

**SEVA MANDAL EDUCATION SOCIETY'S**  
**DR. BHANUBEN MAHENDRA NANAVATI COLLEGE OF HOME SCIENCE**  
**(AUTONOMOUS)**  
**NAAC Re-accredited 'A+' Grade with CGPA 3.69 / 4 (3<sup>rd</sup> Cycle)**  
**UGC Status: College with Potential for Excellence**  
**BEST COLLEGE AWARD 2016-17: Adjudged by S.N.D.T. Women's University**  
**338, R.A. Kidwai Road, Matunga, Mumbai – 400019**

**Department of Post Graduate Studies**

**PROGRAMME: M.Sc. CLINICAL NUTRITION AND DIETETICS**

**ELIGIBILITY FOR M.Sc. CLINICAL NUTRITION AND DIETETICS**

- The minimum percentage is 50% or B grade for students who have the following degrees: B.Sc. Foods and Nutrition, B.Sc. Food Science and Nutrition, B.Sc. Clinical Nutrition and Dietetics/Nutrition and Dietetics, B.Sc. Public Health and Nutrition, B.Sc. Applied Nutrition.
- The minimum percentage is 55% or B grade for students with a degree in Pure Sciences: B.Sc. Life Sciences, B.Sc. Biochemistry, B.Sc. Biotechnology, B.Sc. Physiology, B.Sc. Zoology, B.Sc. Molecular Biology, B.Sc. Clinical and Laboratory Sciences.
- Minimum 50% or B grade for students with Postgraduate Diplomas in Dietetics, Applied Nutrition, Sports Sciences Fitness and Nutrition, Public Health, Clinical Research.
- NOTE: Applicants in B category who do not have specialization in Foods and Nutrition at Undergraduate level should have completed a total 32 credits under the semester pattern or 600 marks under the annual pattern in the following subjects:
  - Chemistry
  - Biology
  - Physiology

**Program Outcomes**

- Utilize knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease processes.
- Provide nutrition counseling and education to individuals, groups, and communities throughout the lifespan using a variety of communication strategies.
- Evaluate nutrition information based on scientific reasoning for clinical, community, and food service application and implement self-learning in future endeavors.
- Practice state-of-the-art nutrition care in collaboration with other health-care providers in interdisciplinary settings within the bounds of ethical, legal, and professional practice standards.

**Semester I**

Sr. No.	Course	No of lecture	T.C.	Th Cr.	Pr. Cr	Internal marks	External marks	Total marks
<b><i>Core component</i></b>								
1	Nutritional Biochemistry	60	4	4	-	50	50	100
2	Macronutrients	60	4	4	-	50	50	100
3	Advanced Nutrition – Pr	120	4	-	4	50	50	100
4	Medical Nutrition Therapy- I (Th)	60	4	4	-	50	50	100
5	Medical Nutrition Therapy- I (Pr)	120	4	-	4	50	50	100
6	<u>CBCS</u> - SWAYAM courses/ Coursera	60	4	4	-	50	50	100
<b><i>Value-Added Courses</i></b>								
1	Human Anatomy and Physiology	30	2	2	-	50	50	100
2	Bridge Course*	60	4	4	-	50	50	100

\*Compulsory for students from non-nutrition background

CBCS: Choice Based Credit System

**Course Title: NUTRITIONAL BIOCHEMISTRY – (Th)****Course Code: MCND101****Course Description:**

- This course provides introduction to biochemistry of macro- and micronutrients with a limited focus on medical aspects of nutrient deficiencies and metabolism

**Course Outcomes:**

At the end of the course, the learner will be able to:

- Analyze and identify structure and related biochemical properties of nutrients, DNA & RNA compounds.
- Develop an insight into interrelationships between various metabolic pathways of nutrients and other related compounds.
- Understand and implement the integration of cellular level metabolic events to nutritional disorders and imbalances.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND101	Nutritional Biochemistry	60	4	4	-	50	50	100

**Evaluation:**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

Contents:

Module 1:  
Introduction to Cell Chemistry, Enzymes, Acid-base balance  
(15 Lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <ul style="list-style-type: none"> <li>• Understand basic of human cell structure</li> <li>• Understand functioning, regulation and structure of enzymes</li> </ul>	<p style="text-align: center;"><b>Biochemistry of Cell Membrane</b></p> <p>Membrane structure, composition and Transport of metabolites across membranes</p> <p style="text-align: center;"><b>Enzymes</b></p> <ul style="list-style-type: none"> <li>• Kinetics of monosubstrate and bisubstrate catalysed reactions (including inhibition)</li> <li>• Enzyme specificity, regulation of enzyme activity and synthesis</li> <li>• Enzymes in clinical diagnosis</li> </ul> <p><b>Acid base balance</b></p> <p><b>Free radicals, ROS and oxidative damage</b></p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

Module 2:  
Metabolism of Macronutrients & Biological Oxidation  
(20 Lectures)

Objectives	Content	Evaluation
<p>This module enables students to:</p> <p>Understand structure, metabolic pathways, disorders related to carbohydrate metabolism</p> <ul style="list-style-type: none"> <li>• Understand chemical structure and property of proteins and lipids, their related disorders</li> <li>• Understand process and pathways with regards to metabolism of proteins and lipids</li> </ul>	<p style="text-align: center;"><b>Review of</b></p> <p><b>Carbohydrate Metabolism:</b> Intestinal transport of carbohydrates, Transport of glucose across various cells, Cellular metabolism of carbohydrates Glycogen metabolism Regulation of carbohydrate metabolism at substrate level, enzyme level, hormonal level and organ level, Disorders of carbohydrate metabolism. Definition, classification, structure and properties of glycoproteins and proteoglycans</p> <p><b>Metabolism of Lipids :</b> Metabolism is to be discussed with reference to: Intestinal transport of lipids, Cellular uptake and metabolism of lipids(beta-oxidation, denovo synthesis of fatty acids, synthesis and breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol) Lipoprotein metabolism, VLDL and LDL ('Forward' Cholesterol transport)VLDL and LDL (Endogenous TAG transport),HDL ('Reverse'</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

	<p>Cholesterol transport), Regulation of lipid metabolism at substrate level, enzyme level, hormonal level and organ level, Disorders of lipid metabolism, Dyslipidemias, Lipid storage diseases</p> <p><b>Protein Metabolism:</b> Metabolism of amino acids- biosynthesis and catabolism - energy, glucose and ketone bodies, protein amino acids, non-protein amino acids (including urea cycle, transamination, one-carbon metabolism), Creatine and creatinine, Plasma proteins – Nature, properties and functions, Biologically active peptides, polypeptides and transport proteins, Inborn errors of amino acid metabolism</p> <p><b>Intermediary Metabolism:</b> Review of regulation of intermediary metabolism- equilibrium and non-equilibrium reactions, committed steps, allosteric modifications, covalent modulation, hormonal induction and repression, cross-over theorem, starve-feed cycle, caloric homeostasis and futile cycles, Tricarboxylic acid cycle</p> <p><b>Biological Oxidation:</b> Electron transport chain and oxidative phosphorylation</p>	
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**Module 3:**  
**Xenobiotics and Cellular Signaling**  
**(10 Lectures)**

Objectives	Content	Evaluation
<p>This module enables students to:</p> <ul style="list-style-type: none"> <li>● Understand basics and advances in xenobiotic and cellular signaling pathway</li> <li>● Understand mechanism of action of free radicals in human body</li> <li>● Understand homeostatic mechanism for acid base balance in human body</li> </ul>	<p><b>Xenobiotics</b></p> <p>Detoxification in the body-metabolism of xenobiotics (Phase I and Phase II enzymes)</p> <p><b>Cell Signaling:</b> Overview of extracellular cell signaling, G protein couple receptors and their effectors, enzyme linked receptors and their effectors, second messengers, map kinase pathways</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**Module 4:**  
**Molecular Biology**  
**(15 Lectures)**

Objectives	Content	Evaluation
<p>This module enables students to:</p> <ul style="list-style-type: none"> <li>● Understand advances in molecular biochemistry</li> <li>● Understand structure, metabolism of nucleotides and its related disorders</li> </ul> <p><b>Understand gene expression and factors involved in its regulation.</b></p>	<p><b>Biochemical aspects of purine and pyrimidines</b></p> <ol style="list-style-type: none"> <li>a. Metabolism of purines</li> <li>b. Metabolism of pyrimidines</li> <li>c. Role of purine and pyrimidine nucleotides in metabolism.</li> </ol> <p><b>Biochemistry of Nucleic Acids</b></p> <ol style="list-style-type: none"> <li>a. Metabolism of DNA</li> <li>b. Metabolism of RNAs</li> <li>c. DNA replication, mutation, repair and recombination concepts</li> <li>d. Disorders of nucleic acid metabolism</li> </ol> <p><b>Protein Biosynthesis</b></p> <ol style="list-style-type: none"> <li>a. Gene expression and its regulation, transcription, translation, post-translational modification</li> <li>b. Inhibitors of protein biosynthesis</li> <li>c. Gene expression in mitochondria</li> <li>d. Systems Biology including Metabolomics and Proteomics</li> </ol>	<p>Students</p> <p>Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**References:**

1. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25<sup>th</sup> Ed. Harpers Biochemistry. Macmillan Worth Publishers.
2. Nelson, D.L. and Cox, M.M. (2000): 3<sup>rd</sup> Ed. Lehninger's Principles of Biochemistry, Macmillan Worth Publishers.
3. Devlin, T.M. (1997): 4<sup>th</sup> Ed. Text book of Biochemistry with Clinical Correlations, Wiley LissInc
4. Stryer, L. (1998): 4<sup>th</sup> Ed. Biochemistry, WH Freeman and Co.
5. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H. (2001): 5<sup>th</sup> Ed. Outlines of Biochemistry, John Wiley and Sons.
6. Voet, D. Voet, J.G. and Pratt, C.W. (1999). Fundamentals of Biochemistry.
7. Tietz, N.W. (1976) Fundamentals of Clinical Chemistry. WB Saunders Co.
8. King, E.J. and Wootton, I.D.P. (1956). 3<sup>rd</sup> ed. Micro-Analysis in Medical Biochemistry. J and A Churchill Ltd.
9. Plummer, D.T. (1987). 3<sup>rd</sup>ed. An Introduction to Practical Biochemistry. McGraw-Hill Book Co.

**COURSE TITLE: MACRONUTRIENTS (Th)**  
**Course Code: MCND102**

**Course Description:**

This course is designed to impart knowledge about the metabolism and functions of macronutrients. It allows the learner to gain knowledge about the metabolic and pharmacological role of macronutrients on human health and its implication in clinical disorders.

