MGM INSTITUTE OF HEALTH SCIENCES

(Deemed to be University u/s 3 of UGC Act, 1956)
Grade 'A^{++}' Accredited by NAAC
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CHOICE BASED CREDIT SYSTEM (CBCS)

(with effect from 2024-2025 Batch onwards)

Curriculum for

M.Sc. Clinical Nutrition

Approved as per AC-48/2023, Dated 12/12/2023

Amended History

1. Approved as per AC-48/2023, Resolution No. 6.4 Dated 12/12/2023.
2. Amended as per AC-48/2023, Resolution No. 6.7 Dated 12/12/2023.

Annexure-47 of AC-48/2023

MGM SCHOOL OF BIOMEDICAL SCIENCES
(A constituent unit of MGM INSTITUTE OF HEALTH SCIENCES)

(Deemed to be University u/s 3 of UGC Act 1956)

Grade "A^{++}" Accredited by NAAC

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CHOICE BASED CREDIT SYSTEM(CBCS)

(Academic Year 2024 - 25)

Curriculum for

M.Sc. Allied Health Sciences

M.Sc. Clinical Nutrition

Semester I & II

Resolution No. 6.4 of Academic Council (AC-48/2023): Resolved to approve the revised syllabus (CBCS Pattern) of M.Sc. Clinical Nutrition (Semester I & II) for Batch admitted in Academic Year 2024-25 onwards **[Annexure-47].**

OUTLINE OF COURSE CURRICULUM

M.Sc. Clinical Nutrition

Semester I

Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Theory														
MCN 101 L	Fundamentals of Nutrition	3	-	-	-	3	45	-	-	-	45	20	80	100
MCN 102 L	Nutritional Biochemistry	3	-	-	-	3	45	-	-	-	45	20	80	100
MCN 103 L	Human Physiology	3	-	-	-	3	45	-	-	-	45	20	80	100
MCN 104 CP	Nutrition Directed Clinical Education - I	-	-	-	21	7	-	-	-	315	315	-	50	50
CC 001 L	Research Methodology & Biostatistics	3	-	-	-	3	45	-	-	-	45	20	80	100
Practical														
MCN 102 P	Nutritional Biochemistry	-	-	2	-	1	-	-	30	-	30	10	40	50
MCN 103 P	Human Physiology	-	-	2	-	1	-	-	30	-	30	10	40	50
CC 001 P	Research Methodology & Biostatistics (Core Course)	-	-	4	-	2	-	-	45	-	45	10	40	50
Total		12	0	8	21	23	180	0	105	315	600	110	490	600

OUTLINE OF COURSE CURRICULUM

M.Sc. Clinical Nutrition

Semester II

Code No.	Core Course	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation (CP)	Total (hrs.)	Internal Assement (IA)	Semester End Exam (SEE)	Total
Theory														
MCN 105 L	Medical Nutrition Therapy - I	4	-	-	-	4	60	-	-	-	60	20	80	100
MCN 106 L	Community & Public Health Nutrition	2	-	-	-	2	30	-	-	-	30	20	80	100
MCN 107 L	Food Microbiology	2	-	-	-	2	30	-	-	-	30	20	80	100
MCN 108 L	Nutrition through Lifecycle	2	-	-	-	2	30	-	-	-	30	20	80	100
MCN 109 CP	Nutrition Directed Clinical Education - II	-	-	-	12	7	-	-	-	315	315	-	50	50
Discipline Specific Elective														
DSE 001 L	Nutrigenomics	2	-	-	-	2	30	-	-	-	30	20	80	100
DSE 002 L	Nutraceuticals & Drug Nutrient Interaction													
Practical														
MCN 105 P	Medical Nutrition Therapy - I	-	-	4	-	2	-	-	60	-	60	10	40	50
MCN 106 P	Community & Public Health Nutrition	-	-	2	-	2	-	-	60	-	60	10	40	50
Total		12	0	6	12	23	180	0	120	315	615	120	530	650

FIRST YEAR

M.Sc. Clinical Nutrition
SEMESTER-I

Code No.	Core Subjects
Theory	
MCN 101 L	Fundamentals of Nutrition
MCN 102 L	Nutritional Biochemistry
MCN 103 L	Human Physiology
MCN 104 CP	Nutrition Directed Clinical Education-I
CC001 L	Research Methodology & Biostatistics
Practical	
MCN 102 P	Nutritional Biochemistry
MCN 103 P	Human Physiology
CC 001 P	Research Methodology & Biostatistics

Name the Programme	**M.Sc. Clinical Nutrition**
Name of the Course	**Fundamentals of Nutrition**
Course Code	**MCN 101 L**

Teaching Objective	**To apprehend the candidate with:** ● The basic concept of nutrition. ● The importance of nutrients for the growth and maintenance of human body.
Learning Outcomes	**After the course accomplishment the student will be able to:** ● Discuss the role of nutrients for human health and certain disorders. ● Describe the different forms of nutrients and about the procurement and requirement of nutrients.

Unit	Topics		No. of Hours
1.	**Basic Concepts**	Introduction, Food pyramid, Balanced diet, RDA.	**1**
2.	**Body Composition**	Significance of body composition and changes through the life cycle, Methods for assessing body composition (both classical and recent) and their applications.	**2**
3.	**Energy**	Estimating energy requirements of individuals, Factors affecting energy requirements, methods for measuring energy expenditure Determination of energy value of food, Components of energy expenditure- BMR PAL, RMR, PAR, Thermic control of food intake, role of hormones in energy requirements for different age groups and energy balance.	**4**
4.	**Carbohydrates**	Introduction, classification, physiological function, Process of digestion & absorption, Metabolic	**6**

		utilization of CHO, Nutritional significance of carbohydrates, requirement and deficiencies. Modification of carbohydrate intake for specific disorders - lactose intolerance, diabetes mellitus. Dietary fibre - Introduction, types, components of dietary fibre, requirements, role of dietary fibre in human nutrition. Artificial sweeteners, glycemic index of food and its uses, glycemic load.	
5.	**Proteins**	Classification, functions, requirement and Deficiencies, Digestion, absorption and metabolic utilization of protein, Nitrogen Balance, quality of protein and protein deficiency. Amino acid – Types, functions, requirements and deficiency. Peptides of physiological significance	**5**
6.	**Lipids**	Fatty acid – types, function, food sources and deficiency, requirements and deficiencies. Digestion, absorption & metabolic utilization of fats. Role of lipo-protein, cholesterol and triglycerides in health and disease. Omega fats: classification & role, daily requirements, food sources, fortification of omega fats.	**5**
7.	**Water & Electrolytes**	**Water:** Distribution of water in the human body, role of water, preformed water, metabolic water, water balance intake and output determination, factors affecting water balance, role of hormones in water balance, fluid balance in stress.	**6**

		Electrolytes: Electrolytes content of fluid compartments, Function of electrolytes. Absorption, transport, balance. Factors influencing electrolyte balance. Maintenance of hydrogen ion concentration	
8.	**Vitamins**	Introduction, Physiological functions, Food sources, Requirement, Deficiency & toxicity manifestations and Interaction with other nutrients a) **Water soluble Vitamins** (B Complex and Vitamin C) b) **Fat soluble Vitamins** (Vitamin A, D, E, K)	**8**
9.	**Minerals**	Introduction, Physiological role, food sources, Bioavailability and requirements, Deficiency and toxicity, Interaction with other nutrients a) **Macro Minerals** (Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chloride) b) **Micro minerals** (Iron, Copper, Zinc, Iodine, Fluoride, and Manganese, chromium, selenium)	**8**
		Total	**45hrs**

References:

1. Shubhangini A. Joshi,(1992)' "Nutrition and Dietetics" Tata Mc Grow- Hill publishing Company Ltd, New Delhi.
2. Srilakshmi. B – "Nutrition Science", V Edn, New Age International (P) Ltd, Publishers, Chennai
3. PassmoneR.and Eastwood M.A,(1986), "Human Nutrition and Dietetics", English language book Society/Churchill Livingstone, Eighth edition, Hong Kong.
4. Neiman N. Catherine, (1990), "Nutrition",Wm.C. Brown Publishers. USA.

