective in convulsive disorders-** Opioid analgesics. Analgesic – antipyretics and non-steroidal anti-inflammatory drugs. Psychopharmacology
3. **Drug therapy of parkinsonism and other degenerative disorders of the brain-** Local anesthetics, Adrenergic and adrenergic blocking drugs. Histamine and anti histamic drugs
4. Pharmacotherapy of cough
5. Pharmacotherapy of bronchial asthma and rhinitis
6. Digitalis and pharmacotherapy of cardiac failure
7. Vasodilator drugs and pharmacotherapy of angina pectoris
8. Pharmacotherapy of hypertension
9. Drugs and blood coagulation
10. Drugs effective in iron deficiency and other related anemias
11. Diuretics
12. Emetics, drug therapy of vomiting, vertigo and diarrhea
13. Pharmacotherapy of constipation
14. Pharmacotherapy of peptic ulcer
15. Sulfonamides, Trimethoprim, cortimoxazole, nitrofurans and quinolones
16. Penicillins and antibiotics effective mainly against gram positive organisms

17. Amonoglycosides and other antibiotics effective mainly against gram negative organisms
18. Antibiotics effective against both gram positive and gram negative organisms
19. General principles of chemotherapy of infections
20. Chemotherapy of urinary tract infections
21. Antiseptics, disinfectants and insecticides
22. Thyroid and antithyroid drugs
23. Insulin and antidiabetic drugs
24. Adrenal cortical steroids
25. Vitamins and antioxidants
26. Drugs, pregnancy and the newborn

Reference Books:

1. Essentials of Medical Pharmacology, Tripathi
2. Basics and Clinical Pharmacology, Katzung

1. Course Overview

Master Over the Mind (MAOM) is an Amrita initiative to implement schemes and organise university-wide programs to enhance health and wellbeing of all faculty, staff, and students (UN SDG -3). This program as part of our efforts for sustainable stress reduction gives an introduction to immediate and long-term benefits and equips every attendee to manage stressful emotions and anxiety facilitating inner peace and harmony.

With a meditation technique offered by Amrita Chancellor and world-renowned humanitarian and spiritual leader, Sri Mata Amritanandamayi Devi (Amma), this course has been planned to be offered to all students of all campuses of AMRITA, starting off with all first years, wherein one hour per week is completely dedicated for guided practical meditation session and one hour on the theory aspects of MAOM. The theory section comprises lecture hours within a structured syllabus and will include invited guest lecture series from eminent personalities from diverse fields of excellence. This course will enhance the understanding of experiential learning based on university's mission: "Education for Life along with Education for Living", and is aimed to allow learners to realize and rediscover the infinite potential of one's true Being and the fulfilment of life's goals.

2. Course Syllabus

Unit 1 (4 hours)

Causes of Stress: The problem of not being relaxed. Need for meditation -basics of stress management at home and workplace. Traditions and Culture. Principles of meditation– promote a sense of control and autonomy in the Universal Human Value System. Different stages of Meditation. Various Meditation Models. Various practices of Meditation techniques in different schools of philosophy and Indian Knowledge System.

Unit 2 (4 hours)

Improving work and study performance. Meditation in daily life. Cultivating compassion and good mental health with an attitude of openness and acceptance. Research and Science of Meditation: Significance of practising meditation and perspectives from diverse fields like science, medicine, technology. philosophy, culture, arts, management, sports, economics, healthcare, environment etc. The role of meditation for stress and anxiety reduction in one's life with insights based on recent cutting-edge technology. The effect of practicing meditation for the wholesome wellbeing of an individual.

Unit 3 (4 hours)

Communications: principles of conscious communication. Relationships and empathy: meditative approach in managing and maintaining better relationships in life during the interactions in the world, role of MAOM in developing compassion, empathy and responsibility, instilling interest, and orientation to humanitarian projects as a key to harness intelligence and compassion in youth. Methodologies to evaluate effective awareness and relaxation gained from meditation. Evaluating the global transformation through meditation by instilling human values which leads to service learning and compassion driven research.