**Course Outcome:**

At the end of the course, the learner will be able to:

- Describe the metabolism of macronutrients and their physiological and metabolic role in the human body.
- Estimate the nutritional requirements and recommendations for individuals throughout the life cycle.
- Apply the knowledge of dietary guidelines and recent advances in nutrition for developing therapeutic plans and public health programmes
- Explain the concept of body composition, its effect on the nutritional status for an individual.
- Examine the need and requirement for individuals living in special climatic conditions.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND102	Macronutrients	60	4	4	-	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>



**Module 1:****Human Nutritional Requirements, Body Composition and Energy****(20 lectures)**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>This module will enable students to:</p> <ul style="list-style-type: none"> <li>● Understand various nutritional guidelines and techniques used to derive nutritional requirements for humans.</li> <li>● Gain knowledge about methods to assess body components of individuals.</li> <li>● Understand the significance of body composition through different life stages.</li> <li>● To understand methods of assessing energy needs and its application for energy regulation for humans</li> </ul>	<p><b>Development and recent concepts in Human nutrition:</b></p> <ol style="list-style-type: none"> <li>i. Description of basic terms and concepts in relation to human nutritional requirements.</li> <li>ii. Methods of determining human nutrient needs</li> <li>iii. Guidelines and Recommendations</li> <li>iv. Development of International and National Nutritional Requirements</li> <li>v. Translation of nutritional requirements into Dietary Guidelines</li> </ol> <p><b>Body Composition</b></p> <ol style="list-style-type: none"> <li>i. Significance of body composition and changes through the life cycle</li> <li>ii. Methods for assessing body composition (both classical and recent) and their applications.</li> </ol> <p><b>Energy</b></p> <ol style="list-style-type: none"> <li>i. Components of energy requirements: BMR, RMR, thermic effect of feeding, physical activity.</li> <li>ii. Factors affecting energy requirements, methods of measuring energy expenditure.</li> <li>iii. Estimating energy requirements of individuals and groups.</li> <li>iv. Regulation of energy metabolism and body weight: Control of food intake – role of leptin and other hormones.</li> </ol>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**Module 2:**  
**Carbohydrates & Proteins**  
**(20 lectures)**

Objectives	Content	Evaluation
<p>This module will enable students to:</p> <ul style="list-style-type: none"> <li>● Understand metabolism, functions of carbohydrates.</li> <li>● Review and search recent trends in carbohydrate related research</li> <li>● Understand concept of glycemic index and load and its application in practical setting.</li> <li>● Gain knowledge about application of fiber in therapeutic conditions.</li> <li>● To understand the correlation between carbohydrates and human genotype and phenotype.</li> <li>● Understand metabolism, functions of protein and its therapeutic application in human health</li> </ul>	<p style="text-align: center;"><b>2.1 Carbohydrates</b></p> <ol style="list-style-type: none"> <li>i. Review of nutritional significance of carbohydrates and changing trends in dietary intake of different types of carbohydrates and their implications</li> <li>ii. Dietary fiber: Types, sources, role and mechanism of action</li> <li>iii. Chemical composition and physiological significance of: <ul style="list-style-type: none"> <li>● Resistant starch &amp; fructo-oligosaccharides</li> </ul> </li> <li>iv. Glycemic Index and glycemic load</li> <li>v. Carbohydrates and gene expression</li> </ol> <p style="text-align: center;"><b>2.2. Proteins</b></p> <ol style="list-style-type: none"> <li>i. Overview of role of muscle, liver and G.I. tract in protein metabolism</li> <li>ii. Amino acid and peptide transporters</li> <li>iii. Therapeutic applications of specific amino acids</li> <li>iv. Peptides of physiological significance</li> </ol> <p>Proteins, amino acids and gene expression</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**Module 3:****Lipids & Nutrition in Special Condition****(20 lectures)**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>This module will enable students to:</p> <ul style="list-style-type: none"> <li>• Understand the function of lipid and related compounds in human body</li> <li>• Gain knowledge about application of lipids in therapeutic conditions.</li> <li>• Understand nutritional requirements for individuals exposed to different environmental conditions</li> </ul>	<p>3.1 Lipids</p> <ol style="list-style-type: none"> <li>Nutritional significance of fatty acids – SFA, MUFA, PUFA: functions and deficiency</li> <li>Role of n-3 and n-6 fatty acids</li> <li>Prostaglandins</li> <li>Trans Fatty Acids</li> <li>Conjugated linoleic acid</li> <li>Nutritional Requirements and dietary guidelines (International &amp; National) for visible and invisible fats in diets.</li> <li>Lipids and gene expression</li> </ol> <p><b>3.2 Nutrition in Special Conditions:</b></p> <ol style="list-style-type: none"> <li>Space Travel,</li> <li>High Altitudes</li> <li>Low Temperature &amp; Submarines</li> </ol>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**References:**

1. Annual Reviews of Nutrition. Annual Review Inc, California, USA
2. David Bender, 5<sup>th</sup> edition (2017), Introduction to Nutrition and metabolism, CRC press
3. Martha Stipanuk and Marie Caudil, 3<sup>rd</sup> edition (2012), Biochemical, Physiological And Molecular Aspects of Human Nutrition, Saunders.
4. Sareen Gropper and Jack Smith, 6<sup>th</sup> edition (2012), Advance Nutrition and Human Metabolism, Cengage Learning Custom Publishing.
5. Sareen Gropper and Jack Smith, 7<sup>th</sup> edition (2016), Advance Nutrition and Human Metabolism, Cengage Learning Custom Publishing.
6. Somdat Mahabir and Yashwant Pathak, 1<sup>st</sup> edition (2014), Nutraceuticals and Health: Review of Human Evidence, CRC Press
7. Susan A Lanham et al, 2<sup>nd</sup> edition (2011), Nutrition and metabolism, Blackwell Publishing

*Journals:*

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Nutrition
5. European Journal of Clinical Nutrition
6. International Journal of Vitamin and Nutrition Research
7. International Journal of Food Science and Nutrition
8. Nutrition Research
9. Annals of Nutrition and Metabolism

**Course Title: ADVANCED NUTRITION (PRACTICAL)****Course Code: MCND103****Course Description:**

The course is designed to understand the fundamentals in human nutrition and macronutrient metabolism and its implication in human health and disease.

**Course Outcomes:**

At the end of the course, the learner will be able to:

- List and design the ABCD of Nutritional assessment techniques.
- Apply the skill of nutritional assessment techniques to evaluate health status of individual and group.
- Record the effect of an intervention program to understand the prognosis of the disease.
- Diagnose malnutrition, nutrient deficiency and other nutritional related disorders.
- Interpret laboratory/ research reports and data to design a suitable diet plan.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND103	Advanced Nutrition (P)	120	4	-	4	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Journal work & assignment/ project submission	50
External	Practical examination test & Viva Voce	50
	<b>Total marks</b>	<b>100</b>

Content

**Module 1:**  
**Assessment of Nutritional Status & Body Composition**  
**(40 lectures)**

OBJECTIVES	CONTENT	EVALUATION
<p>This module enables students to:</p> <p>a. Understand the process of nutritional status assessment and its application in clinical set-up and community</p> <p>Develop skills for nutritional assessment techniques aiding in research data collection</p>	<p><b>Assessment of Nutritional Status</b></p> <ol style="list-style-type: none"> <li>a. Reliability, validity accuracy, precision of nutritional assessment techniques</li> <li>b. Measurement of weight and height for young, old children and adults.</li> <li>c. Calculation of BMI and its interpretation</li> <li>d. Use of WHO reference standards</li> <li>e. Wasting, stunting, underweight, severe and moderate malnutrition</li> <li>f. Calculation of z-scores and use of software</li> <li>g. Circumference Measurements – chest, head, mid arm. Waist, hip and ratios wherever applicable</li> </ol> <p><b>1.2 Body Composition Analysis</b></p> <ol style="list-style-type: none"> <li>a. Use of skinfold technique.</li> <li>b. bioelectric impedance</li> <li>c. DEXA</li> <li>d. Calculation of body fat</li> </ol>	<p>Students will be evaluated on exercise completion, report and journal writing/ presentations &amp; Demonstrations</p>

**Module 2:**  
**Energy Analysis & Dietary Assessment Techniques**  
**(40 lectures)**

Objectives	Content	Evaluation
<p>This module enables students to:</p> <p>Develop assessment skills to identify energy balance for individuals by evaluating energy components in detail</p>	<p><b>2.2 Energy intake &amp; expenditure Analysis</b></p> <ol style="list-style-type: none"> <li>a) Indirect calorimetry: use of ergometer, treadmill, heart rate monitoring</li> <li>b) Recording physical activities</li> <li>c) Factorial estimation of energy expenditure: MET, PAL</li> <li>d) Study of food labels- calculation of DV</li> <li>e) In vitro starch digestibility</li> </ol> <p><b>2.2 Dietary assessment:</b></p> <ol style="list-style-type: none"> <li>a) Food frequency questionnaire</li> <li>b) 24-diet recall, 24-hour diet record</li> <li>c) Weighment method</li> </ol>	<p>Students will be evaluated on exercise completion, report and journal writing/ presentations &amp; Demonstrations</p>

**Module 3:**  
**Biomarkers of Macronutrients (40 lectures)**

Objectives	Content	Evaluation
<p>This module enables students to:</p> <p>Understand assessment techniques used for biochemical marker evaluation of carbohydrates and lipids</p>	<p><b>3.1 Dietary Protein Evaluation and Assessment of Protein Status:</b></p> <ol style="list-style-type: none"> <li>a) Chemical Score for proteins</li> <li>b) PDCAAS index</li> <li>c) In vitro protein digestibility</li> <li>d) Estimation of serum albumin, globulin and albumin: globulin ratio</li> </ol> <p><b>3.2: Biomarkers of Carbohydrate &amp; lipids</b></p> <ol style="list-style-type: none"> <li>a) Fasting and Postprandial Blood Glucose estimation</li> <li>b) OGTT</li> <li>c) Glycosylated Hemoglobin,</li> <li>d) Glycemic index and glycemic load</li> <li>e) Insulin index</li> <li>f) Measurement of lipid levels in serum and its Interpretation</li> </ol>	<p>Students will perform and submit report on following:</p> <ul style="list-style-type: none"> <li>● Calculating chemical score of different protein rich food sources.</li> <li>● Survey on PDCAAS index of protein powders available in the market for different target audience like children, adults, clinical condition, muscle building, meal replacers etc.</li> <li>● Interpretation report for abnormal serum albumin, globulin levels and their ratio.</li> <li>● Normal values of blood glucose, HbA1c and interpretation of the results</li> <li>● Preparation of Carbohydrate counting chart for different community</li> <li>● Calculation of glycemic index of a meal</li> <li>● Interpretation of abnormal blood lipid profile with possible cause and consequences</li> </ul>

**Course Title: MEDICAL NUTRITION THERAPY I (TH)****Course Code: MCND104****Course Description:**

- The course is designed to provide concepts of an intermediate study of nutritional therapy of disease. Course content includes evidence-based practice in prevention and nutritional management of diseases.
- Patient assessment and medical chart documentation will be covered. Elements of pathology and biochemistry of the nutrition related problems are integrated into course topics.

**Course Outcome:**

At the end of the course, the learner will be able to:

- Describe the role of diet in disease prevention and treatment across the continuum of diet-related health conditions from primary, secondary and tertiary care.
- Explain the pathophysiology of diet-responsive diseases and other conditions, and how these conditions affect nutritional status.
- Utilize all elements of nutrition screening and assessment within context of the Nutrition Care process.
- Demonstrate comprehension of medical terminology associated with each disease condition and also utilize course resources to identify nutritional side effects and food/nutrient/drug interactions of common medications prescribed to treat the disease condition.
- Apply appropriate communication, counseling and education skills to patient care with specific disease conditions

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND104	MNT I (T)	60	4	4	-	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>



Contents

**Module 1:**  
**The Nutrition Care Process & Nutrition Support**  
**(15 lectures)**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>This module enables students to:</p> <p>a) To understand the basics of Nutritional Care (NCP) and its application as a preliminary step in a diseased individual.</p> <p>b) To gain knowledge and skills to identify an individual who is at risk of and who would benefit the most from NCP.</p> <p>c) To understand the various methods available for delivery of nutritional support.</p>	<p><b>Nutritional (and dietary) care Process</b></p> <p><b>A) in health</b></p> <ul style="list-style-type: none"> <li>- Depending on the state of growth &amp; development of the individual</li> <li>- at various activity levels and socioeconomic status.</li> </ul> <p><b>B) in disease</b></p> <ul style="list-style-type: none"> <li>- Nutritional screening/ assessment and identification of nutritional problem</li> <li>- Nutritional Intervention and Diet Modification based on interpretation of</li> <li>- Patient data- clinical, biochemical and other relevant data</li> <li>- Nutrition Education and Counseling</li> <li>-Evaluation of Nutritional care</li> </ul> <p><b>Delivery of Nutritional Support – Meeting nutritional needs</b></p> <p>A. Enteral tube feeding  Different Enteral feeding access routes  Practical Aspects</p> <p>B. Parenteral nutrition</p> <p>Exchange lists as a tool in planning diets</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews  Assignments/ Presentations assigned/ conducted for each module</p>

**Module 2:**  
**Nutrition for Weight Management**  
**(20 lectures)**

Objective	Content	Evaluation
<p>This module enables students to:</p> <p>a) To understand the basics of body components, adipose tissue and methods available for the assessment of obesity.</p> <p>b) To understand the etiological factors and health risk associated with Obesity and Underweight.</p> <p>c) To understand the multi- dimensional approach for the treatment of obesity and underweight.</p> <p>To understand the various eating disorders, its prevalence and a multi- dimensional approach for its treatment.</p>	<p><b>Nutrition for weight management:</b> Disorders of energy balance</p> <p>A. Obesity</p> <p>Components of body weight</p> <p>Adipose tissue- structure, regional distribution and storage</p> <p>Regulation of body weight</p> <p>Types of obesity Assessment of obesity</p> <p>Health risks</p> <p>Causes of obesity: neural, hormonal, and psychological</p> <p>Management of obesity</p> <ul style="list-style-type: none"> <li>- Dietary Modification: past and present approach</li> <li>- Psychology of weight reduction: psychotherapy and behavior modification</li> <li>- Physical activity and exercise</li> <li>- Pharmacological treatment</li> <li>- Surgical treatment effect on satiety and other factors</li> <li>- Maintenance of Reduced weight</li> </ul> <p>B. Underweight/Excessive Leanness/ Under nutrition</p> <ul style="list-style-type: none"> <li>- Pathophysiology, Causes and assessment including fever and infectious diseases (Tuberculosis, AIDS)</li> <li>- Health risks and effect on nutritional status</li> <li>- Dietary Management</li> <li>- Psychotherapy</li> </ul> <p style="text-align: center;">Eating disorders: Anorexia Nervosa and Bulimia Nervosa</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**Module3:**  
**Nutrition for Digestive system**  
**(25 lectures)**