Name of the Programme	**M.Sc. Clinical Nutrition**
Name of the Course	**Nutritional Biochemistry**
Course Code	**MCN 102 L**

Teaching Objective	**To apprehend the candidate with:** ● Understand the mechanisms adopted by the human body for regulation of metabolic pathways. ● Develop an insight into interrelationships between various metabolic pathways.
Learning Outcomes	**After the course accomplishment the student will be able to:** ● Understand integration of cellular level metabolic events to nutritional disorders and imbalances.

Unit	**Topics**		**No. of Hours**
1.	**Enzymes**	Definition, classification of enzymes, Factors affecting enzyme activity, regulation of enzyme activity and inhibition. Enzymes in clinical diagnosis.	**2**
2.	**Water & Electrolyte metabolism**	Acid base homeostasis, blood buffer system, metabolism and disorders, and metabolism in starvation	**5**
3.	**Carbohydrate metabolism**	Composition and classification (self-study) - General metabolism – Glycolysis, TCA cycle, Glycogenesis, Glycogenolysis, uric acid pathway, Gluconeogenesis and HMP Shunt, Glycogen storage diseases – clinical importance, regulation and hormonal influences of carbohydrate metabolism .	**8**
4.	**Protein Metabolism**	Composition and classification (self-study) Amino acid pool, nitrogen balance, catabolism of amino acids. Urea – formation and its clinical significance.	**8**

		Creatine and creatinine – synthesis and regulation. Plasma proteins, biologically active peptides.	
5.	**Lipid Metabolism**	Composition and classification (self-study), Metabolism of Lipids, Oxidation of fatty acids, Unsaturated fatty acids, Metabolism of Ketone bodies, Biosynthesis of fatty acids, Biosynthesis of Cholesterol and regulation, Biosynthesis of Bile acids Biosynthesis of phospholipids –cephalin and lecithin, Plasma lipoproteins - Composition, Classification, Functions, Synthesis, Metabolism and Significance.	**8**
6.	**Biological Oxidation**	Introduction, Electron transport chain and oxidative phosphorylation. Free radicals, ROS and oxidative damage Detoxification in the body, metabolism of xenobiotics.	**2**
7.	**Nucleic Acid metabolism**	Introduction**,** Metabolism of purines and pyrimidines. Role of purine, pyrimidine, and nucleotide in metabolism . Metabolism of DNA (DNA Replication, repair, recombination), Metabolism of RNA (transcription, translation) Concept of Operons, Disorders of nucleic acid metabolism .	**2**
8.	**Function Tests**	**Liver** – liver function tests, diagnostic tests, detoxification, excretory test (two tests each) **Renal function Test -** Biological functions of kidneys – manifestation of clinical symptoms, classification – glomerular filtration tests, renal plasma flow test, tubular function tests and other miscellaneous tests **Gastric Function Test** Test for malabsorption – Fat – Qualitative and quantitative analysis; Carbohydrate – D- xylose; Lactose breath test – lactose intolerance; Hydrogen test – H.Pylori; Schilling's Test – B12; Protein – Serum protein, albumin.	**10**

		Cerebrospinal fluid - Composition, appearance, biochemical changes – clinical importance **Oncogenic markers** – classification and clinical uses **Diabetic Profile**	
		Total	**45hrs**

MCN 102 P – Nutritional Biochemistry

Sr. No.	Topic	No. of Practical Classes
1.	Test for Monosaccharides	2
2.	Test of disaccharide and polysaccharide	2
3.	Colour Reactions of Proteins	4
4.	Precipitation Reactions of proteins	2
5.	Estimation of Blood Glucose, glycosylated Haemoglobin	4
6.	LCD on Glucose Tolerance Test	4
7.	LCD on Lipid Profile	2
8.	Demonstration on Total Protein & A/G Ratio	2
9.	Estimation of Serum Uric Acid	2
10.	Demonstration on AST, ALT & ALP	2
11.	LCD of Thyroid Function Test	2
12.	LCD – Normal Constituents of Urine	2
Total		**30 hrs**

***LCD – Lecture Cum Demonstration**

References:

1. Dasgupta, S. K., Biochemistry Vol. I; N & Iii, Mc Milan Co. of India Ltd
2. Das, Debajyoti, Biochemistry 2nd Ed., 1980, Academic Publishers, India.
3. Harper, H. A. etal, A Review Of Physiological Chemistry, Los Altos,Lange Medical Publications, 1985.
4. Lehninger, A. L., Principles Of Biochemistry
5. Chaterjee. Textbook Of Medical Biochemistry
6. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.

Name of the Programme	M.Sc. Clinical Nutrition
Name of the Course	Basic Human Physiology
Course Code	MCN 103 L

Teaching Objective	**To apprehend the candidate with:** ● The basic physiology of various system in human body. ● The functions of various organs and their regulation.
Learning Outcomes	**After the course accomplishment the student will be able to:** ● To discuss the physiology of the different organ system. ● To understand the functions of various organs of human body.

Unit	Topics		No. of Hrs.
1.	**Cell Membrane**	Structure, composition and Transport of metabolites across the across the membrane	**2**
2	**Circulatory system**	Basic structure and function of CVS, Structure and function of heart, Cardiac Impulse and cardiac cycle, Concept of haemorrhage, heart failure, shock, hypertension, Concept of Blood Pressure, Normal values, Regulation, Cardiac Output, Normal ECG	**4**
3.	**Respiratory system**	Basic structure and function of RS, Mechanism of breathing, Transport of oxygen and carbon dioxide, Regulation of respiration, Respiratory abnormalities – Hypoxia, apnea, hypo and hyperventilation	**4**
4.	**Renal system**	Basic structure and function of Renal System, Mechanism of urine formation GFR & Tubular functions, Maintenance of Osmolarity& Volume of ECF, Micturition & RFT (Renal handling of individual substances-inulin, urea, para –amino hippuric acid, dialysis & functions)	**6**