TEXT BOOKS:

- 1.Mata Amritanandamayi Devi, "Cultivating Strength and vitality," published by Mata Amritanandamayi Math, Dec 2019
- 2.Swami Amritaswarupananda Puri , "The Color of Rainbow " published by MAM, Amritapuri.

REFERENCES:

- 1.Craig Groeschel, "Winning the War in Your Mind: Change Your Thinking, Change Your Life" Zondervan

Publishers, February 2019

2.R Nagarathna et al, “New Perspectives in Stress Management “Swami Vivekananda Yoga Prakashana publications, Jan 1986

3. Swami Amritaswarupananda Puri “Awaken Children Vol 1, 5 and 7 - Dialogues with Amma on Meditation”, August 2019

4. Swami Amritaswarupananda Puri “From Amma’s Heart - Amma’s answer to questions raised during world tours” March 2018

5. Secret of Inner Peace- Swami Ramakrishnananda Puri, Amrita Books, Jan 2018.

6. Mata Amritanandamayi Devi “Compassion :The only way to Peace:Paris Speech”, MA Center, April 2016.

7. Mata Amritanandamayi Devi “Understanding and collaboration between Religions”, MA Center, April 2016.

8. Mata Amritanandamayi Devi “Awakening of Universal Motherhood: Geneva Speech” M A center, April 2016.

3. Evaluation and Grading

Internal		External		Total
<i>Components</i>	<i>Weightage</i>		Practical (attendance and class participation) 60%	100%
Quizzes(based on the reading material)	20%	40%		
Assignments (Based on webinars and lecture series)	20%			

4. Course Outcomes (CO)

CO1: Relate to the causes of stress in one’s life.

CO2: Experiment with a range of relaxation techniques CO3: Model a meditative approach to work, study, and life.

CO4: Develop appropriate practice of MA-OM technique that is effective in one’s life CO5: Inculcate a higher level of awareness and focus.

CO6: Evaluate the impact of a meditation technique

***Programme Outcomes(PO)**(As given by NBA and ABET)

PO1: Engineering Knowledge

PO2: Problem Analysis

PO3: Design/Development of Solutions

PO4: Conduct Investigations of complex problems

PO5: Modern tools usage

PO6: Engineer and Society

PO7: Environment and Sustainability

PO8: Ethics

PO9: Individual & Team work

PO10: Communication

PO11: Project management & Finance

PO12: Lifelong learning

CO – PO Affinity Map

PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PSO2	PSO3
CO															

CO1	3	3	3	2		-	2	3	-	3	-	3	-	-	-
CO2	3	3	3	2	2	-	2	3	3	3	-	3	-	-	-
CO3	3	3	2	2	2	2	2	3	3	3	-	3	-	-	-
CO4	3	3	3	2	-	2	3	3	3	3	-	3	-	-	-
CO5	3	2	2	2	-	2	-	3	2	2	-	2	-	-	-
CO6	3	2	2	2	3	2	-	3	2	2	-	2	-	-	-

SEMESTER-II

24CNF511

Advanced Nutrition

4

- 1. Energy:** Energy content of foods. Physiological fuel value – review. Measurement of energy expenditure: BMR, RMR, Thermic effect of feeding and physical activity, methods of measurement. Estimating energy requirements of individuals and groups. Regulation of energy metabolism: control of food intake, digestion, absorption and body weight.
- 2. Carbohydrates:** Types, classification, digestion and transport – review, dietary fibre, fructo-oligosaccharides, resistant starch – chemical composition and physiological effects. Glycemic index of foods. Sweeteners – nutritive and non-nutritive.
- 3. Proteins:** Classification, digestion, absorption and transport – review. Metabolism of proteins: Role of muscle, liver and gastro intestinal tract. Protein quality, methods of evaluating protein quality. Protein and amino acid requirements. Therapeutic applications of specific amino acids: Branched chain, glutamine, arginine, homocysteine, cysteine, taurine.
- 4. Lipids:** Classification, digestion, absorption, transport – review. Functions of EFA. Role of n-3, n-6 fatty acids in health and disease. Requirements of total fat and fatty acids. Trans fatty acids. Prostaglandins.
- 5. Water:** Regulation of intra and extra cellular volume. Osmolality, water balance and its regulation.
- 6. Minerals:** ° Macro minerals: calcium, phosphorus, magnesium, sodium, potassium and chloride. Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride. Trace minerals: selenium, cobalt, chromium, vanadium, silicon, boron, nickel
- 7. Vitamins:** Historical background, structure, food sources, absorption and transport, metabolism, biochemical function, assessment of status. Interactions with other nutrients. Physiological, pharmacological and therapeutic effects, toxicity and deficiency with respect to the following.