Objective	Content	Evaluation
<p>This module enables students to:</p> <ol style="list-style-type: none"> <li>1. To understand the pathophysiology and symptoms associated with various gastro intestinal and hepato biliary disorders.</li> <li>2. To explain the interrelationship between the disease conditions and nutritional status</li> </ol> <p>To understand the therapeutic role of diet in the treatment of these disorders.</p>	<p><b>Medical Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders</b></p> <ol style="list-style-type: none"> <li>a) Diagnostic Tests for the G.I. diseases</li> <li>b) Pathophysiology and Nutritional care and diet therapy in               <ol style="list-style-type: none"> <li>i) Diseases of esophagus; esophagitis, Hiatus hernia</li> <li>ii) Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers</li> </ol> <p>Management: associated with H. pylori infection, NSAIDS</p> <p>Dietary management: traditional approach and liberal approach</p></li> <li>c) Gastric Surgery: Nutritional care, dumping syndrome</li> </ol> <p><b>Medical Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders</b></p> <p>Common Symptoms of Intestinal dysfunction</p> <ul style="list-style-type: none"> <li>- Flatulence, constipation, haemorrhoids, diarrhoea, steatorrhoea, typhoid</li> </ul> <ol style="list-style-type: none"> <li>b) Diseases of the large intestine:               <ul style="list-style-type: none"> <li>- Diverticular disease, irritable bowel syndrome, inflammatory bowel disease</li> </ul> </li> <li>c) Malabsorption Syndrome/Diseases of Small intestine               <ul style="list-style-type: none"> <li>- Celiac (Gluten –induced) sprue, tropical sprue, intestinal brush border enzyme deficiencies, Lactose intolerance, protein- losing enteropathy</li> </ul> </li> <li>d) Principles of dietary Care: Fibre, residue Modified fibre diets</li> <li>e) Intestinal surgery: short bowel syndrome, Ileostomy, Colostomy, Rectal surgery</li> </ol> <p><b>Medical Nutrition therapy for Diseases of the Hepato - Biliary Tract</b></p> <ol style="list-style-type: none"> <li>a. Nutritional care in liver disease in context with results of specific liver function tests</li> <li>- Dietary care and management in viral hepatitis (different types), cirrhosis of liver, hepatic encephalopathy, Wilson’s disease</li> </ol> <p>Dietary care and management in diseases of the gall bladder and pancreas i.e., biliary dyskinesia, cholelithiasis, cholecystitis, cholecystectomy, pancreatitis, Zollinger-Ellison syndrome</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**References:**

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10<sup>th</sup> Edition, W.B. Saunders Ltd.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9<sup>th</sup> Edition, Williams and Wilkins.
3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4<sup>th</sup> Edition, Williams and Wilkins.
4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10<sup>th</sup> Edition, Churchill Livingstone.
5. Williams, S.R. (1993): Nutrition and Diet Therapy, 7<sup>th</sup> Edition, Times Mirror/Mosby College Publishing.
6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2<sup>nd</sup> Edition, W.B. Saunders Co.
7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9<sup>th</sup> Edition, W.B. Saunders Co.
9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9<sup>th</sup> Edition, Lea and Febiger, Philadelphia.
10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14<sup>th</sup> Edition, McGraw Hill.
11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D. WCRF.

*Journals and Other Reference Series*

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Reviews

**Course Title: MEDICAL NUTRITION THERAPY I (PR)****Course Code: MCND105****Course Description:**

- The course is designed to provide concepts of an intermediate study of nutritional therapy of disease. Course content includes evidence based practice in prevention and nutritional management of diseases.
- Patient assessment and medical chart documentation will be covered. Elements of pathology and biochemistry of the nutrition related problems are integrated into course topics.

**Course Outcome**

At the end of the course, the learner will be able to:

- Create a therapeutic diet according to the individual or patient's requirement in diseased conditions.
- Analyze the assessment report to understand the inter-relations of the metabolic disturbance and overall health status of the individual.
- Construct new ideas and solutions for dietetic problems based on their knowledge and experience

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND105	MNT I (P)	60	4	-	4	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Journal	40
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	10
External	Practical Examination & Viva Voce	50
	<b>Total marks</b>	<b>100</b>

**Module 1:**  
**Diet Therapy: Introduction, Standardization, Nutrition Care Process & Exchange list**  
**(30 lectures)**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation (50 M)</b>
<p>This module enables students to:</p> <p>a) To understand the basics of portion size and standardization of common recipes and gain knowledge about existing products used for different nutritional purpose in Indian Market</p> <p>b) To understand the basics of Nutritional Care (NCP) and its application as a preliminary step in a diseased individual.</p> <p>c) To gain knowledge and skills to identify an individual who is at risk of and who would benefit the most from NCP.</p> <p>d) To understand the various methods available for delivery of nutritional support</p>	<p>Collection and storage of biological samples for clinical investigations</p> <p>Standardisation of food groups and preparation of tube feed</p> <p>Market survey of commercial nutritional supplements and nutritional support substrates</p> <p><b>Nutritional (and dietary) care Process</b></p> <p>A) in health</p> <ul style="list-style-type: none"> <li>- Depending on the state of growth &amp; development of the individual</li> <li>- at various activity levels and socioeconomic status.</li> </ul> <p>The Nutritional care process</p> <p>B) in disease</p> <ul style="list-style-type: none"> <li>- Nutritional screening/ assessment and identification of nutritional problem</li> <li>- Nutritional Intervention and Diet Modification based on interpretation of</li> <li>- Patient data- clinical, biochemical and other relevant data</li> <li>- Delivery of Nutritional Support – Meeting nutritional needs and practical aspects</li> <li>a) Enteral tube feeding</li> <li>b) Parenteral Nutrition</li> <li>- Nutrition Education and Counseling</li> <li>-Evaluation of Nutritional care</li> </ul> <p><b>Exchange list as a tool in planning diets</b></p>	<p>Students will be evaluated on basis of diet plan submission/ journal competition/ assignments/ planning exams</p>

**Module 2:**  
**Nutrition for Weight Management**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This module enables students to:</p> <p>a) To understand the multi-dimensional approach for weight management.</p> <p>To focus on Nutrition as a part of management of Obesity and Underweight.</p>	<p><b>Nutrition for weight management: Disorders of energy balance</b></p> <p>B. Obesity Assessment of obesity Management of obesity</p> <ul style="list-style-type: none"> <li>- Dietary Modification : past and present approach</li> <li>- Psychology of weight reduction : psychotherapy and behavior modification</li> <li>- Physical activity and exercise</li> <li>- Maintenance of Reduced weight</li> </ul> <p><b>B. Underweight/Excessive Leanness/Under nutrition including Tuberculosis and AIDS</b></p> <ul style="list-style-type: none"> <li>- assessment</li> <li>- Dietary Management</li> <li>- Psychotherapy</li> </ul> <p>Eating disorders: Anorexia Nervosa and Bulimia Nervosa</p>	<p>Students will be evaluated on basis of diet plan submission/ journal competition/ assignments/ planning exams</p>

**Module 3:**  
**Nutrition for Digestive system**  
**(30 lectures)**

Objective	Content	Evaluation
<p>This module enables students to:</p> <p>a) To understand the interrelationship between the disease conditions and nutritional status</p> <p>To understand the therapeutic role of diet in the</p>	<p><b>Medical Nutrition therapy for Upper Gastrointestinal tract Diseases /Disorders</b></p> <p>a) Diagnostic Tests for the G.I. diseases b) Pathophysiology and Nutritional care and diet therapy in</p> <p>i) Diseases of esophagus; esophagitis, Hiatus hernia ii) Disorders of stomach: Indigestion, Gastritis, Gastric and duodenal ulcers</p> <p>Management: associated with H. pylori infection, NSAIDS Dietary management: traditional approach and liberal approach</p> <p>c) Gastric Surgery: Nutritional care, dumping syndrome</p>	<p>Students will be evaluated on basis of diet plan submission/ journal competition/ assignments/ planning exams</p>

treatment of these disorders	<p><b>Medical Nutrition therapy for Lower gastrointestinal tract Diseases/Disorders</b></p> <p>Common Symptoms of Intestinal dysfunction</p> <ul style="list-style-type: none"> <li>- Flatulence, constipation, haemorrhoids, diarrhoea, steatorrhoea,</li> </ul> <p>b) Diseases of the large intestine:</p> <ul style="list-style-type: none"> <li>- Diverticular disease, Irritable bowel syndrome, inflammatory bowel disease</li> </ul> <p>c) Malabsorption Syndrome/Diseases of Small intestine</p> <ul style="list-style-type: none"> <li>- Celiac (Gluten –induced) sprue, tropical sprue, intestinal brush border enzyme deficiencies, Lactose intolerance, protein- losing enteropathy</li> </ul> <p>d) Principles of dietary Care: Fibre, residue</p> <p>Modified fibre diets</p> <p>e) Intestinal surgery: Short bowel syndrome, Ileostomy, Colostomy, Rectal surgery</p> <p><b>MNT for Diseases of the Hepato - Biliary Tract</b></p> <p>a) Nutritional care in liver disease in context with results of specific liver function tests</p> <ul style="list-style-type: none"> <li>- Dietary care and management in viral hepatitis(different types) , cirrhosis of liver, hepatic encephalopathy, Wilson’s disease</li> </ul> <p style="padding-left: 40px;">Dietary care and management in diseases of the gall bladder and pancreas i.e. biliary dyskinesia, cholelithiasis, cholecystitis, cholecystectomy, pancreatitis, Zollinger-Ellison syndrome</p>	
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**PROGRAMME: M.Sc. in Clinical Nutrition and Dietetics****SEMESTER I- Value Added Course****Course Title: HUMAN ANATOMY AND PHYSIOLOGY*****Course Description***

This course introduces students to the physiology of the human body. Students understand the mechanisms of body function, organized around the central theme of homeostasis – how the body meets changing demands while maintaining the internal constancy necessary for all cells and organs to function.