5.	**Nervous system**	Structure & functions of brain and spinal cord Blood brain barrier	**3**
6.	**Digestive system**	Basic structure and function of GIT, Digestion & Absorption of food in various parts of GIT, Mechanism of secretion of digestive juices, movements of GI tract, digestion and absorption, gastrointestinal hormones – sources and action	**8**
7.	**Musculoskeletal system**	Basic structure and function of skeletal muscle, Conduction of nerve impulses, role of neurotransmitters; afferent & efferent nerves, regeneration of nerve fibres, Neuromuscular Transmission and muscle contraction, Energetics of muscle contraction	**6**
8.	**Endocrine system**	1. Introduction to Endocrine system 2. Function, Regulation & Disorders of ● Pituitary gland ● Thyroid gland ● Parathyroid gland ● Adrenal gland ● Endocrine Pancreas gland	**6**
9.	**Haematology**	1. Composition & Functions of Blood 2. Normal Hemogram 3. Formation of blood cells-RBC, WBC, Platelets 4. Anemia 5. Blood coagulation 6. Blood groups	**6**
Total			**45 hrs**

MCN 103 P – Basic Human Physiology

Sr. No.	Topic	No. of Practical Classes
1.	Microscopy	2
2.	Estimation of Haemoglobin	2
3.	Estimation of WBC	2
4.	Estimation of RBC	2
5.	Estimation of DLC	4
6.	Estimation of blood group	2
7.	Bleeding Time & Clotting Time	2
8.	General Examination, History taking	2
9.	Clinical Examination of Pulse	4
10.	Blood Pressure	2
11.	Demonstration of Clinical Examination of CVS	2
12.	Demonstration of Clinical Examination of RS	2
13.	Demonstration of Clinical Examination of Alimentary System	2
Total		**30 hrs**

References:

1. Sembulingam. K, Essentials of Medical physiology, 2010, Jaypee Medical Publishers, NewDelhi
2. E. Rabsky, B.Khodorov, G.Kositskv, A. Zubkov, Human physiology, Vol II, MIR Publishers, 1989.
3. Dorothy S.Luciano, Arthur J. Vander, James H. Sherman, Human function and its structure international student edition, Me Graw Hill pub.

4. P.D Strukie, Basic physiology, Springer - Verlag pub, 1981.
5. Winter & Shourd, Review of human physiology 1982, W.B.Saunderscompany publication, 2nd edition.
6. Anil Baran & Singha Mahapatra, 1999, Essentials of medical physiology, Current book international.
7. G.K.Pal&Parvati Pal, 2010, Textbook of Practical Physiology (New), India

Course code- MCN 104 CP: Nutrition Directed Clinical Education – I

Students will gain additional skills in this program to increase the role of nutrition in the practice of medicine, medical research, health promotion, and disease prevention by providing a unique combination of educational experiences to medical students. The students will be exposed to both clinical and academic aspects of nutrition. (315 hrs.)

Name of the Programme	**M.Sc. Clinical Nutrition**
Name of the Course	**Research Methodology & Biostatistics (Core Course)**
Course Code	**CC 001 L**

Teaching Objective	The course is intendedtogive an overview of research and statistical models commonly used in medical and bio-medical sciences. The goal is toimpartanintuitiveunderstandingandworkingknowledgeofresearchdesigns and statistical analysis. The strategy would be to simplify, analyse the treatment of statistical inference and to focus primarily on how to specify and interpret the outcome of research.
Learning Outcomes	Student will be able to understand develop statistical models, research designs with the understating of background theory of various commonlyusedstatisticaltechniquesaswellasanalysisinterpretation&reportingof Results and use of statistical software.

Sr.No	Topic	No. of Hrs.
A	**Research Methodology:**	**23**
1	Scientific Methods of Research: Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research, Research Methods versus Methodology	4
2	Research Designs: Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design,CohortStudies,Case-ControlStudies,Cross-sectionalstudies,Interventionstudies,Panel Studies.	5
3	Sampling Designs: Census and Sample Survey, Need and importance for Sampling, Implications of a Sample Design, Different Types of Sample Designs (Probability sampling and non probability	5

	sampling),How to Select a Random Sample?, Systematic sampling, Stratified sampling, Cluster sampling, Area sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling.	
4	Measurement in research:Measurement Scales, Sources of Error in Measurement, TestsofSoundMeasurement	3
5	MethodsofDataCollection:Typesofdata,CollectionofPrimaryData,Observation Method,InterviewMethod,CollectionofPrimary Data	4
6	Ethics and Ethical practice in research and plagiarism	2
B	**Biostatistics**	**22**
7	Data Presentation: Types of numerical data: Nominal, Ordinal, Ranked, Discrete andcontinuous.Tables:Frequencydistributions,Relativefrequency,Graph:Barcharts,Histograms,Frequencypolygons,onewayscatterplots,Box plots, two wayscatterplots, linegraphs	3
8	MeasuresofCentralTendencyandDispersion:Mean,Median,ModeRange,Inter quartilerange,varianceandStandardDeviation,Coefficientofvariation,groupedmeanandgroupedstandarddeviation(includingmeritsanddemerits).	3
9	Testing of Hypotheses: Definition, Basic Concepts, Procedure for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Normal distribution, Important Parametric Tests including Z-test, t-test, and ANOVA	4
10	Chi-squareTest:Chi-squareasaNon-parametricTest,ConditionsfortheApplicationChi-squaretest,StepsInvolvedinApplyingChi-squareTest,AlternativeFormula, Yates' Correction, and Coefficient by Contingency.	2
11	Measures of Relationship: Need and meaning, Correlation and Simple Regression Analysis	3
12	Non parametric or Distribution -free Tests: Important Non parametric or Distribution-free Test Sign test, Wilcoxonsigned-Rank Test, Wilcoxon Rank Sum Test: Mann-WhitneyU Test Kruskal Walli's test, Friedman's test, and Spearman Correlation test.	3

13	Vital Health Statistics: Measurement of Population: rate, crude rate, specific rate, Measurement of fertility: specific fertility rate, Total fertility rate, Reproduction rate, Gross Reproduction Rate, Net Reproduction Rate, Measures related tomortality: Crude Death Rate (CDR), Age-specific death Rate, Infant and child mortality rate, Measures related to morbidity.	4
Total	**45 Hrs**	

CC 001 P–Research Methodology & Biostatistics

Sr.No.	Topics	No.ofHrs
A	**Research Methodology**	
1	Research Article Presentation (Seminar)	5
B	**Biostatistics**	
2	Data Presentation	2
3	Measures of Central Tendency and Dispersion	4
4	Testing of Hypotheses	12
5	Chi-square Test	2
6	Measures of Relationship	2
7	Analysis of Variance	4
8	Non parametric or Distribution-free Tests	8
9	Computer Application Using Statistical Software including SPSS	6
Total		**45 hrs**

M.Sc. Clinical Nutrition

SEMESTER-II

Code No.	Core Subjects
Theory	
MCN 105 L	Medical Nutrition Therapy I
MCN 106 L	Community & Public Health Nutrition
MCN 107 L	Food Microbiology
MCN 108 L	Nutrition through Lifecycle
MCN 109 CP	Nutrition Directed Clinical Education-II
Discipline Specific Elective	
DSE 001 L	Nutrigenomics
DSE 002 L	Nutraceuticals & Drug Nutrient Interaction
Practical	
MCN 105 P	Medical Nutrition Therapy I
MCN 106 P	Community & Public Health Nutrition

Name of the Programme	M.Sc. Clinical Nutrition
Name of the Course	Medical Nutrition Therapy I
Course Code	MCN 105 L

Teaching Objective	**To apprehend the candidate with:** ● Understanding of basic concepts of medical nutrition therapy. ● Develop an insight about the Etiology, signs and symptoms, nutritional management of diseases and disorders.
Learning Outcomes	**After the course accomplishment the student will be able to:** ● To explain about the basics of therapeutic diet. ● To discuss about the medical nutrition management of various disease condition.