Reference Books:

1. Shils, Olson, Shike and Ross (1999). Modern Nutrition in Health and Disease, 9th edition, Williams & Wilkins
2. Groff JL and Gropper SS: Advanced Nutrition and Human Metabolism, 3rd ed. Wadsworth Thomson Learning
3. Whitney EN and Rolfes SR. Understanding Nutrition, 10th ed. West Publishing Co., 2004.
4. Robinson CH, et al Normal and Therapeutic Nutrition, 17th ed, Macmilan Publishing Co, New York
5. Baamji M, Prahlad N, Vinodini R (1998), Textbook of Human Nutrition, Oxford & IBH Pub Co. New Delhi
6. Staci Nix, William's Basic Nutrition and Diet Therapy, 12th ed, Mosby 2005.
7. Mahan and Escott- Stump, Krause's Food, Nutrition and Diet Therapy, 12th ed WB Saunders.
8. Michael Zimmermann, "Micronutrients in the Prevention and Therapy of Disease" 9th ed, 2000

1. Nutrition during different stages of life

Nutrition during Pregnancy: Physiology of pregnancy, nutritional requirements and dietary guidelines, effect of Nutritional Status on pregnancy outcome, nutrition-related disruptions in fertility (under and over nutrition), nutrition related complications, complications of pregnancy, HIV/AIDS during pregnancy – Dietary concerns

Nutrition during lactation: Physiology of Lactation, Human milk composition, Nutritional requirements & dietary guidelines, Benefits of Breast Feeding, Galactogouges, Lactation Management in Normal & Special conditions,

Nutrition in infancy: Physiological development, Motor, Cognitive development, Energy and nutrient needs, feeding in early and late infancy, Common nutrition problems, Feeding Preterm and low birth weight infants,

Nutrition in Toddlerhood and Preschool, Childhood & Preadolescent: Growth and development, Nutritional requirements, Nutrition for children with special health care needs, feeding problems, Nutritional concerns and prevention of nutrition related disorders i. Obesity – underweight, ii. Deficiency condition, iii. Allergies, eating disorders

Nutrition in adolescence: Growth and development, Physiological and Psychological changes, Nutritional requirements of adolescents, Health and eating related behavior

Nutrition in Adult and Elderly: Nutrition and work efficiency. Menopausal and post menopausal women, hormonal changes, nutritional requirement of the adult, Common health problems in old age, Problems of feeding during old age, Nutritional consideration & Menu planning for adult and old age

2. Nutrition in special conditions: Nutritional requirements for extreme environments, Nutritional requirements for space missions

3.Role of Functional foods in Health & Disease

History, Definition, Classification, Sources, Physiological effects - effects on human health and potential applications in risk reduction of diseases of the following:

- Prebiotics
- Probiotics
- Symbiotic
- Non-digestible carbohydrates/oligosaccharides: Dietary fibre, Resistant starch, Gums
- Other Food Components
 - Polyphenols: Flavonoids, catechins, isoflavones, tannins
 - Phytoestrogens and Phytosterols
 - Pigments: Lycopene, Curcumin

Reference Books:

1. Groff JL and Gropper SS: “*Advanced Nutrition and Human Metabolism*”, 3rd ed. Wadsworth Thomson Learning
2. Mahan and Escott- Stump, “*Krause’s Food, Nutrition and Diet Therapy*”, 12th ed. WB Saunders.
3. Alpers DH, Stenson FW, Bier MD – “*Manual of Nutritional Therapeutics*” 4th edition. Lippincott Williams and Wilkins, 2002
4. Mitchell, “*Nutrition Across Life span*” 1997

1. Molecular Biology and Immunology

DNA replication, DNA Polymerase, Cell cycle, DNA repair.