***Course objectives***

This course will enable students to:

- Gain knowledge about human anatomy and its related regulatory mechanism.
- Understand the integrated functions of all systems and the grounding of nutritional science in Physiology.
- Understand alterations of structure and function in various organs and systems in disease conditions.
- Understand the role of nutrients and foods that can prevent the malfunctioning of the organ system due to lifestyle changes

***Learning outcomes:***

After completion of the course students are expected to:

- Have an understanding of the fundamental physiological processes of homeostasis, cell physiology, nervous system, urinary system, digestive system, respiratory system, circulatory and immune system.
- Understanding about the alteration in structure and function that takes place due to clinical disorders and vice versa.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
	Human Anatomy and Physiology	30	1	1	-	25 M	25M	50 M

***Evaluation:***

Evaluation	Details	Marks
Internal	Unit test, presentation/ class quizzes/ projects/ assignments	25
External	Written Examination	25
	<b>Total marks</b>	<b>50</b>

**Content**

**MODULE 1:**  
***Introduction to physiology, cell and Cardio-vascular system***  
**6 Lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>The module enables students to:</p> <p>a. Understand basics of human cell structure and levels of organisation for human anatomy</p> <p>b. Understand types, distribution and specific functions of tissues in human body</p> <p>c. Understand composition, location and functioning of different fluids present in human body</p>	<p><b>a) The Human Cell</b></p> <p>b) Basic structure of a Eukaryotic Cell</p> <p><b>Heart and Circulation</b></p> <p>c) Basic Structure, cardiac muscle properties, Systematic, pulmonary, coronary and portal circulation</p> <p>d) Cardiac cycle, cardiac output, factors affecting cardiac output</p> <p>e) Normal ECG.</p> <p>f) Blood pressure, control and factors affecting blood pressure.</p> <p>g) Blood: Blood formation, composition.</p> <p>h) Human Vasculature &amp; Endothelial dysfunction</p>	<p>The Students will be evaluated based on their performance on quizzes, assignment/ presentations in relation to the module</p>

**MODULE 2:**

***Focus on Homeostasis: cardio-respiratory system & Gastro-intestinal system***

**6 Lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>The module will enable students to:</p> <p>a. Understand structure, location and functions of cardiac and respiratory systems in human body</p> <p>b. Understand the regulatory mechanism of cardio-respiratory system</p>	<p><b>Gastrointestinal system and Hepato biliary system</b></p> <p>a) Structure, physiology and functions of the GI tract and accessory organs</p> <p><b>Endocrine System</b></p> <p>a. Chemical classification of hormones</p> <p>b. Hormone-Receptors, mode of action</p> <p>c. Second messenger system, negative feed-back control.</p>	<p>The Students will be evaluated based on their performance on quizzes, assignment/ presentations in relation to the module</p>

<p>c. Understand the mechanism of breathing</p> <p>d. Understand the normal ECG pattern and the concept of blood pressure</p> <p>e. Understand various pathological conditions that can be manifested by individuals due to changes in structure and functioning of these organs/ systems</p>		
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**MODULE 3:*****Focus on Homeostasis: gastro-intestinal, excretory & reproductive system******8 Lectures***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>a) Understand structure, location and functions of gastro-intestinal, hepatic-biliary system, excretory and reproductive system in human body and its regulatory mechanism</p> <p>b) Understand various pathological conditions that can be manifested by individuals due to changes in structure and functioning of these organs/ systems</p>	<p><b>3.Excretory System</b></p> <p>a. Components of Excretory System</p> <p>b. Kidney: Structural and functional relation</p> <p>c. Overview of urine formation process</p> <p>d. Blood supply to kidney &amp;GFR</p> <p><b>3.3 Reproductive System</b></p> <p>a. Female Reproductive System – Structure and function of Ovary, Uterus</p> <p>b. Hormonal control of menstrual cycle</p> <p>c. Male reproductive system – Structure and Function of Testis, hormonal control of spermatogenesis.</p>	<p>The Students will be evaluated based on their performance on quizzes, assignment/ presentations in relation to the module</p>

**MODULE 4:*****Focus on Homeostasis: Endocrine and nervous system, Biological aspects of Immunity, & respiratory system***  
**10 Lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>This module enables students to:</p> <ol style="list-style-type: none"> <li>Understand structure, location and functions of endocrine and nervous system, in human body and its regulatory mechanism</li> <li>Understand types of immunity present in humans and disorders of immune system</li> <li>Understand various pathological conditions that can be manifested by individuals due to changes in structure and functioning of these organs/ systems</li> </ol>	<p><b>Brain &amp; Nervous system:</b></p> <ol style="list-style-type: none"> <li>Brain and Nervous system</li> <li>central and autonomic nervous system and its organization</li> <li>Structure and properties of nerve</li> <li>Transmission of impulse, resting and action potential.</li> </ol> <p><b>Biological Aspects of Immunity</b></p> <ol style="list-style-type: none"> <li>Innate, acquired and active immunity</li> <li>Cell mediated immunity</li> <li>Humoral immunity and complement system</li> </ol> <p><b>Respiratory system</b></p> <p>Mechanism of breathing and respiration</p>	<p>The Students will be evaluated based on their performance on quizzes, assignment/ presentations in relation to the module</p>

**References:**

- West, J.B.: Best and Taylor's Physiological Basis of Medical Practice, 11<sup>th</sup> Edition.
- Chatterjee, C.C. (2002): Human Physiology: Medical Allied Agency, Calcutta.
- Guyton and Hall (2003): Test Book of Medical Physiology, 9<sup>th</sup> Edition, Prism Books Pvt. Ltd., W.B. Sanders Company, USA.
- Tortora (2003) Principles of Anatomy and Physiology.. John Wiley and sons.
- Keel and Neil: Samson and Wright's Applied Physiology (12<sup>th</sup> edition), Oxford University Press. London.
- Ross and Wilson: Anatomy and physiology in Health and Illness, 8<sup>th</sup> Edition, Church Hill Livingstone, N.Y

**BRIDGE COURE****Course Title: BASICS IN FOOD SCIENCE, NUTRITION AND DIETETICS**

**Course Description:** This course is designed to impart knowledge to students who are graduate from other than nutrition field and have enrolled for M.S in Clinical Nutrition and Dietetics course. the course shall provide students with required knowledge and skills required for competition of the curriculum.

**Objectives:**

This course will enable the students to:

- Gain knowledge about the basics of human nutrition
- Understand the basics of meal planning and diet therapy.
- Understand the importance of nutritional requirement for an individual in different life stages

**Learning outcomes:**

After completion of the course students are expected to:

- Have basic knowledge about nutrition and dietetics which will enable them to understand the advanced syllabus offered in the M.Sc. course.
- Have practical knowledge which will be useful for planning therapeutic diet for different clinical conditions

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
	Bridge Course - Basics in Food Science, Nutrition and Dietetics	60	4	3	1	50	50	100

**EVALUATION:**

- 1) Internal-50 marks – class tests and quiz, journal submissions and lab work
- 2) External- 50 marks- planning exam and theory exam

**MODULE 1: Basics in Human Nutrition**

<b>Objectives</b>	<b>Content</b>	<b>No. of Lectures</b>	<b>Evaluation</b>
<p>This module will enable students to:</p> <ul style="list-style-type: none"> <li>• Understand basic terminologies and concepts related to nutrition</li> <li>• To understand types of nutrients which are vital for human life and also their basic metabolic pathway</li> <li>• Students will also understand the role of each nutrient and effects of its deficiency or toxicity on human health.</li> </ul>	<ul style="list-style-type: none"> <li>• Understanding basics: Nutrition, Nutrients, health, food pyramid, my plate, ICMR, RDA, units of energy, components of energy and factors affecting the components.</li> <li>• The structure and role of enterocytes</li> <li>• Process of digestion &amp; absorption of nutrients across the gastrointestinal tract</li> <li>• Transportation of nutrients cross the brush border membrane</li> <li>• Macronutrients: types, function, metabolic pathways, deficiency and toxicity effects</li> <li>• Micronutrients: types, function, overview of deficiency and toxicity</li> <li>• Overview for nutritional assessment techniques and their application</li> </ul>	15	Students will be evaluated based on class test, quizzes and assignments completed.

**Module 2: Basics of meal planning & food science (T)**

Objectives	Content	No. of Lectures	Evaluation
<p>This module will enable students to:</p> <ul style="list-style-type: none"> <li>Understand food groups, food pyramid and procedure of diet planning for general population.</li> <li>It will also introduce students to basic concept of food principle related to each food group</li> </ul>	<ul style="list-style-type: none"> <li>Concept of nutritive value of food and development of exchange list</li> <li>Principle of planning diet.</li> <li>Modification of normal diets with special emphasis on macronutrients and micronutrients.</li> <li>Menu planning with nutrient distribution</li> </ul> <p><b>Basic concept of food science:</b></p> <ul style="list-style-type: none"> <li>Basics of heat transmission &amp; its type, methods of cooking.</li> <li>5 basic food groups: cereals, pulses, milk &amp; milk products, eggs, poultry, fish, sugar and fats &amp; oils</li> <li>Effect of processing on the food groups</li> <li>Overview of preservative technique used for perishable food products</li> </ul>	15	Students will be evaluated based on class test, quizzes and assignments completed.

**Module 3: basics of meal planning & food science (P)**

Objectives	Content	No. of Lectures	Evaluation
<p>This module will enable students to:</p> <ul style="list-style-type: none"> <li>Understand and develop exchange list for practical use.</li> <li>Understanding the concept of portion size by developing standardised recipe which will help them for meal planning</li> <li>It will also enable students to plan appropriate diet for healthy population/ individuals belonging to different life stage.</li> </ul>	<ul style="list-style-type: none"> <li>Development of exchange list</li> <li>Standardization of common recipe belonging to different food groups and</li> <li>applying their food properties</li> <li>modification of normal diet for consistency and texture</li> <li>planning diet for different age groups: Childhood, adolescence, adult, elderly. Pregnancy &amp; lactation</li> </ul>	15	Students will be evaluated based on class test, quizzes and assignments completed.

**Module 4: nutrition throughout life stages**

<b>Objectives</b>	<b>Content</b>	<b>No. of Lectures</b>	<b>Evaluation</b>
<ul style="list-style-type: none"><li>• This module will enable students to understand the basic nutritional requirement for individual belonging to different age groups</li></ul>	<b>Understand the nutritional requirements based on growth and development / changes taking place in the following life stages:</b> <ul style="list-style-type: none"><li>• Infancy</li><li>• Childhood</li><li>• Adolescence</li><li>• Adulthood</li><li>• Elderly</li><li>• Pregnancy</li><li>• Lactation</li></ul>	15	Students will be evaluated based on class test, quizzes and assignments completed.



Semester II

Sr. No.	Course	No of lecture	T.C.	Th Cr.	Pr. Cr	Internal marks	External marks	Total marks
<i>Core Component</i>								
1	Research Methodology and Scientific writing	60	4	4	-	50	50	100
2	Vitamins	60	4	4	-	50	50	100
3	Medical Nutrition Therapy II - Th	60	4	4	-	50	50	100
4	Medical Nutrition Therapy II - Pr	120	4	-	4	50	50	100
5	Pathophysiology and Metabolism in Disease – Th	60	4	-	4	50	50	100
6	CBCS: Clinical Nutrition / Nutrition for Sports and Exercise	60	4	-	4	50	50	100

**Course Title: RESEARCH METHODOLOGY AND SCIENTIFIC WRITING****Course Code: MCND201****Course Description:**

The course designed to impart education in the foundational methods and techniques of academic research in social science context.

**Course Outcome:**

At the end of the course, the learner will be able to:

- Identify the basic framework of research process, research designs and techniques.
- Explain various sources of information for literature review and data collection.
- Develop an understanding of the ethical dimensions of conducting applied research.
- Understand the writing types and styles for scientific data
- Review a book and summarize it effectively
- Design a thesis in an appropriate format and publish research papers

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND201	Research Methodology and Scientific Writing	60	4	4	-	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

ContentsModule 1The research process: Steps, Elements & Ethics (15 lectures)

Objectives	Topics	Evaluation
<p>This module enables student to:</p> <p>a. understand the entire process of research in a systematic manner</p> <p>b. Understand concepts, procedure, hypothesis formulation and other necessary components required for designing research project.</p>	<p><b>The Research Process</b></p> <p>a. Scientific approach to enquiry in comparison to native, common sense approach</p> <p>b. Knowledge, theory and research</p> <p>c. Role, need and scope of research in the discipline of Home Science</p> <p><b>Assignment:</b> <i>Differentiate between investigative reporting and research report (with examples to be brought by students as exercise)</i></p> <p><b>Steps in Research Process and Elements of Research</b></p> <p>a. Identifying interest areas and prioritizing</p> <p>Selection of topic and considerations in selection</p> <p>c. Review of related literature and research: Literature search and use of databases ,Writing review of literature on an upcoming area ,Review paper including bibliography</p> <p>d. variables- types of variables including discrete and continuous variables</p> <p>Conceptual definitions and operational definitions</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

	<p>e. Concepts, hypotheses and theories</p> <p>f. Hypothesis- meaning, attributes of a sound hypothesis, Stating the hypothesis and types of hypothesis. Hypothesis testing- null hypothesis, sample distribution, level of significance, critical regions, Type I and Type II errors</p> <p>g. Research Design .Research questions, objectives and assumptions</p> <p><b>Assignment:</b> <i>Types of variables</i></p> <p><i>Hypothesis formations and research questions from Research readings – students identify hypothesis/research questions – Discussion</i></p> <p><b>Ethics in Research</b></p>	
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### Module 2