Unit	Topics		No. of Hrs.
1.	**Introduction to Medical Nutrition Therapy**	**Nutrition Education & Dietetic Counselling:** Principles and objectives, role of dietitian in Interdisciplinary Medical Team & Outreach Activities. Clinical Information Resources – Medical History and Patient Profile. Routine hospital diets and modifications for different diseases or disorders, use of exchange lists in nutrient calculation and menu planning. **Nutrition Care Process:** Introduction, Nutrition Assessment- Nutritional Screening & Assessment Tools (NRS, SGA,	**8**

		MNA, Case Specific tools) , Nutrition diagnosis, Nutrition intervention and Nutrition monitoring, Evaluation and Documentation.	
2.	**Nutritional support**	**Nutrition Support Techniques:** **Type of Dietary Adaptations for therapeutic needs** **Enteral nutrition** - Indications, enteral access - Routes of enteral feeding,enteral formula composition, methods of administration, monitoring, advantages of enteral feeding and management of complications ; medication and enteral nutrition interactions. **Parenteral nutrition** - Indications for use of TPN, parenteral access, parenteral nutrition solutions, administration, monitoring and complications.	**8**
3	**Nutrition in Paediatrics -**	Basic needs and plans of nutritional care of the hospitalized infant- Assessment of Pediatric patients, Special infant needs - low birth weight, failure to thrive- Gastrointestinal problems of infancy & childhood- general functional disturbances, infantile diarrhea, celiac malabsorption syndrome, cleft palate and cleft lip, dental caries and nutrition support techniques	**8**
4.	**Nutritional management of Infections and Febrile Conditions**	**Febrile Conditions:** Defence mechanism in body, metabolic changes during infection, type, Etiology, signs and symptoms, diagnosis and treatment and Nutritional management of different type of fever: Short duration (typhoid, malaria, Dengue), Long duration (Tuberculosis) and HIV/AIDS.	**4**
5.	**Dietary**	**Energy Imbalance:** Neuronal & Hormonal Regulation of food intake and pathogenesis of	**6**

	management in Nutritional Imbalance	obesity and malnutrition and starvation. Energy imbalance, Obesity : Etiology, Theories, Physiology of obese state, Obesity Management – Pharmacological, Dietary & Lifestyle management, Surgical Management. Evaluation of Common diets – Atkin's diet, intermittent fasting & Ketogenic diet (Self-study). Underweight : Etiology & Dietary Management. **Eating Disorders :** Nutrition Management in Anorexia Nervosa, Bulimia	
6	**Nutritional management in Immune System Diseases**	Adverse food reactions: food allergy and food intolerance, Definition, Diagnosis - History, Food record, overview of Biochemical and Immune testing, Dietary Approach -Elimination diets management, Food Allergy in infancy - Milk sensitive enteropathy; Colic, Intolerance to breast milk, celiac disease (gluten sensitive enteropathy), Preventions of adverse food reactions.	**4**
7	**Nutritional Management in Pulmonary & Musculo Skeletal System**	**Diseases of the Pulmonary System:** Asthma, COPD, Bronchopulmonary Dysplasia, Cystic Fibrosis **Diseases of the Musculo-Skeletal System:** Pathophysiology & Inflammation, Rheumatic Diseases, Arthritis, Gout, Osteoporosis, Sjogren's Syndrome, Systemic Lupus Erythematous, Anti-inflammatory Diet	**4**
8	**Nutritional Management in GI disorders**	**Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders:** Diagnostic tests for the G.I. diseases, Signs and symptoms Nutritional care and diet therapy in diseases of oesophagus; Oesophagitis, Hiatus hernia, Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers. Nutrition management in Gastric Surgery **Medical Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders:**	**8**

		Common Symptoms of Intestinal dysfunction – Flatulence, constipation, haemorrhoids, diarrhoea, steatorrhea. Diseases of the large intestine: - Diverticular disease, irritable bowel syndrome, inflammatory bowel disease. Malabsorption Syndrome/Diseases of Small intestine - Celiac (Gluten –induced) sprue, tropical sprue, intestinal brush border enzyme deficiencies, Lactose intolerance, protein- losing enteropathy. Intestinal surgery: Short bowel syndrome, Ileostomy, Colostomy, Rectal surgery	
9.	**Nutritional Management of Endocrinal Disorders**	Medical Nutrition Therapy for Thyroid and other endocrinal Disorders: Thyroid Physiology; Assessment of Thyroid Disorders; Hypothyroidism, Polycystic Ovary Syndrome; Hyperthyroidism; Other Endocrine System Disorders- Cushing's Syndrome, Addison's Disease, Adrenal Insufficiency	**6**
	Nutrient & Drug Interaction	Basic concept of nutrient drug interaction- effect of nutrition on drug, drugs effect on nutritional status, drug and drug interaction, clinical significance of drug nutrient interaction	**4**
Total			**60 hrs**

MCN 105 P: Medical Nutrition Therapy I

Sr. No.	Topic	No. of Hrs
1.	Standardisation of Common Foods	4
2.	Understanding and Using Food Exchange lists and Food Composition Table	2
	Market Survey of Commercial Feeding Products – Adult & Children	2
3.	Planning of Enteral Feeds	4
4.	Plan & Prepare Weaning foods	4
5.	Diet plan for febrile conditions 1. Typhoid 2. Tuberculosis	6
6.	Diet Plan for Obesity & Underweight	6
7.	Anti-inflammatory diet plan	6
8.	Diet Plan for COPD	4
9.	Diet plan for peptic ulcer	4
10.	Diet plan for IBS	6
11.	Diet plan GI Surgery	4
12.	Diet Plan for Thyroid Disorders	4
13.	Diet Plan for PCOD	4
Total		**60 Hours**

References:

1. Mahan, L.K. and Escott-Stump, S. (2021): Krause's Food Nutrition and Diet Therapy, 15th Edition, W.B. Saunders Ltd.

2. Anita Jatan., Daphnee DK ., et.al (2022): Apollo Clinical Nutrition Handbook, 1st Edition. Jaypee Brothers Publication.

3. Annalynn Skipper, Dietitian's Handbook of Enteral and Parenteral Nutrition, 2012, I edition, An ASPEN Publication

5. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10th Edition, Churchill Livingstone.

6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2nd Edition, W.B. Saunders Co.

7. Antia F. P.: Clinical Dietetics and Nutrition, 3rd ed., Oxford University, Press, Delhi, Reprinted in 1989.

8. Laura E. Matarese, Michele M. Gottschlich, Contemporary nutrition support practice: a clinical guide, 2006, I edition, Saunders Elsevier's Science, Missouri

Name of the Programme	M.Sc. Clinical Nutrition
Name of the Course	Community and Public Health Nutrition
Course Code	MCN 106 L

Teaching Objective	**To apprehend the candidate with:** ● Basics of community nutrition ● Understanding of nutrition related problems and nutrition interventions.
Learning Outcomes	**After the course accomplishment the student will be able to:** ● Discuss about the nutrition related problems prevalent in community.