Transcription, inhibition of transcription, genetic code, post transcriptional processing, reverse transcriptase.

Protein biosynthesis, post translational processing, inhibitors of protein synthesis.

Molecular genetics and gene expression, principles of breeding, autosomal, recessive, x- linked recessive, population genetics, gene location on chromosomes, mutations, recombination, mutagens, repression, operon, gene amplification, gene switching, transposition of genes, somatic recombination, enhancer, viruses.

Recombinant DNA technology.

Restriction endonuclease, DNA ligase, vectors, chimeric molecules, cloning, gene library, cloning strategies, insitu hybridization, blot techniques and applications, RFLP, Gene Therapy, Transgenesis, DNA finger printing, DNA sequencing, PCR, DNA probes, hybridoma technology.

Pre-natal diagnosis of genetic disorders.

Immunology: Principles of immunology, antigen, antibodies and their reactions. Immunoglobulins, MHC, Complement system, Interleukins, Interferons and Cytokines. Cellular immunity, immune responses and cells involved, autoimmunity, immuno deficiency diseases.

Immunological Techniques, MIF, TRC, ELISA, Immuno electrophoresis, double diffusion technique, immunofixation, Immunoassay of enzymes, Nephelometric immunoassay, Chemiluminescence immunoassay western blot, Immunofluorescence and Radio immunoassay.

Preparation, assessment and storage of antisera (polyclonal and monoclonal). Methods of assessing analytical sensitivity, specificity and standardization.

2.Nucleic Acids

Chemistry of purines, pyrimidines, nucleosides, nucleotides, nucleic acids, nucleosomes.
Structure of DNA and RNA.

3.Metabolism of Lipids:

Oxidation of fatty acids, Biosynthesis of fatty acids, Ketogenesis. Biosynthesis of Triglycerides, Phospholipids & Sphingolipids. Biosynthesis of cholesterol & Bile Acids, Plasma Lipoproteins, Apolipoproteins & Lipoprotein metabolism. Obesity, Fatty Liver, Lipotropic factors and ketosis.

PUFA, Lipid per oxidation & Eicosanoids-Prostaglandins & Leukotrienes . Lipid and Lipoprotein measurements- blood sampling and storage, Estimation of Lipids-Cholesterol, Triglycerides, Phospholipids & lipoproteins- Colorimetric and enzymatic methods

4.Inter – relation between the metabolism of Carbohydrate, lipids and proteins

Generation of ATP, substrate level phosphorylation & Oxidative phosphorylation
Brief outline of Electron transport chain

1. Introduction to Course: Lifestyle gene/diet interactions
2. Lifestyle gene/diet interactions; postprandial versus chronic dietary effects; exogenous/endogenous stressors; nature of bidirectional relationships (nutrigenetics /nutrigenomics; host/microbiota)
3. Dietary choices in nutrition and nutrigenomics
4. Microbiota: Current knowledge about host/microbiota interactions. Techniques employed
5. Effects of diet on microbiota/host interactions
6. Impact of physical activity on health and disease conditions
7. Sleep and diurnal cycles
8. Food and herbal/supplement interactions
9. Environmental Exposures and chronic diseases
10. Impact of westernized diet across ethnic and racial groups
11. Cultural and culinary practices: (Mediterranean diet, vegetarians, vegans) and evolutionary adaptation
12. Precision nutrition and lifestyle genomics in professional and recreational athletes
13. Lifestyle, nutritional habits and aging-associated neurodegenerative diseases
14. Nutrition, lifestyle, and cancer, Environmental conditions associated with cancer
15. Precision nutrition and lifestyle genomics autism disease spectrum and ADHD
16. Lifestyle, diet associated with heart disease, Genetics, precision nutrition and heart disease
17. Omega-3 deficiencies and inflammatory diseases: Inflammatory Bowel Disease, rheumatoid arthritis, Omega-3 deficiencies and inflammatory diseases: Covid-19 and others

SEMESTER III

24CNF601 Critical Care Nutrition Credits- 4 Total hours:60

1.Nutritional screening and nutritional status assessment of the critically ill. Nutritional support systems and other life-saving measures for the critically ill.