#### Research types (15 lectures)

Objectives	Topics	Evaluation
<p>This module enables students to:</p> <p>understand various types of research design that can be implemented in a research project</p>	<p><b>Types of Research</b></p> <p>a. Basic and Applied research, Qualitative and Quantitative research (brief review of differences)</p> <p>b. Historical research</p> <p>c. Descriptive research methods – survey, case study, correlational study, content analysis, causal-comparative research</p> <p>d. Analytic studies- pre-experimental, experimental research, quasi experimental research</p> <p>e. Qualitative research, Ethnography</p> <p>f. Evaluative research- general characteristics, use of qualitative methods in enquiry</p>	<p>Students Will be evaluated based on their performance in Quizes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

	<p>Scope and importance in Home Science</p> <p><b>Assignment:</b> <i>Differentiate between (a) basic and applied research (Exercise to be based on actual research papers published in accredited journals)</i></p> <p><i>(b) qualitative and quantitative research</i></p> <p><i>Based on Journal contents undertake a critical appraisal of studies/research papers and discuss types of Research with examples</i></p>	
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### Module 3

#### Sampling: Types & techniques (15 lectures)

Objective	Content	Evaluation
<p>This module enables student to:</p> <p>understand sampling procedure in detail</p>	<p><b>Sampling</b></p> <p>a. Rationale, characteristics- meaning, concept of population and sample, and utility</p> <p>b. Types of sampling and generalizability of results</p> <p>c. Probability sampling - simple random sample, systematic random sample, stratified random sampling etc - random and non-random samples, random numbers and use</p> <p>d.. Non-probability sampling - purposive samples, incidental samples, quota samples, snowball samples</p> <p>e.. General consideration in determination of sample size</p>	<p>Students Will be evaluated based on their performance in Quizes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

Module 4Data collection (15 lectures)

Module No.	Objective	Content	Evaluation
4	<p>This module enables students to:</p> <p>Understand various tools that are available and can be used for data collection for research work.</p> <p>To learn the skills and guidelines for writing a review on a specific scientific topic and also for review paper</p>	<p><b>Tools for Data Collection</b></p> <ol style="list-style-type: none"> <li>Primary and secondary methods of data collection</li> <li>Different types of questionnaires, rating scales, check lists, schedules, attitude scales, inventories, standardized tests, interviews, observation</li> <li>Development of tools, estimation of reliability and validity of tools</li> <li>Procedure for preparation of the tool, administration of tools for data collection</li> <li>Procedure for data collection</li> <li>Planning for data analysis-coding of responses</li> <li>Writing a research proposal for various Funding Agencies</li> <li>Writing a scientific paper including abstract and identification of key words</li> <li>Styles and formats for writing references</li> <li>Writing a Book review</li> </ol> <p><b>Assignment:</b> <i>Construction of tools for data collection a) types of questions b) Questionnaire c) interview schedule d) observation d) scales e) writing scientific paper</i></p> <p><i>For a given topic students to frame and discuss the different possibilities of methods and tools</i></p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

***References***

1. Bell, J. (1997): *Doing Your Research Project: A Guide for First-time Researchers in Education and Social Science*, Viva Books, New Delhi
2. Bell, J. (1997): *How to Complete Your Research Project Successfully: A Guide for First-time Researchers*, UBSPD, New Delhi.
3. Bulmer, M.C. (1984): *Sociological Research Methods: An Introduction*, Macmillan, Hong Kong.
4. Festinger, L. and Katz, D. (ed.) (1977): *Research Methods in the Behavioral Sciences*, Amerind Publishing, New Delhi.
5. Holloway, I. (1997): *Basic Concepts of Qualitative Research*, Blackwell Science, London.
6. Jain, G. (1998): *Research Methodology: Methods and Techniques*, Mangal Deep, Jaipur.
7. Kothari, C.R. (2000): *Research Methodology: Methods and Techniques*, Wishwa Prakashan, New Delhi.
8. Kumar, A. (1997): *Social Research Method (The Art of Scientific Investigation)*, Anmol Publication, New Delhi.
9. Kumar, A. (2002): *Research Methodology in Social Sciences*, Sarup and Sons, New Delhi.
10. McBurney, D.H. (2001): *Research Methodology*, Thomson-Wadsworth, Australia.
11. Pande, G.C. (1999): *Research Methodology in Social Sciences*, Anmol Publication, New Delhi.

**Course Title: VITAMINS****Course Code: MCND202****Course description:**

This course will provide with information about the role of vitamins in maintaining cellular health through biochemical and physiological mechanisms. Topics provide an in-depth view of specific vitamins as well as effective ways to translate this information toward efforts for prevention of chronic disease.

**Course Outcome:**

At the end of the course, the learner will be able to:

- Discuss the chemistry, metabolism and physiological role of vitamins required for human health.
- Apply the course knowledge in therapeutic nutrition to enhance the quality of diet.
- Identify and assess vitamin deficiency in a person or group and develop strategies to overcome them.
- Interpret, review and summaries researches related to human nutrition to support self - learning

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND202	Vitamins	60	4	4	-	50	50	100

***Evaluation***

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>



**Contents:**

For each of the vitamins, the following will be discussed:

- ❖ Historical background
- ❖ Structure and chemistry
- ❖ Food sources
- ❖ Metabolism (digestion, absorption, transport, storage and elimination), Bioavailability and factors affecting bioavailability.
- ❖ Biochemical and physiological functions
- ❖ Assessment of status
- ❖ Interaction with other nutrients, regulation of gene expression (wherever applicable)
- ❖ Pharmacological and therapeutic effects
- ❖ Requirements, methods for estimating requirements and recommended daily allowance.
- ❖ Deficiency, overload, and toxicity.

**Module 1:**  
**Fat Soluble & Quasi Vitamins**  
**(30 lectures)**

<b>Objectives</b>	<b>Contents</b>	<b>Evaluation</b>  <b>(50M)</b>
This module enables students to: <ol style="list-style-type: none"> <li>a. Understand processes involved in metabolism of vitamins in human body and their assessment techniques</li> <li>b. Understand the main functions and genetic effects created by vitamins on human body</li> <li>c. Understand pathologies associated with vitamin deficiency, toxicity and also interactions of these vitamins in the biological system.</li> </ol>	<b>Fat Soluble Vitamins</b> Vitamin A and Beta Carotene Vitamin D Vitamin E Vitamin K <b>Quasi vitamins (in brief)</b> Choline/Betaine Myo Inositol Carnitine Bioflavinoids	Students Will be evaluated based on their performance in Quizes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**Module 2:**  
**Water Soluble Vitamins**  
**(30 lectures)**

Objective	Content	Evaluation
This module enables students to: <ol style="list-style-type: none"> <li>a. Understand processes involved in metabolism of vitamins in human body and their assessment techniques</li> <li>b. Understand the main functions and genetic effects created by vitamins on human body</li> <li>c. Understand pathologies associated with vitamin deficiency, toxicity and also interactions of these vitamins in the biological system.</li> </ol>	Ascorbic acid Thiamin Riboflavin Niacin Pyridoxine Folic acid Vitamin B <sub>12</sub> Biotin	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**References:**

1. Annual Reviews of Nutrition. Annual Review Inc, California, USA.
2. Shils, M.E.; Olson, J.; Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9<sup>th</sup> edition. Williams and Williams. A Beverly Co. London.
3. Bodwell, C.E. and Erdman, J.W. (1988) Nutrient Interactions. Marcel Dekker Inc. New York
4. World Reviews of Nutrition and Dietetics.
5. WHO Technical Report Series.
6. Indian Council of Medical Research. Recommended Dietary Intakes for Indians - Latest Recommendations.
7. Indian Council of Medical Research. Nutritive Value of Indian Foods - Latest Publication.
8. Berdanier, C.D. and Haargrove, J.L.(ed) (1996): Nutrients and Gene Expression: Clinical Aspects. Boca Raton, FL CRC Press.
9. Baeurle, P.A. (ed) (1994) Inducible Gene Expression. Part I: Environmental Stresses and Nutrients. Boston: Birkhauser.
10. Chandra, R.K. (ed) (1992): Nutrition and Immunology. ARTS Biomedical. St. John's Newfoundland.
11. Jim Mann & Truswell S, (2012) Essentials of Human Nutrition. 4<sup>th</sup> edition, Oxford University press.
12. Gropper S & Smith J (2013), Advanced Nutrition and Human Metabolism, 6<sup>th</sup> edition, Yolando Cossio.

*Journals:*

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Nutrition
5. European Journal of Clinical Nutrition
6. International Journal of Vitamin and Nutrition Research
7. International Journal of Food Science and Nutrition
8. Nutrition Research
9. Annals of Nutrition & Metabolism

**Course Title: MEDICAL NUTRITION THERAPY II (TH)****Course code: MCND203****Course Description:**

- The course is designed to provide concepts of an intermediate study of nutritional therapy of disease. Course content includes evidence-based practice in prevention and nutritional management of diseases.
- Patient assessment and medical chart documentation will be covered. Elements of pathology and biochemistry of the nutrition related problems are integrated into course topics.

**Course Outcome:**

At the end of the course, the learner will be able to:

- Describe the role of diet in disease prevention and treatment across the continuum of diet-related health conditions from primary, secondary and tertiary care.
- Explain the pathophysiology of diet-responsive diseases and other conditions, and how these conditions affect nutritional status.
- Utilize all elements of nutrition screening and assessment within context of the Nutrition Care process.
- Demonstrate comprehension of medical terminology associated with each disease condition and also utilize course resources to identify nutritional side effects and food/nutrient/drug interactions of common medications prescribed to treat the disease condition.
- Apply appropriate communication, counseling and education skills to patient care with specific disease conditions

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND203	Medical Nutrition Therapy II - Th	60	4	4	-	50	50	100

**Evaluation:**

<b>Evaluation</b>	<b>Details</b>	<b>Marks</b>
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	100

**Contents:**

**Module 1:**  
**Nutrition for Endocrine Disorders**  
**(15 lectures)**

<b>Objective</b>	<b>Content</b>	<b>Evaluation</b>
<p>1. To understand the etiology as well physiological and metabolic alterations in endocrine disorders</p> <p>2. To understand the therapeutic role of diet in managing diseases and related complications</p> <p>To apply the principles of dietary management to specific conditions</p>	<p><b>Nutrition for Endocrine Disorders</b></p> <p><b>Nutrition for Diabetes Mellitus and hypoglycemia</b></p> <p><b>A) Etiology, classification, pathophysiology symptoms and diagnosis</b></p> <p><b>B) Management of DM</b></p> <p style="padding-left: 20px;">i) Home blood glucose monitoring</p> <p style="padding-left: 20px;">ii) Glycosylated hemoglobin</p> <p style="padding-left: 20px;">iii) Urine testing</p> <p><b>C) Blood sugar lowering agents</b></p> <p style="padding-left: 20px;">i) Oral hypoglycemic agents</p> <p style="padding-left: 20px;">ii) Insulin</p> <p><b>D) Exercise</b></p> <p><b>E) Nutritional management</b></p> <p style="padding-left: 20px;">i) Diet planning for Type1, Type2</p> <p><b>ii) For Special conditions</b></p> <p style="padding-left: 20px;">a) Pregnancy</p> <p style="padding-left: 20px;">b) Elderly</p> <p style="padding-left: 20px;">c) Surgery</p> <p style="padding-left: 20px;">d) Illness</p> <p style="padding-left: 20px;">e) Physical activities</p> <p><b>F) Acute complications – pathophysiology, diagnosis, types, treatment</b></p> <p style="padding-left: 20px;">i) Hypoglycemia</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments / Presentations assigned/ conducted for each module</p>

	<p>ii) Ketoacidosis iii) Somogyi effect iv) Dawn phenomenon</p> <p><b>G) Long term complication - pathophysiology, diagnosis, types, and treatment</b></p> <p>i). Macrovascular ii). Microvascular</p> <p><b>Nutrition in Diseases of Other Endocrine organs</b></p> <ul style="list-style-type: none"> <li>• Functions of the adrenal cortex, thyroid and parathyroid gland, their insufficiencies, clinical symptoms and metabolic implications.</li> <li>• Dietary treatment as supportive to other form of therapy</li> <li>• Hyper and Hyperthyroidism (goiter)</li> <li>• Hypocalcaemia</li> </ul>	
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**Module 2:**