Unit	Topics		No. of Hrs.
1	**Introduction to community and Public Health**	Definition, Scope and Concept (biomedical, ecological, psychological and holistic) of community & Public health nutrition. **Epidemiology** – Definition, methods of epidemiological studies – retrospective study, prospective study, case control study, cohort study, randomized control trials, non-randomized control trials Role of nutritionist in community.	3
2	**Nutritional Assessment**	Nutritional status assessment: Goal and objectives Methods of Nutritional status assessment at individual and community level Direct methods: ● Anthropometry ● Biochemical assessment ● Clinical assessment	6

		● Dietary assessment Indirect methods ● Age Specific Mortality Rates ● Cause Specific Mortality Rates ● Cause Specific Nutritionally – Relevant ● Morbidity Rate Ecological Factors	
3	**Nutrition standards**	Determinants and Indicators of Nutritional Status WHO standards for children for growth monitoring, IAP Standards, Anthro plus software WHO standards for adults for assessment of nutritional status	**2**
4	**Food and Nutrition Security**	Food and Nutrition Security: Concept of food security and nutritional security. Food security in India, Dimensions of food security, Availability, Food Production, Distribution, Access, Losses, Consumption Factors affecting food availability and intake; Food Security and Adequacy of Diets; Determinants of food and nutrition Security, Policies and measures taken by the Government of India to achieve food security. Public distribution system, Nutrition Food security act (NFSA), GFSI, GHI	**6**
5	**Nutritional Problems in India**	Etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: a. Macro and micro nutrient deficiencies b. Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis.	**6**

		c. Overweight, obesity and chronic degenerative diseases Synergism between malnutrition and infection. Strategies to Overcome Malnutrition: Integrated Approach to Solve the Problems of Malnutrition: Nutrition Education, Nutrition Intervention Programmes, Agriculture Planning, Role of Food Technology, Environmental Sanitation and Health Occupational health hazards – Physical, Chemical and Biological hazards - prevalence, prevention and control; Hazards in Industries- hospital, textiles, foundry, agriculture and radiation: Controlling measures and legal provisions.	
6	**Nutrition Education**	Meaning, Nature and Importance of Nutrition Education to the Community; Principles of Planning, Executing and Evaluating Nutrition Education Programmes; Educational Aids; Problems of Nutrition Education Programmes	**3**
6	**Health & Nutrition Administration in India**	**Welfare Programmes** – Maternal and child health (specific reference to immunization programme); Nutrition programmes; public nutrition approach to tackle nutritional problems; Policies and programmes of the government and NGO sector of vulnerable groups, Millennium Development Goals and indicators pertaining to nutrition like goals 1,4,5,6. **Health status in India** (based on current statistics)- Definition, principles and objectives of community health administration and policy; Prevalence of lifestyle diseases in India; Nutritional health policy, Health care delivery system at central, state and district level (specific reference to PHC). **Health Agencies** –UNICEF, FAO, UNDP, ILO, UN, UNESCO, WHO, USAID, CARE, World bank Functions and beneficiaries.	**4**

TOTAL			**30 hrs**

MCN 106 P: Community & Public Health Nutrition

Unit	Topics		No. of Hrs.
For each unit field visits should be undertaken and report to be prepared by the students			
1	**Nutritional status assessment**	Anthropometric Measurement of community - Height, weight, circumference of Head and Chest, Mid-upper arm circumference of children; Comparison with norms and interpretation of the nutritional assessment data and its significance - Weight for age, height for age, weight for height Body Mass Index (BMI), Waist - Hip Ratio (WHR) for adults	**16**
2.	**Growth monitoring**	Visits to Anganwadi, Assessment of height weight, MUAC etc. of children, use of growth charts and its application for assessment of nutritional status using WHO standards for children for growth monitoring, IAP Standards Use of different software Observation of ICDS activities (Supplementary feeding programs)	**10**
3	**Dietary Assessment**	Estimation of food and nutrient intake - Household food consumption – using coefficient of consumer unit, 24 hours dietary recall, weighment method, food diaries, food frequency questionnaire - for households	**12**
4	**Planning Nutritious Recipes**	Development of Low-cost nutritious recipes, sensory evaluation of selected recipes for nutrient deficiencies.	**10**

5	**Nutrition Education intervention**	Nutrition cum Health Education for rural population- through development of selected Nutrition Education tools.	**12**
TOTAL			**60 hrs**

References:

1) Parks's Textbook of Preventive and Social medicine, 26th Latest Edition 2021 Kpark, Bhanot Publisher

2) Srilakshmi B and V Suganthi. Community Nutrition. New Age International Private Limited; 1st edition (7 July 2022); NEW AGE International, 7/30A, Near LIC Flats, Daryaganj, ND110002

3) Suryatapa Das. Textbook of community. Nutrition Academic publishers (1 January, 2022)

4) Elizabeth Eilender. Public Health and Community Nutrition. Momentum Pr (28 September 2016s

5) M. Margaret Barth, Ronny A. Bell, Karen Grimmer. Public Health Nutrition: Rural, Urban, and Global Community-Based Practice, Springer Publishing Co Inc; 1st edition (30 June 2020)

Name of the Programme	M.Sc. Clinical Nutrition
Name of the Course	Food Microbiology
Course Code	MCN 107 L

Teaching Objective	To apprehend the candidate with: ● Morphology and life cycle of different microorganisms. ● Information regarding food borne diseases. ● Identification of causative organisms and their treatment measures.
Learning Outcomes	After the course accomplishment the student will be able to: ● Identify various types of microorganisms. ● Understand microbial spoilage of foods and management of food borne diseases. ● Identify the causative organisms and learn treatment measures.

Unit	Topics		No. of Hrs.
1	**Basics and Morphology**	**History and scope of food microbiology-** Historical development in food preservation, food spoilage and food poisoning, role of microbes in food. **Microbial growth pattern**– Growth curve of microbial cultures, its application to food preservation. **Factors affecting microbial growth** – pH, moisture content, Eh, nutrient content, antimicrobial constituents, biological structures, extrinsic factors.	4
2	**Microorganisms**	**Types of microorganism associated with food:**	6

	in food	**Mold** – general characteristics, morphological features, reproduction, physiological requirements, common Molds associated with foods. **Bacteria** – Morphological, physiological characteristics, important food spoilage and pathogenic bacteria, associated with foods. **Yeast** – General Characteristics, reproduction, cultural characteristics, physiological characteristics. **Viruses** – Structure and replication with particular reference to food born viruses. **Biochemical changes caused by micro-organisms** – Degradation of carbohydrates, fermentation, degradation of lipids, degradation of proteins and amino acids, putrefaction. **Hygiene** – basic principles, Antisepsis, Antibiotic, Bactericidal agents.	
3	**Microbial Contamination**	**Microbial contamination and spoilage of foods –** Vegetables, cereals, pulses, oilseeds, milk and meat during handling, processing and storage **Microbiology of water -** Microbiological quality of water. Analysis of water. **Spoilage of processed foods –** Canned products, causes of spoilage, appearance of spoiled cans, types of spoilage of canned foods by yeast, moulds and bacteria.	**6**
4	**Food Borne Diseases**	**Food borne disease** – Staphylococcal gastroenteritis, Botulism, Listeriosis, Salmonellasis, Shigillosis, Hepatitis A, B **Toxicants of microbial origins -** Aflatoxins, ochratoxins, patulin, botulism, enterotoxins. **Detection of food borne pathogens -** Physical, chemical and immunological	**6**