2.Nutritional Support-Introduction, Meeting the nutritional needs, Oral feeding and oral nutritional supplements. Enteral and parenteral nutrition support.Rationale and Criteria for Appropriate Nutrition Support

3.Enteral Nutrition-Indications and contraindications, Enteral access, Enteral formula composition, Tube feeding delivery systems, Tube feeding administration methods, Complications and monitoring

4.Parenteral Nutrition-

i. Patient selection, ii. Parenteral access, iii. Parenteral nutrition solutions, iv.Physical characteristics of parenteral formulas ,v. Commercially available protein sources, vi. Commercially available fat sources, vii. Methods of administration, viii. Complications and monitoring, ix.Refeeding syndrome

5.Transitional Feeding

i. Parenteral to enteral feeding, ii. Parenteral to oral feeding, iii. Enteral to oral feeding, iv.Oral supplements

6.Role of immuno enhancers, conditionally essential nutrients, immune suppressants, and special diets in critical care.

7.Patho-physiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like - Stress, trauma, sepsis, burns. CV complications and surgery. ESRD, dialysis,

transplant. Multiple organ failure. Cancer, AIDS, GI tract surgery, GER (Gastro-esophageal reflux) and complications, Hepatic failure and transplants, Neurosurgery

8. Complications of Nutritional Support Systems including Refeeding Syndrome

9. Rehabilitation diets – stages.

10. Diet related ethical issues in the terminally ill.

Reference Books:

1. Gottschlich M – *“The science and practice of nutrition support”*

2. Laura E Matarese – *“Contemporary Nutrition Practice”* 2003, 2nd edition Saunders Publications

3. Rombeau JL Caldwell DM, *“Text book of Enteral and Parenteral Nutrition”*

4. Rombeau JL Caldwell DM, *“Clinical Nutrition Enteral and Tube Feeding”* 2nd ed WBSaunders 1990.

Total hours:30

1. **Public Health Nutrition – An Overview**-Concept and importance of public health nutrition. Public health issues and problems, Health care system in India, Role of public nutritionist in health care delivery

2. **Public Health Problems** - Prevalence and management, Non-Communicable diseases- Obesity, Cardio-vascular diseases, Diabetes, Cancer and their preventive measures, **Nutrient deficiencies** – PEM, severe acute malnutrition, anemia, Vitamin D, Folic acid, IDD

3. **Assessment of nutritional status in community Settings**-Methods of nutritional assessment - ABCD technique, Dietary assessment – family diet survey, assessment of dietary intake of individuals, qualitative diet surveys, institutional diet surveys, food balance sheet

4. **Strategies to combat Public Health Problems**-Improving food and nutrition security - Green White and Blue revolution, Nutrition education - Principles of planning –, where, when, whom, Kitchen garden, food fortification, food enrichment, PDS, PHC

5. Nutrition Intervention programmes

National Nutrition Policy Preschool feeding programme, ICDS, MDM, SNP, WNP, ANP, BNP, NNAPP, FNB, NIDDCP, National Program for Prevention of Blindness due to Vitamin A Deficiency

6. Strategies to combat malnutrition

International organizations concerned with food and nutrition: FAO, WHO, UNICEF, CARE, AFPRO, CWS, CRS World Bank and others. National organizations concerned with Food and Nutrition: ICMR, ICAR, CHEB, CSWB, SSWB

Economics of Nutrition: Malnutrition and its economic consequences; Economics in Nutrition – Food security, food production and food pricing

Reference Books:

1. Gulani, K.K. 2005. Community Health Nursing. 1st Edition. Kumar Publishing House. New Delhi. Pp – 662 to 664.
2. Gupta M.C., Mahajan B.K. 2003. Textbook of Preventive and Social Medicine. Third Edition. Jaypee Brothers Medical Publishers. New Delhi. India. Pp- 355-357.
3. Kishore J. 2007. National Health Programmes of India. 7th Edition Century Publication. New Delhi. Pp- 340-361.
4. Oxford textbook of Public Health Ed. Roger Detels, James McEwen, Robert Beaglehole, and Heizo Tanaka Oxford University Press (OUP) 4th Edition: 2002.
5. Public Health at the Crossroads – Achievements and Prospects. Robert Beaglehole and Ruth Bonita 2nd Edition Cambridge University Press
6. Maxcy-Rosenau-Last Public Health & Preventive Medicine, Fourteenth Edition Ed Robert Wallace, MD, et al.
7. Epidemiology and Management for Health Care: Sathe, P.V. Sathe, A.P., Popular Prakashan, Mumbai, 1991
8. International Public Health: Diseases, Programs, Systems, and Policies by Michael Merson, Robert E Black, Anne J Mills - Jones and Bartlett Publishers
9. Preventive and Social Medicine, K Park, Bansaridas Bhanot Publishing House

ELECTIVE PAPER-2

24CNF603

Sports Nutrition

Credit- 2

Total hours:30

1. Introduction to physical activity and exercise – types, Body system involved in exercise Cardio respiratory, muscular and energy system. Definition of fitness. Substrate utilization during work.

2. Physical fitness assessment- cardio respiratory fitness, assessment of body composition, muscular fitness assessment, flexibility assessment.

3. Diet in exercise - Carbohydrates for exercise, carbohydrate loading, ergogenic aspects, carbohydrate based dietary supplements.

4. Role of protein, electrolytes changes in exercise, electrolytes & temperature regulation. Fluid & Electrolyte losses, fluid and electrolyte replacement. Role of vitamins and minerals during exercise, vitamin and mineral supplements for exercise

5. Yoga and Fitness, effect of yoga on immune system, endocrine system, nervous system, digestive system and muscular system, Health benefits of yoga.

Reference Books:

1. Roberta Larson Duyff. John Wiley & Sons, Inc, American Dietetic Association, complete food and Nutrition guide, 2nd edition 2002,

2. Nutrition for health fitness & sport Melvin H. Williams. 5th edition – 1999.

3. Udaiveer, Nutrition & Food, Anmol Publication Pvt. Ltd, New Delhi, 2005.

4. Guyton & Hall, Text book of Medical Physiology, 11th edition, 2006.

5. Gordon M. Wardlaw, Anne M. Smith contemporary Nutrition, Mc Graw – Hill International Edition, 2006.

6. Wc13 McGraw – Hill. Vishwannath M. Sardesai, Introduction to clinical Nutrition, Marcel Dekker, Inc New York, 2003.

SEMESTER-IV

**Elective Paper 3-
24CNF611**

Nutrigenetics

Credits-1

Total hours:15

- 1.Introduction to nutritional genetics and genomics-** Gene and DNA structure
- 2.**Nutrients and Gene expression with its regulation
- 3.** Nutrients and epigenetics, Genes and disease
- 4.**Molecular methods used in nutritional genomics
- 5.Technologies in nutrigenomics:** Genomic techniques: Different sequencing approaches, Microarray, SNP genotyping, PCR and RT-PCR techniques Proteomics Techniques:1-D, 2-D gel electrophoresis, Differential gel electrophoresis (DIGE), novel peptide identification, peptide sequencing methods Metabolic techniques: Chromatography and mass spectrometry techniques, Discovery and validation of biomarkers for important diseases and disorders
- 6:** Nutrigenomics and nutrigenetics in ageing and calorie restriction, obesity, Cardiovascular disease and cancer.

References Books:

- 1.** Journal Nutrients 2012, 4, 1898-1944; Molecular Nutrition Research—The Modern Way of Performing
- 2.** Nutritional Science.
- 3.** Journal Nutrients 2013, 5, 32-57; Nutrigenetics and Metabolic Disease: Current Status and Implications
- 4.** Journal Nutrigenetics Nutrigenomics 2011; 4:69–89; Nutrigenetics and Nutrigenomics: Viewpoints on the
- 5.** Current Status and Applications in Nutrition Research and Practice.