**Nutrition cardiac diseases and hyperlipidemia**

**(15 lectures)**

Objective	Content	Evaluation
<p>1. To understand the various risk factors for pulmonary and cardiovascular diseases.</p> <p>2. To explain the pathogenesis of the disease and complications</p> <p>To explain the dietary management in relation to the physiologic and meatabolic alterations of the diseases.</p>	<p><b>Nutrition in Cardiovascular Diseases</b></p> <p>Nutrition in Cardiovascular diseases</p> <p>Review of Normal circulatory system (in brief), Blood pressure, i) Regulation, Short-term (sympathetic nervous system) and long-term (kidneys), ii) Hypertension – classification (secondary and essential)</p> <p>iii) Risk Factors for hypertension</p> <p>iv) Dietary management-DASH approach</p> <p>v) Use of various drugs (In brief)</p> <p><b>Hyperlipidemia and Hyperlipoproteinemia</b></p> <p>i) Classifications</p> <p>ii) Dietary management</p> <p>iii) Drug management – (in brief)</p> <p>D. Atherosclerosis - Etiology and understanding the pathogenesis</p> <p>i) Coronary Heart Disease</p> <p>- Angina Pectoris and Myocardial Infarction</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments / Presentations assigned/ conducted for each module</p>

	<ul style="list-style-type: none"> <li>- Clinical manifestation and importance of cardiac enzymes to aid in the detection of CHD</li> <li>- Dietary management</li> </ul> <p>E. Congestive Heart Failure</p> <ul style="list-style-type: none"> <li>- Pathogenesis - Pathogenesis of sodium and water retention</li> </ul> <p>Risk factors Clinical manifestation Cardiac Cachexia Treatment</p> <ul style="list-style-type: none"> <li>- Nutritional Care</li> </ul> <p>F. Cerebrovascular Disease and Peripheral Vascular Disease</p> <ul style="list-style-type: none"> <li>- In brief etiology and dietary care</li> </ul> <p>G. Rheumatic and Congenital Heart Disease</p> <ul style="list-style-type: none"> <li>- Clinical manifestation, pathogenesis and nutritional care</li> </ul>	
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**Module 3:**

**Nutrition for Renal Disorders, Musculo-skeletal system & Pulmonary Disease**

**(30 lectures)**

Objective	Content	Evaluation
<p>To understand the pathophysiology of various renal disorders and musculoskeletal disorders</p> <p>To explain the interrelationship between the disease conditions and nutritional status</p> <p>To understand the therapeutic role of diet vis-à-vis the severity and</p>	<p><b>Nutrition in Renal Diseases and Disorders of the Musculo-Skeletal System</b></p> <ul style="list-style-type: none"> <li>- Physiology and function of normal kidney – A brief review</li> <li>- Classification of kidney diseases               <ol style="list-style-type: none"> <li>a. Glomerulo Nephritis Etiology, characteristics Objectives, Principles of dietary treatment and management</li> <li>b. Nephrotic Syndrome Etiology, Objectives, Principles of dietary treatment and management</li> <li>c. Uremic Renal Failure                   <ol style="list-style-type: none"> <li>i) History, General importance of protein nutrition in renal failure and uremia</li> <li>ii) Causes and Dietary management in Acute Renal Disease</li> <li>iii) Causes and Dietary management in Chronic Renal Disease</li> </ol> </li> </ol> </li> </ul>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments / Presentations assigned/ conducted</p>

<p>medical management.</p>	<p>iv) Dietary modification in chronic renal disease with complications  v) Sodium and Potassium Exchange list  d) Types of dialysis and their nutritional care – Haemodialysis, CAPD, Continuous Ambulatory peritoneal dialysis)  e) Renal Transplant and its nutritional care  f) Nephrolithiases- etiology, types of stones and nutritional care (acid &amp; alkaline ash diet)  g) Chronic renal disease in Children (in brief)</p> <p><b>MNT for Rheumatic disorders (of the musculoskeletal system)</b>  Pathophysiology of inflammation in  i)Rheumatic Diseases ii) Osteoarthritis iii) Rheumatoid Arthritis, Gout  Pharmacologic therapy and Nutritional Care</p> <p><b>Nutritional Management in Pulmonary Disease</b>  a. Effects of Malnutrition on Respiration  b. Chronic Obstructive Pulmonary Disease  c. Pneumonia</p>	<p>for each module</p>
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### References:

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10<sup>th</sup> Edition, W.B. Saunders Ltd.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9<sup>th</sup> Edition, Williams and Wilkins.
3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4<sup>th</sup> Edition, Williams and Wilkins.
4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10<sup>th</sup> Edition, Churchill Livingstone.
5. Williams, S.R. (1993): Nutrition and Diet Therapy, 7<sup>th</sup> Edition, Times Mirror/Mosby College Publishing.
6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2<sup>nd</sup> Edition, W.B. Saunders Co.
7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9<sup>th</sup> Edition, W.B. Saunders Co.



9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9<sup>th</sup> Edition, Lea and Febiger, Philadelphia.
10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14<sup>th</sup> Edition, McGraw Hill.
11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D. WCRF.

**Journals and Other Reference Series**

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Reviews

**Course Title: MEDICAL NUTRITION THERAPY II – (PR)****Course code: MCND204****Course Description:**

- The course is designed to provide concepts of an intermediate study of nutritional therapy of disease. Course content includes evidence-based practice in prevention and nutritional management of diseases.
- Patient assessment and medical chart documentation will be covered. Elements of pathology and biochemistry of the nutrition related problems are integrated into course topics.

**Course Outcome**

At the end of the course, the learner will be able to:

- Create a therapeutic diet according to the individual or patient's requirement in diseased conditions.
- Analyze the assessment report to understand the inter-relations of the metabolic disturbance and overall health status of the individual.
- Construct new ideas and solutions for dietetic problems based on their knowledge and experience.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND204	Medical Nutrition Therapy II - Pr	120	4	-	4	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Journal work & assignment/ project submission	50
External	Practical examination test & Viva Voce	50
	<b>Total marks</b>	100
Evaluation	Details	Marks

Content

Module 1:  
Nutrition for Endocrine disorders  
(40 lectures)

Objectives	Contents	Evaluation
<p><b>This module enables students to:</b></p> <p>a) To understand the therapeutic role of diet in managing Diabetes Mellitus and related complications</p> <p>b) To apply the principles of dietary management to specific conditions</p>	<p><b>Nutrition for Diabetes Mellitus and hypoglycemia</b></p> <p>A) Nutritional management</p> <p>i) Diet planning for Type1, Type2 diabetes mellitus</p> <p>ii) For Special conditions</p> <p>a) Pregnancy</p> <p>b) Elderly</p> <p>c) Surgery</p> <p>d) Illness</p> <p>e) Physical activities</p> <p>B) Acute complications – nutritional care</p> <p>i) Hypoglycemia</p> <p>ii) Somogyi effect</p> <p>iii) Dawn phenomenon</p> <p>C) Long term complication – prevention and nutritional care</p> <p>i). Macrovascular</p> <p>ii). Microvascular</p> <p><b>Nutrition in Diseases of Other Endocrine organs</b></p> <p>- Dietary treatment as supportive to other form of therapy in diseases of the adrenal cortex, thyroid and parathyroid gland</p> <p>- Hyper and Hyperthyroidism (goiter)</p> <p>- Hypocalcaemia</p>	<p>Students will be evaluated on basis of diet plan submission/ journal competition/ assignments/ planning exercises.</p>

**Module 2:**  
**Nutrition for Cardiovascular & Pulmonary Diseases**  
**(40 lectures)**

Objective	Content	Evaluation
<p><b>This module enables students to:</b></p> <p>a) To understand the interrelationship between the disease conditions and nutritional status</p> <p>b) To understand the therapeutic role of diet in managing cardiovascular and pulmonary diseases</p>	<p><b>Nutrition in Cardiovascular Diseases and Pulmonary Disorders</b></p> <p><b>Nutrition in Cardiovascular Diseases</b> Dietary management of Hypertension-DASH approach Developing low sodium recipes</p> <p><b>Dietary management of Hyperlipidemia and Hyperlipoproteinemia</b> Dietary management</p> <p>i) Coronary Heart Disease - Dietary management ii). Congestive Heart Failure - Nutritional Care iii) Cerebrovascular Disease and Peripheral Vascular Disease: dietary care iv). Rheumatic and Congenital Heart Disease: nutritional care</p>	<p>Students will be evaluated on basis of diet plan submission/ journal competition/ assignments/ planning exercises</p>

**Module 3:**  
**Nutrition for Renal disorders, Musculo-skeletal Disorder**  
**(40 lectures)**

Objective	Content	Evaluation
<p><b>This module enables students to:</b></p> <p>a) To understand the</p>	<p><b>Nutrition in Renal Diseases and Musculoskeletal disorders</b> Sodium and Potassium Exchange list</p> <p>A. GlomeruloNephritis Principles of dietary treatment and management</p> <p>B. Nephrotic Syndrome Principles of dietary treatment and management</p> <p>C. Uremic Renal Failure</p>	<p>Students will be evaluated on basis of diet plan submission/ journal competition/</p>

<p>interrelation ship between the disease conditions and nutritional status</p> <p>b) To understand the therapeutic role of diet in managing Renal diseases and musculoskel etal disorders</p>	<p>ii) Dietary management in Acute Renal Disease iii) Dietary management in Chronic Renal Disease iv) Dietary modification in chronic renal disease with complications D) Types of dialysis and their nutritional care – Haemodialysis, CAPD, Continuous Ambulatory peritoneal dialysis) E) Renal Transplant and its nutritional care F) Nephrolithiases- nutritional care (acid &amp; alkaline ash diet)</p> <p>MNT for Rheumatic disorders ( of the musculoskeletal system) Nutritional Care for - i) Rheumatic diseases ii) Osteoarthritis iii) Rheumatoid arthritis iv) Gout</p>	<p>assignments/ planning exercises</p>
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**Course Title: PATHOPHYSIOLOGY AND METABOLISM IN DISEASE (Th)****Course Code: MCND205****Course Description:**

This course analyses and compares human diseases by studying pathophysiology, pathogenesis and diseases as they impact cellular metabolism. Course content integrates pathophysiology with more common clinical aspects of disease.

**Course Outcomes:**

At the end of the course, the learner will be able to:

- Define and distinguish among the concepts of homeostasis, allostasis, stress, inflammation, cellular responses to injury and ischemia and explain how these responses can result in necrosis and apoptosis.
- Compare and contrast the etiologies, genetic expression, biologic behavior, and clinical evaluation of various diseases.
- Identify and differentiate relevant and significant symptoms and signs of diverse pathophysiologic and disease processes.
- Recognize and formulate relevant questions in the identification and evaluation of pathophysiologic processes and problem recognition

Course code	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND205	Pathophysiology & Metabolism in Disease Th	60	4	4	-	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

**Module 1:**  
**Adaptive Metabolism & Cellular Metabolomics**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This module will enable students to:</p> <p>a. Understand normal physiology of human body and changes that lead to diseased condition</p> <p>Understanding causes, complications and prognosis of diseases.</p>	<p><b>Basic concepts of pathophysiology and metabolism of adaptation</b></p> <p>a. Altered cellular and tissue biology b. Fluid and electrolyte, acids and bases c. Immunity d. Inflammation e. Hypersensitivity, infection and Immunodeficiency f. Stress and Disease g. Musculoskeletal system-Biochemistry and Pathophysiology, Osteoporosis, Osteomalacia, Osteoarthritis</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**Module 2:**  
**Pathophysiology for disease related to Digestive system, Hematological conditions**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This module will enable students to:</p> <p>b. Understand normal physiology of human body and changes that lead to diseased condition</p> <p>Understanding causes, complications and prognosis of diseases</p>	<p><b>Digestive system: Biochemistry and Pathophysiology</b></p> <p>a. Manifestations of gastrointestinal dysfunction, b. Acute and chronic gastritis, Ulcers c. Malabsorption syndrome d. Pancreatic insufficiency and Pancreatitis e. Liver dysfunction, Hepatitis, Cirrhosis, Cholelithiasis f. Ulcerative colitis, Crohn's disease</p> <p><b>Alterations of Haematologic functions:</b></p> <p>a. Anemias and clinical manifestations b. Thalasemia, sickle cell anemia</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**Module 3:**  
**Pathophysiology for disease related to Endocrine & Excretory System**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This module will enable students to:</p> <p>a. Understand normal physiology of human body and changes that lead to diseased condition</p> <p>b. Understanding causes, complications and prognosis of diseases.</p>	<p><b>Endocrine System</b></p> <p>A. Mechanisms of hormone regulation b. Alteration of hormonal regulation c. Hypo and Hyperfunctions of Pituitary, Adrenal cortex and medulla, Hypo and Hyperthyroidism d. Type I, Type II and other types of Diabetes</p> <p><b>Renal and Urological Biochemistry and Pathophysiology</b></p> <p>a. Alteration of renal and urinary tract function b. Urinary tract obstruction, kidney stones, c. Cystic pyelonephritis, glomerulonephritis, Nephritic syndrome, renal failure</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**Module 4:**  
**Pathophysiology for disease related to cardiac, pulmonary, lymphatic system and Cancer**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This module will enable students to:</p> <p>c. Understand normal physiology of human body and changes that lead to diseased condition</p> <p>d. Understanding causes, complications and prognosis of diseases.</p>	<p><b>Cardiovascular, lymphatic and pulmonary system</b></p> <p>a. Alteration of cardiovascular functions, atherosclerosis, arteriosclerosis, Thrombus, embolus, dysrhythmias Myocardial ischemia, Myocardial infarction, Heart failure stroke b. Hypertension c. Dyslipidemias d. Alterations of pulmonary function- signs and symptoms of pulmonary disease Respiratory distress syndrome in adults and newborn Obstructive pulmonary diseases Asthma and cystic fibrosis</p> <p><b>Cellular Proliferation and Cancer</b></p> <p>a. Biology of Cancer b. Tumor spread and treatment c. Clinical manifestations of cancer</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>



***References***

Harsh Mohan (2019), Textbook of Pathology, 8<sup>th</sup> Edition, Jaypee.