		methods of detecting microbes in foods with special reference to Staphyllococcus, Clostridium, Lysteria, Yersenia, Salmonella, Escherichia, Vibrio	
5	**Control of Microorganisms**	Access, physical removal, heat, low temperature, low pH, organic acids, modified atmosphere, antimicrobial preservatives, irradiation and novel processing technologies	**4**
6	**Microbiology in Food Sanitation**	Bacteriology of water; sewage and waste treatment and disposal; good manufacturing Practices; HACCP; Microbiological criteria for foods; Control Agencies	**4**
Total			**30 hrs**

References:

1. Frazier, W. C. and Westhoff, D. C. (1988): 4th edition, Food Microbiology, MaGraw Hill Inc.
2. Jay James. N. (1986) : 3rd edition, modern Food Microbiology, Van Nestrand Reinhold Company Inc
3. Peleezar, M.I. and Reid, K. D. (1978): Microbiology, McGraw Hill Company, New York.
4. Benson Harold, J. (1990) : Microbiological Application, Publishers, U.S.A.
5. Colling, C.E. and Lyne, P.M. (1976) : Microbiological Methods Butterworth. London.
6. George J. Banwart (2004), 2nd edition CBS Publishers & Distributors
7. Pelezar, M.J. and Chan, E.C.S. (Jr.), 2000: Microbiology, Tata McGraw Hill Pub. Co., New Delhi
8. G.K.Pal&Parvati Pal Textbook of Practical Physiology (New),2010 , India
9. Stanier R.Y., Adelberg E.A. and Ingraham J.L. (1987) General Microbiology, 5th Edition. Macmillan Press Ltd.

Name of the Programme	M.Sc. Clinical Nutrition
Name of the Course	Nutrition Through Life Cycle
Course Code	MCN 108 L

Teaching Objective	To apprehend the candidate with: ● Understanding of the development of the human being at different stages ● Study the importance of nutritional requirements throughout the life cycle
Learning Outcomes	After the course accomplishment the student will be able to: ● To explain about the basics of human development at various stages of life. ● To discuss about the importance of nutrition throughout the life cycle.

Unit	Topics	Hours
1	**Nutrition in Pregnancy:** Physiology of pregnancy, maternal physiological adjustments, maternal weight gain, subjective and objective symptoms of pregnancy, Stages of human fetal growth, mechanism and regulation of fetal growth, Nutrient requirements during prenatal, perinatal, and postnatal periods, High-risk pregnancy-teenage pregnancy, pre-eclampsia and eclampsia, hyperemesis, alcoholism, Complications of Caffeine abuse and smoking, Diet counselling for teenage and adult pregnancy.	4
2	**Nutrition in Lactation:** Physiology of lactation, Hormonal regulation and reflex action, the effectiveness of milk production, supply and demand for nursing and frequency of nursing; breastfeeding benefits, and duration of exclusive breastfeeding, Contraindications to breastfeeding; the association between breastfeeding and immune system, oral motor, and gastrointestinal system development;	4

	lactogenic foods; nutritional needs for lactation. Infant Formulas, cow's milk, and human milk composition and comparison.	
3	**Nutrition in Infancy**: Growth & maturation, Reference standards for growth and growth monitoring; Infant feeding - nutritional requirement of full-term infants; breastfeeding Vs bottle feeding; weaning practices; feeding problems of normal infants, Sequence of development of feeding behaviour. Low birth weight and preterm infants - characteristics, growth, development, feeding practices, feeding problems, Strategies for reducing the incidence and severity of allergy in high-risk infants.	**4**
4	**Nutrition in preschool age:** Physical growth and development related to neuromuscular development, eating behavior, nutritional requirements of preschool children; factors influencing food choices, standard for growth monitoring. **Nutrition in school children:** Physical growth, height and skeletal maturation, weight and anthropometric measurement, Standards for growth monitoring, factors to be considered while planning a menu; feeding problems of underweight and hyperactive children, dental caries; packed lunch and its effect on nutritional status. Nutritional related health issues in childhood.	**6**
5	**Nutrition during adolescence**: Growth and development – physical growth & psychosocial development, physiological malnutrition, BMR, and body composition changes; Age at menarche, factors affecting menarche, psychological problems and challenges in adolescence, body image, weight control, skipping meals, anorexia nervosa, obesity, snacking, fast foods, sense of identity- addiction to cigarettes, alcohol, and drugs. Nutritional problems in adolescence – iron deficiency anemia, obesity, and undernutrition - etiology, prevention, and control, pubescent growth assessment.	**6**
6	**Nutrition during Adulthood:** Physiological changes of adulthood – male- climacteric change, female – menopausal changes, Osteoporosis and Osteopenia; Factors influencing nutritional requirements of the adult.	**2**
7	**Geriatric Nutrition**: Ageing process - physiological, metabolic, body composition changes and impact on health and nutritional status, Nutritional and health status of the elderly, Factors influencing food and nutrient intake, health status including lifestyle pattern, medication,	**4**

	psychosocial aspects, etc., Chronic degenerative diseases and nutritional problems of the elderly - their etiopathogenesis, management, prevention, and control.	
TOTAL		**30hrs**

References :

1. Worthington. S and Sue Rodwell Williams, Nutrition Throughout the Life Cycle, 1996, Third Edition, The McGraw Hill, New Jersy
2. Gail Goldberg, Elizabeth Dowler, Prakash Shetty, Nutrition Through the Life Cycle, 2007, RSC publishing, London.
3. Judith Sharlin, Sari Edelstein, Essentials of Life Cycle Nutrition, 2010, I edition, Jones & Bartlett Publishers, London.
4. Jim Mann & A. Stewart, Essentials of human nutrition, 2002, II edition, Truswell, Oxford university press, New Delhi
5. Myron Winick, Nutrition and exercise, 1996, I edition, John Wiley & Sons publishing company, Singapore.
6. Ira Wolinsky, Nutrition in Exercise and Sport, 1997, III Edition, CRC press, United Kingdom.
7. Raymond, J.L. *et al.* (2023) Krause and Mahan's food and the Nutrition Care Process. St. Louis, MO: Elsevier.