Gary D. Hammer, Stephen J. McPhee (2014), Pathophysiology of Diseases: An Introduction to Clinical Medicine, 8<sup>th</sup> Edition, Lange Publishers.

Eckhard Lammert & Martin Zeeb, 2014, Metabolism of Human Diseases, Organ Physiology & Pathophysiology, 1<sup>st</sup> Edition, Springer.

Enid Gilbert-Barnes, Lewis A. Barnes, Philip M. Farrell, 2017, Foundations of Clinical Management, Genetics and Pathology, 2<sup>nd</sup> Edition, IOS Press.

**Journals:**

Clinical Practice, endocrinology and Metabolism,

Journal of inherited metabolic diseases

**Course Title: CLINICAL NUTRITION****Course Code: MCND206A**

**Course Description:** This course will provide students with knowledge about different conditions that underlies the disease formation/ manifestation process

**Course Outcome:**

At the end of the course, the learner will be able to:

- Explain the physiological complications arising at cellular level and nutritional plans that can help prevent the same
- Relate to the importance of preventive nutrition and will be able to apply the skills for educating individual and mass population.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND206A	Clinical Nutrition	60	4	4	-	50	50	100

**EVALUATION**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	100

**MODULE 1:**  
**Stress adaptation, drug Nutrient interactions**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This will enable students to understand</p> <p>a. Adaptation to stress and changes that the human body makes</p> <p>b. Response of human body to immune system</p> <p>c. Effect of drugs on human body and interaction with nutrients.</p> <p>d. Understanding the changes human body undergoes during aging process</p>	<p><b>A. Cellular adaptations to stress.</b></p> <p><b>a.</b> Types of stress</p> <p><b>b.</b> Changes in hormonal secretion, CNS and immune system. Cellular changes</p> <p><b>c.</b> Effects on cells and tissues</p> <p><b>B. Diet, nutrient and drug interactions.</b></p> <p><b>a.</b> Effect of drugs on ingestion, digestion, absorption and metabolism of food and nutrients.</p> <p><b>C. Nutrition and Immune response</b></p> <p><b>a:</b> Role of individual nutrients in immune response and function</p> <p><b>b:</b> Effect of undernutrition and overnutrition on immune function</p> <p><b>c:</b> Immunoenhancers, immunosuppressants, conditionally essential nutrients. d. Effect of food, nutrients and nutritional status on drug dosage and efficacy.</p> <p><b>D.Ageing</b></p> <p>Physiological changes with ageing</p> <p>Bone health</p> <p>Osteoporosis</p> <p>Rheumatoid arthritis</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 2:**  
**Preventive nutrition for digestive diseases**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This will enable students to understand</p> <p>a. Nutrition for GI disorders and oral health</p>	<p><b>A. Nutrition and the gastro intestinal tract</b></p> <p>a. Malabsorption and its patho-physiology, Carbohydrate intolerance.</p> <p>b. Parasitic infections</p> <p>c. Acute and chronic infections</p> <p>d. Diarrhea</p> <p>e. Recent advances in gastroenterology and nutrition</p> <p>f. Diet and gut microflora</p> <p><b>B. Nutrition and oral health</b></p> <p>a. Structure, development and maturation</p> <p>b. Dental caries</p> <p>c. Recent advances in role of nutrition in dental health</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 3:**  
**Preventive nutrition for Cardiac renal and Diabetes**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This module will enable students to:</p> <p>a. understands the preventive aspects for cardiac diseases, endocrine diseases</p>	<p><b>A. Nutrition and cardiovascular diseases</b></p> <p>a. Role of lipids, carbohydrates, protein, and other nutrients</p> <p>b. Bile acid metabolism</p> <p>c. Prostaglandins</p> <p><b>B. Diabetes mellitus and complications-Recent advances</b></p> <p><b>C. Nutrition and Renal Disease</b></p> <p>a. Nephrotic syndrome</p> <p>b. Nephritis</p> <p>c. ESRD</p> <p>d. Renal Transplant</p> <p>e. Nephrolithiasis</p> <p>Recent advances</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 4:**  
**Nutrition for Cancer prevention**  
**(15 lectures)**

Objective	Content	Evaluation
This module will enable students to:  a. Understand the preventive aspects for Cancer, its therapies and treatments s	<b>Nutrition and Cancer</b> Carcinogenesis and Mutagenesis- Carcinogens in Food Epidemiology Investigations of Diet-Cancer relationship Development of cancer Types of cancer and effect on metabolism and nutritional status Nutrients and their relationship with cancer Recent developments in nutrition and cancer. <b>Nutrition and HIV/AIDS</b>	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**References:**

1. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10<sup>th</sup> Edition, W.B. Saunders Ltd.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9<sup>th</sup> Edition, Williams and Wilkins.
3. Escott-Stump, S. (1998): Nutrition and Diagnosis Related Care, 4<sup>th</sup> Edition, Williams and Wilkins.
4. Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10<sup>th</sup> Edition, Churchill Livingstone.
5. Williams, S.R. (1993): Nutrition and Diet Therapy, 7<sup>th</sup> Edition, Times Mirror/Mosby College Publishing.
6. Davis, J. and Sherer, K. (1994): Applied Nutrition and Diet Therapy for Nurses, 2<sup>nd</sup> Edition, W.B. Saunders Co.
7. Walker, W.A. and Watkins, J.B. (Ed) (1985): Nutrition in Pediatrics, Boston, Little, Brown & Co.
8. Guyton, A.C. and Hall, J.E. (1999): Textbook of Medical Physiology, 9<sup>th</sup> Edition, W.B. Saunders Co.
9. Ritchie, A.C. (1990): Boyd's Textbook of Pathology, 9<sup>th</sup> Edition, Lea and Febiger, Philadelphia.

10. Fauci, S.A. et al (1998): Harrison's Principles of Internal Medicine, 14<sup>th</sup> Edition, McGraw Hill.
11. World Cancer Research Fund (1997). Food, Nutrition and the Prevention of Cancer- A Global perspective, Washington E.D. WCRF

Journals and Other Reference Series

1. Nutrition Update Series
2. World Review of Nutrition and Dietetics
3. Journal of the American Dietetic Association
4. American Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition
6. Nutrition Reviews
7. Clinical Nutrition
8. Asia Pacific Journal of Clinical Nutrition
9. Nutrition in Clinical Practice
10. Current Opinion in Clinical Nutrition and Metabolic Care
11. International Journal of Clinical Nutrition and Dietetics
12. Guidelines /Position statements of ASPEN, ESPEN, ADA, IDF
13. Canadian Journal of Clinical Nutrition
14. Annals of Nutrition and Metabolism

**Course Title: NUTRITION FOR SPORTS AND EXERCISE****Course code: MCND206B****Course Description:**

The course is designed to examine the application of nutritional regimens to meet exercise requirements and improve athletic performance. Current practice and recommendations for different types of sports will be examined

**Course Outcome:**

At the end of the course, the learner will be able to:

- Describe energy intake, expenditure, and recommendations as it relates to energy balance of athletes.
- Discuss the effect of exercise on fluid balance and outline strategies for maintaining fluid balance before, during, and after exercise.
- Explain the loss, intake, and recommendations for minerals, vitamins, and supplements for athletes.

code	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND206 B	Nutrition for Sports & Exercise	60	4	4	-	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	100

**Module 1:**  
**Sports Nutrition: Introduction, Fuel Metabolism, Fluids**  
**(15 lectures)**

Objective	Content	Evaluation
<p>This module enables student to:</p> <p>a. Understand the need to assess and calculate nutrient needs differently for sports individuals</p> <p>b. Understand various fuel systems used by different sports activities</p>	<p><b>Introduction</b>, Nutritional considerations for sports / exercising person as compare to normal active person.</p> <p>Energy substrate for activities of different intensity and duration, aerobic and anaerobic activities.</p> <p>Fluid balance in sports and exercise, importance, symptoms and prevention of dehydration, Sports drink,</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**Module 2:**  
**Macronutrients in Sports**  
**(30 lectures)**

Objective	Content	Evaluation
<p>This module enables students to:</p> <p>a. Understand requirement of lipids and proteins for different sports activity</p> <p>b. Gain knowledge for planning fats and proteins for sports person</p> <p>c. Understand methods of assessing protein quality</p> <p>d. Gain knowledge about carbohydrate loading and planning for a sport</p>	<p><b>Macro Nutrients</b>-Carbohydrate as an energy source for sport and exercise. Carbohydrate stores, Fuel for aerobic and anaerobic metabolism, Glycogen re-synthesis, CHO Loading, CHO composition for pre exercise, during and recovery period.</p> <p><b>Role of Fat as an energy source for sports and exercise.</b> Fat stores, regulation of fat metabolism , factors affecting fat oxidation (intensity, duration , training status, CHO feeding) , effect of fasting and fat ingestion</p> <p><b>Protein and amino acid requirements,</b> Factors affecting Protein turnover, Protein requirement and metabolism during endurance exercise, resistance exercise and recovery process. Protein supplement.</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>



person specific to the sport.		
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**Module 3:**  
**Micronutrients, Eating disorders and ergogenic aids in sports**  
**(15 lectures)**

Objective	Content	Evaluation
This module will enable students to: a. Understand requirement of micronutrients and ergogenic aids for different sports.	<b>Important micronutrients for exercise.</b> B complex vitamin and specific minerals. Exercise induced oxidative stress and role of antioxidants Chronic dieting and eating disorder. Female athletic triad, sports anemia Dietary supplements and ergogenic aids (nutritional, pharmacological and physiological)	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

### References

1. Bucci, L., 1993 Nutrients as Ergogenic Aids for Sports and Exercise. Boca Raton, FL.:CRC Press.
2. Advances in Sport and Exercise Science : Nutrition and Sport , Edited by Don MacLaren. , ChPublished by Churchill Livingstone, Elsevier. 2007
3. Sports Medicine: The school age athlete by Bruce Reider. 1996. Published by W.B. Saunders.
4. Nutrition for Serious Athletes. Dan Banardot. 2000; Human Kinetics.
5. Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition. Edited by Judy A Driskell , Ira Wolinsky, CRC Press 2000.
6. Recommended Dietary Intakes for Indian Sportsman and Women. Satyanarayan, K; Nageshwar Rao. C; Narsinga Rao,B.S.; Malhotra, M.S. (1985)., Hyderabad, National Institute of Nutrition.