Course code- MCN 109 CP: Nutrition Directed Clinical Education – II

Students will gain additional skills in this program to increase the role of nutrition in the practice of medicine, medical research, health promotion, and disease prevention by providing a unique combination of educational experiences to medical students. The students will be exposed to both clinical and academic aspects of nutrition. (315 hrs)

Discipline Specific Elective
Semester II

Name of the Programme	M.Sc. Clinical Nutrition
Name of the Course	Nutrigenomics
Course Code	DSE 001 L

Teaching Objective	**To apprehend the candidate with:** ● The concept of nutrigenomics and nutrigenetics. ● Importance of nutrition and its effects on gene expression. ● Learn nutrient and gene interactions as they relate to disease prevention and intervention.
Learning Outcomes	**After the course accomplishment the student will be able to:** ● Correlate the relationship between nutrigenomics, nutrigenetics and incorporate the knowledge in nutrition and health research. ● Interpret the role and importance of food and nutrition for the welfare of the community and acquire skills in planning diet. ● Understand dietary intervention based on knowledge of nutritional requirement, nutritional status, and genotype.

Unit	Topics		No. of Hrs.
1	**Basic molecular biology**	Introduction to nutritional genetics and genomics, **Gene and DNA structure:** Concepts of nucleic acid, gene concept, gene structure, central dogma (replication, transcription, translation, DNA repair mechanism) operon concept, RNA processing, Structure and functions	3

		of different types of RNA, RNA transport, gene regulation.	
2	**Introduction to tools and techniques**	PCR, RT-PCR, different sequencing approach, microarray, SNP, genotyping, Electrophoresis, Chromatography, and Spectrometry. Introduction to different types of public database, Datamining strategies, Primer designing.	**3**
3	**Foods and genes**	**Nutrients and Gene expression with its regulation:** Genetics and epigenetic of bioactive foods, conventional and Indian traditional foods and food components, vitamins and minerals-antioxidant potentials; their role in preventing diseases, incidence of diet related diseases, influence of genes on dietary preference and tolerance, mucosal tolerance, Role of Selenium in oxidant and inflammatory process.	**6**
4	**Health Biomarkers**	Identification and validation of compounds in tissues, blood and fluids; genetic screening for predisposition and occurrence in inflammatory diseases; genetic markers associated with increased risk for chronic disease, metabolic dysfunction. **Case Study**: IGF rs680 polymorphisms in height variation in preadolescent children**.**	**6**
5	**Gene approaches for diseases**	**Nutrigenetics** of myocardial infarction, Nutrient regulation of insulin gene, genetics in Crohn's disease, genetics and nutritional control of lipid metabolism, nutrigenetic approach to study obesity. **Nutrigenomics** for cancer detection, nutrigenomics in ageing, DNA polymorphisms, Microarrays to study gene expression, gene-nutrient interaction, Dietary signatures.	**10**
6	**Personalized medicine**	Dietary indications for population health and wellness, vitamin and supplement products, genetic counselling, clinical trials to test food effects to demonstrate efficacy of food-health claims.	**2**
Total			**30 hrs**

References:

1. Nutritional Genomics: Discovering the path to personalized nutrition , Edited by Jim Kaput, 2013, Wiley
2. Nutrigenomics and Nutrigenetics in functional foods and personalized nutrition, Edited by Lynnette R Ferguson,2013, CRC Press
3. Genomics and proteomics in nutrition Edited by Carolyn D Berdeiner and NamiaMoustaid Moussa, 2004, CRC Press
4. Dietary modulation of Cell Signaling pathways by Zigang Dong and Young JoonSurh, 2008, CRC Press

ssName of the Programme	M.Sc. Clinical Nutrition
Name of the Course	Nutraceuticals and Drug interaction
Course Code	DSE 002 L

Teaching Objective	To apprehend the candidate with: 1. Understand of pharmacology, pharmacology processes, and nutraceutical 2. Understand the importance of functional foods and health disease 3. Develop an insight into drugs nutrients interaction
Learning Outcomes	After the course accomplishment the student will be able to: 1.Gain knowledge about functional foods and nutraceuticals 2.Importance of nutraceuticals on health disease 3.Understand the effect of drugs on ingestion, digestive absorption & metabolism of nutrients

Unit	Topics		No. of Hrs.
1.	Introduction to Nutraceuticals, Biological Functions of Nutraceuticals	Historical perspective, Definition, classification, scope & future prospects. Differentiation between Nutraceuticals and functional foods and drugs. Approval process for Nutraceuticals in India and USA. Routes of administration, pharmacokinetics and pharmacodynamics of Nutraceuticals.	2
2.	Importance of bioactive	Potential health benefits of the following bioactive components	10

	components in functional foods in health and disease	Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases : ● Polyphenols: Flavonoids, tannins, Curcumin, Resveratrol, Phytoestrogens- Isoflavones and Lignans ● Phytosterols ● Glucosinolates ● Pigments: Lycopene, Carotenoids ● Organo sulphur compounds ● Conjugated linoleic acid and n-3 fatty acids ● Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins ● Prebiotics, probiotics, symbiotic and dietary fiber, Resistant starch and others	
3.	**Overview of Drug Nutrient Interactions**	Concepts and mechanisms of drug and nutrient interaction	**2**
4.	**Influence of Pharmaceuticals on Nutritional Status**	Cardiac drugs on nutritional status: Antihypertensive drugs and nutritional status– beta blockers, ACE Inhibitors & Angiotensin receptor blockers, Calcium channel blockers, Vasodilators and anticoagulants Antiepileptic drugs on nutritional status Diuretics and its interactions CNS disorders - Pain Killers, Alcohol, General anaesthetics and Sedatives on nutritional status Antacids, anti -ulcer drugs, purgatives and antiemetics on nutritional status. Hormone related drugs - Growth hormone, Thyroid hormone, Corticosteroids on nutritional status Oral diabetic drugs and Insulin on nutritional status	**10**

5	**Drug Nutrient Interactions in Specific Conditions**	Drug nutrient interactions in patients with cancer Drug nutrient interactions in transplantation Drug nutrient interactions and immune functions Drug nutrient interactions in patients with chronic infections Anti-microbial – nutrient interactions – an overview	**4**
6.	**Drug Nutrient Interaction in Special Nutrition Support**	Drug nutrient interaction in enteral nutrition, nutraceuticals, functional foods, elemental and hydrolyzed diets, Drug nutrient interaction in parenteral nutrition – commercial formula; Role of probiotics	**2**
Total			**30 hrs**

References

1. Joseph I. Boullata and Vincent T. Armenti, Handbook of Drug Nutrient Interactions, 2004, Humana Press, Nutrition and health (Totowa, N.J.) , New York, NY, 2010.
2. Laster Packer and Klaus Kraner, Nutraceuticals in Health and Disease Prevention, 2001, Peter-Paul Hoppe Publications, Germany.
3. Bennet P.N, Clinical Pharmacology, 10th Edition, 2008, Churchill Livingston (Elsevier) Publications, Philadelphia
4. S.P. Maity and R.N. Chatterjee, Pharmacology, 5th Edition, 2006, Books and Allied (P) Ltd., Calcutta
5. Wildman, R.E.C. ed. (2000) Handbook of Nutraceuticals and Functional Foods, CRC Press, Boca Raton.
6. Goldberg, I. Ed (1994): Functional Foods: Designer Foods, Pharma Foods, Nutraceuticals, Chapman & Hall, New York
7. Gibson, G., Williams, C. eds (2000): Functional Foods. Woodhead Publishing Ltd. U.K.
8. Cho S. S. and Dreher, M.L. (2001): Handbook Dietary Fibre, Marcel Dekker Inc., New York.
9. Robert E.C. Wildman, Handbook of Nutraceuticals and Functional Foods, 2nd Edition, 2007, CRC Press, New York.
10. Peter N. Bennett, Morris J. Brown, Pankaj Sharma, Clinical Pharmacology, 10th edition, 2009, Churchill Livingston (Elesiever) publications, Philadelphia

sScheme of University Examination Theory for PG Program:

General structure / patterns for setting up question papers for Theory / Practical courses, their evaluation weightages for PG programs of MGMSBS are given in the following tables

2.2 a Marks scheme for the University exam:

Final theory marks will be 10**0 marks (80 marks University Theory exam + 20 Marks Internal assessment).**

Question		Marks distribution	Marks allotted per section	Marks
Sec:A	MCQ	10 x 1 M = 10	10	10
Sec:B	SAQ	3/4x 5 M = 15	15	35
Sec:B	LAQ	2/3 x 10 M = 10	20	
Sec:C	SAQ	3/4x 5 M = 15	15	35
Sec:C	LAQ	2/3x 10 M = 10	20	
				Total = 80 M

2.2 b Practical exam pattern: Total 40 marks with following breakup :

Exercise	Description	Marks
Q No 1	Practical exercise - 1	1 x20=20 M
Q No 2	Station exercise	2x5M=10 M
Q No 3	VIVA	10 M
QNo 4	Journal	NIL
		Total = 40 M

2.2 c Practical to be conducted at respective departments and marks submitted jointly by the parent department to the university.

2.2 d Breakup of theory IA calculation for 20 marks

Internal exam (at department)	15 marks
Seminar	5 marks
	Total = 20 M

Breakup of practical IA calculation:

Internal exam (at department)	10 marks
Viva	5 marks
Journal	5 marks
	Total = 20 M

Note –20 marks to be converted to 10 marks weightage for submission to the university.

Annexure 2.1a : Model Checklist for Evaluation of the Seminar Presentations (PG)

Name of the student: _____ Date: _____

Name of the Faculty/ Observer: _____

Items for observation during presentation	Marks allotted	Marks Obtained
Extent of understanding of scope & objectives of the paper by the candidate	10 marks	
Whether cross- references have been consulted		
Ability to defend the paper		
Clarity of presentation		
Any other observation		

Note: Assessment of seminar: the seminar shall be assessed on the basis of the content of the paper chosen and its presentation.

Annexure 2.1 b : Model Checklist for Evaluation of the Educational Tour/Field Work/Hospital Visit/ Industrial Visit (PG)

Name of the student: _____ Date: _____

Name of the Faculty/ Observer: _____

Items for observation during presentation	Marks allotted	Marks Obtained
Educational Tour/Field Work/Hospital Visit/ Industrial Visit report / Conference/oral presentation	15	
Online MOOC/Swayam / NPTEL courses	05	
Total	**20 Marks**	

*marks to be given based on the proof submitted by the student. Formal examination not required

Annexure 2.1.c- Model Checklist for Evaluation of the Clinical Directed Posting (PG)

Name of the student: _____Date:_____
Program:_____
Semester: _____ Name of the Internal faculty/Observer:_____
Name of the External Faculty/Observer:_____

Core Competencies	Marks allotted	Marks obtained
Students will begin to develop critical thinking abilities utilizing the allied health personnel roles of communicator and caregiver. Students will learn principles of professional allied health personnel practice and provide direct care to individuals within a medical surgical setting while recognizing the diverse uniqueness of individuals with health alterations.		
Clinical Teaching		
a. Demonstrate beginning competency in technical skills.	10	
Independent Work by Student guided by faculty		
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	2.5	
b. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	2.5	
Hands on practical work by students		
a. Protect confidentiality of electronic/manual health records data, information, and knowledge of technology in an ethical manner	05	
Independent work by student		
a. Demonstrate expected behaviors and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behavior and appearance.	05	
Log book	10	
Viva	10	
Attendance	05	
Total	**50 Marks**	

Sign of Internal Examiner:_____
Sign of External Examiner:_____

Annexure IV: SEM 3 – Dissertation (PG) (Internal Assessment)

Dissertation/Project Proposal : overall performance of the student	**Marks allotted**	**Marks Obtained**
Open mindedness/ Receptivity to feedback Integrates feedback	5 Marks	
Meets deadlines / Regularity in meeting / Consistency in communication	10 Marks	
Continuous Internal evaluation (CIE)		
Interest shown in selecting topic	5 marks	
Appropriate review	10 marks	
Discussion with guide and other faculty	10 marks	
Quality of protocol	5marks	
Preparation of proforma / log book / daily reports	5marks	
TOTAL	**Out of 50**	

Evaluation parameter (Semester IV)

Evaluation parameter (Semester IV)	Continuous Internal Evaluation (CIE)	Semester End Evaluation (SEE)	
	Guide	Internal examiner	External examiner
Thesis preparation, Novelty, Overall Lab Work Culture	25	-	-
Dissertation/Project work book	25	25	25
Evaluation of thesis including Viva Voce	-	50	50
Total	50	75	75
Overall Total = 200			

Resolution No.6.7 of Academic Council (AC-48/2023): Resolved to approve the list of books from M.Sc. Clinical Embryology, M.Sc. Medical Biotechnology, M.Sc. Clinical Nutrition, B. Optometry, B.Sc. MRIT, M.Sc. MRIT & M. Optometry **[Annexure-50].**

Programme Name	Book Name	Author
M.Sc. Clinical Nutrition	Food:Facts and Principle By N. Shakuntala Manay & M. Shadaksharaswamy Fourth Edition (1 oct.2020)	New Age International Publisher Private Limited
	Food science By BSrilakshmi 7th Edition (1st Feb.2018)	New Age International Publisher Private Limited
	Food analysis By S.Suzanne Nielsen 5th Edition (2017)	Springer Cham
	Modern food microbiology By James Jay 7th Edition (10th may 2006)	Springer-Verlag New York Inc.
	Food Microbiology By William Frazier 5thEdition (1st July 2017)	McGraw Hill Education India
	Community Nutrition By B Srilakshmi and Suganthi V 1st edition (7 July 2022);	New Age International Private Limited;
	Public Health and Community Nutrition By Elizabeth Eilender Edition (28 September 2016)	Momentum Pr
	Krause and Mahan's Food and the Nutrition Care Process By Janice L.Raymond and Kelly Morrow, 16th edition	Elsevier Science Health Science; 16th edition (27 September 2022)
	Advances in Nutraceuticals and functional Foods: Concept and Application By Preetha Balakrishnan and Sreerag Gopi 1st Edition (19th may 2022)	CRC Press, Taylor and Francis group Apple Academic Press Inc
	Nutrient and gene interaction By Kelly Anne Meckling	CRC Press, Taylor and Francis group Apple Academic Press Inc
	Nutrigenomics By Carsten Carlberg, Stine Marie Ulven, Ferdinand Molnar	Springer; Softcover reprint of the original 1st ed. 2016 edition (30 May 2018)
	Food Service Manual for Health Care Institutions Fourth Edition By Ruby Parker Puckett	Jossey -Bass, A Wiley Imprint

MGM INSTITUTE OF HEALTH SCIENCES

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