**Semester III**

<b>Sr. No.</b>	<b>Course</b>	<b>No of lecture</b>	<b>T.C.</b>	<b>Th Cr.</b>	<b>Pr. Cr</b>	<b>Internal marks</b>	<b>External marks</b>	<b>Total marks</b>
<b><i>Core component</i></b>								
<b>1</b>	Minerals	<b>60</b>	<b>4</b>	<b>4</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>100</b>
<b>2</b>	Nutrition in Critical Care and Cancer	<b>120</b>	<b>4</b>	<b>-</b>	<b>4</b>	<b>50</b>	<b>50</b>	<b>100</b>
<b>3</b>	Statistical Applications	<b>60</b>	<b>4</b>	<b>-</b>	<b>4</b>	<b>50</b>	<b>50</b>	<b>100</b>
<b>4</b>	Applied Food Science and Product Modification	<b>120</b>	<b>4</b>	<b>-</b>	<b>4</b>	<b>50</b>	<b>50</b>	<b>100</b>
<b>5</b>	Geriatric Nutrition	<b>120</b>	<b>4</b>	<b>4</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>100</b>
<b>6</b>	CBCS: Pediatric Nutrition/ Mother Infant and Young Child nutrition/ SAM & MAM Management	<b>60</b>	<b>4</b>	<b>-</b>	<b>4</b>	<b>50</b>	<b>50</b>	<b>100</b>
<b><i>Value-Added Courses</i></b>								
<b>1</b>	Modifying traditional foods for different clinical conditions	<b>30</b>	<b>2</b>	<b>-</b>	<b>2</b>	<b>50</b>	<b>50</b>	<b>100</b>

**Course Title: MINERALS****Course code : MCND301**

**Course Description:** Minerals are an important non-organic constituent of diet for humans. This course imparts in-depth knowledge about different minerals important for human health and allows therapeutic application for the same in different clinical conditions.

**Course Outcomes:**

At the end of the course, the learner will be able to:

- Explain the biochemistry of minerals along with its biological function at the molecular/ cellular and tissue level.
- Correlate the function of each mineral with its deficiency symptoms and describe the possible mechanism involved.
- Identify and assess the clinical signs and symptoms of mineral deficiency and toxicity and apply the course knowledge in prevention &/or management of clinical disorders.
- Develop the skill to read, review, and interpret research articles in the field of human nutrition.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND301	Minerals	60	4	4	-	2/50	2/50	100

**EVALUATION**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

**MODULE 1:**  
**Macro minerals**  
**20 lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
The learner understands the historical background, chemistry and structure, metabolism, factors affecting bioavailability, biochemical & physiological functions, assessment of status, interactions with other nutrients, regulation of gene expression, pharmacological and therapeutic effects, RDA, deficiency and toxic effects	<ol style="list-style-type: none"> <li>1. Calcium</li> <li>2. Phosphorus</li> <li>3. Magnesium</li> <li>4. Sodium</li> <li>5. Potassium</li> <li>6. Chloride</li> </ol>	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**MODULE 2:**  
**Microminerals**  
**30 lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
The learner understands the historical background, chemistry and structure, metabolism, factors affecting bioavailability, biochemical & physiological functions, assessment of status, interactions with other nutrients, regulation of gene expression, pharmacological and therapeutic effects, RDA, deficiency and toxic effect	<ol style="list-style-type: none"> <li>1) Iron</li> <li>2) Copper</li> <li>3) Manganese</li> <li>4) Iodine</li> <li>5) Fluoride</li> <li>6) Zinc</li> <li>7) Selenium</li> <li>8) Cobalt</li> <li>9) Chromium</li> <li>10) Molybdenum</li> </ol>	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**MODULE 3:**  
**Ultra Trace Elements**  
**10 lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
The learner understands the historical background, chemistry and structure, metabolism, factors affecting bioavailability, biochemical & physiological functions, assessment of status, interactions with other nutrients, regulation of gene expression, pharmacological and therapeutic effects, RDA, deficiency and toxic effects	1) Vanadium 2) Silicon 3) Boron 4) Nickel 5) Lithium 6) Lead 7) Cadmium 8) Sulphur 9) Arsenic	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

***References:***

1. Annual Reviews of Nutrition. Annual Review Inc, California, USA
2. David Bender, 5<sup>th</sup> edition (2017), Introduction to Nutrition and metabolism, CRC press
3. Martha Stipanuk and Marie Caudil, 3<sup>rd</sup> edition (2012), Biochemical, Physiological And Molecular Aspects of Human Nutrition, Saunders.
4. Sareen Gropper and Jack Smith, 6<sup>th</sup> edition (2012), Advance Nutrition and Human Metabolism, Cengage Learning Custom Publishing.
5. Sareen Gropper and Jack Smith, 7<sup>th</sup> edition (2016), Advance Nutrition and Human Metabolism, Cengage Learning Custom Publishing.
6. Somdat Mahabir and Yashwant Pathak, 1<sup>st</sup> edition (2014), Nutraceuticals and Health: Review of Human Evidence, CRC Press
7. Susan A Lanham et al, 2<sup>nd</sup> edition (2011), Nutrition and metabolism, Blackwell Publishing

***Journals:***

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Nutrition
5. European Journal of Clinical Nutrition
6. International Journal of Vitamin and Nutrition Research
7. International Journal of Food Science and Nutrition
8. Nutrition Research
9. Ann Nutr Metab
10. Human nutrition and metabolism

**Course Title: NUTRITION IN CANCER AND CRITICAL CARE**  
**Course code: MCND302**

**Course Description:**

Patients in critical care settings require management by a multi-disciplinary team that includes experts in nutrition. Management of the dietary and nutritional needs of these patients is crucial, and the evidence-based input of specialists in nutrition in critical care is central to their care process. This course will enable students to be familiar with different nutritional support system and their role in various critical care conditions.

**Course Outcomes:**

At the end of the course, the learner will be able to:

- Relate with the special nutritional support techniques and feeding formulations to meet their nutritional needs.
- Understand the physiology, metabolism and special requirements of the critically ill patients
- Evaluate the cancer therapies and therapeutic care required in Cancer.
- Develop the skill for nutritional screening for critically ill patients

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND302	Nutrition in Cancer and Critical Care	60	4	4	-	2/50	2/50	100

**Evaluation:**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

**MODULE 1:**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<ul style="list-style-type: none"> <li>➤ To understand the different nutritional support systems, indications for use, their administration, and complications.</li> <li>➤ To know about the composition of different formulations used in enteral and parenteral nutrition.</li> </ul>	<p><b>Nutritional support systems and other life – saving measures for the critically ill.</b></p> <p>Enteral and parenteral nutrition support. Role of immune enhancers, conditionally essential nutrients, immune suppressants, and special diets in critical care.</p> <p><b>Enteral Nutrition :</b></p> <ul style="list-style-type: none"> <li>i). Various sites for Enteral nutrition</li> <li>ii). In brief, discussion on Ryle’s tube and its care</li> <li>iii). Types of feeds, advantages, and disadvantage of home-based feeds, Commercial formula feeds.</li> <li>iv). Incorporation of easily digestible foods.</li> <li>v). Requirements of nutrients according to problems eg. Renal, respiratory etc.</li> </ul> <p><b>Total Parental Nutrition</b></p> <ul style="list-style-type: none"> <li>i). The importance of TPN</li> <li>ii). Long term effect of its use</li> <li>iii). Site of TPN and its care</li> <li>iv). Composition</li> </ul> <p><b>Diet-related ethical issues in the terminally ill.</b></p> <p><b>Nutritional Support System and Complications including refeeding syndrome and rehabilitation diets</b></p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

*Nutritional Support System**15 Lectures*

**MODULE 2:*****Understanding Cancer and its Nutritional Management***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<ul style="list-style-type: none"> <li>➤ To explain the pathophysiologic and metabolic consequences of cancer</li> <li>➤ To understand the preventive and therapeutic role of diet and nutritional care in cancer</li> <li>➤ 3. To Understand different types of bone marrow transplantation and its nutritional care</li> </ul>	<p><b>Nutrition and Cancer</b></p> <p>Etiology and Pathogenesis of carcinogenesis</p> <p>Metabolic and Nutritional Alterations in Malignancy</p> <p>Interrelationships of nutritional status and systemic effects of cancer, Cancer cachexia</p> <p>Nutritional impacts of cancer therapy</p> <p>Types of therapy</p> <p>Nutritional support of the Cancer patient</p> <p>Bone Marrow Transplant and its nutritional care</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

*20 lectures***MODULE 3:*****Nutritional Management of Critical Conditions****25 lectures*

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<ul style="list-style-type: none"> <li>➤ To understand the various tools available for nutritional screening and nutritional status assessment of critically ill patients</li> <li>➤ To understand the pathophysiologic, metabolic and clinical aspects of following critical care conditions Know the specific nutritional requirements and management of these conditions</li> <li>➤ To understand the role of immune enhancers and conditionally essential nutrients in the following conditions</li> </ul>	<ul style="list-style-type: none"> <li>● CV complications, stroke,</li> <li>● Respiratory failure</li> <li>● Multi-organ failure</li> <li>● Hepatic failure</li> <li>● Surgery and its complications</li> <li>● Sepsis and burns</li> </ul>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>



**References:**

- 1) Ainsley Malone, Liesje Nieman Carney, Amy Long Carrera, Andrew Mays, ASPEN Enteral Nutrition Handbook: Second Edition, (2019)
- 2) Charles Morrison Mueller, American Society for Parenteral and Enteral Nutrition, The ASPEN Adult Nutrition Support Core Curriculum, (2017)
- 3) Peggi Guenter, A.S.P.E.N. Parenteral Nutrition Handbook, (2009)
- 4) Jacob M Rowe, Angelo M Carella, Hillard M Lazarus, Handbook of Bone Marrow Transplantation, (2000)
- 5) A. Catherine Ross, Modern nutrition in health and disease 12th edition, (2017)
- 6) Thomas Prates Ong, Fernando Salvador Moreno, Nutrition and Cancer Prevention: From Molecular Mechanisms to Dietary Recommendations, (2019)
- 7) Peter Faber, Mario Siervo, Nutrition in Critical Care, (2014)

**Journals:**

- 1) International Journal of Cancer
- 2) British Journal of Cancer
- 3) European Journal of Cancer
- 4) South Asian Journal of Cancer
- 5) Journal of Cancer Metastasis and Treatment
- 6) Journal of Cancer Epidemiology
- 7) Indian Journal of Critical Care
- 8) American Journal of Respiratory and Critical care medicine

**Course Title: STATISTICAL APPLICATIONS IN RESEARCH****Course code: MCND303****Course Description:**

This course will help students to learn how to apply statistical tests for data analysis for both large and small samples. It will also enable them to know how to interpret the results of statistical analysis of data.

**Course Outcomes:**

At the end of the course, the learner will be able to:

- Understand and apply various parametric and non-parametric tests and their application in research.
- Develop skills for preparation of research proposals.
- Design a research and analyze the collected data, interpret it and draw conclusion for the research hypothesis.
- Construct a research report and contribute to the research knowledge of the society.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND303	Statistical Applications in Research	60	4	4	-	2/50	2/50	100

**Evaluation:**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

**MODULE 1:**  
**Introduction to Statistics**  
**15 lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>➤ To introduce the learner to basics of statistics and make them familiar with the concepts of statistics.</p>	<p>Introduction to Statistics</p> <p>Definition, conceptual understanding of statistical measures, popular concepts and misuse of statistics</p> <p>Normal Distribution and its Properties</p> <p>a. Normal distribution</p> <p>b. Binomial distribution</p> <p>c. Probability, use of normal probability tables, area under a normal distribution curve</p> <p>D. Parametric and non-parametric tests</p> <p>Data Management</p> <p>Planning for data analysis – coding of responses, preparation of codebook</p> <p>Coding of data</p> <p>Use of statistical programs</p> <p>- MS Excel</p> <p>- SPSS</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 2:*****Data Analysis & Statistical tests******15 Lectures***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>➤ To make students understand how to interpret the results of statistical analysis of data</p>	<p>Data Analysis</p> <p>a. Quantitative analysis, descriptive statistics, inferential statistics : Uses and limitations, Summation sign and its properties</p> <p>b. Proportions, percentages, ratios</p> <p>c. Measures of central tendency-mean, median, mode-arithmetic mean and its uses, mid-range, geometric mean, weighted mean</p> <p>d. Measures of dispersion /variability- range, variance, standard deviation, standard error, coefficient of variation, Kurtosis, skewness</p> <p>Grouped data-frequency distribution, histogram, frequency polygons, percentiles, quartiles, tertiles, ogive</p> <p>e. Large and Small Sample tests and interpretation</p> <p>- . Z-test for single proportions and difference between proportions</p> <p>- . Large sample test for a single mean and difference between means</p> <p>- . Small sample tests- 't'-test, paired 't'-test, 'F' Test</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 3:**  
**Data Analysis & Statistical tests**  
**15 lectures**

Objectives	Content	Evaluation
<ul style="list-style-type: none"> <li>● To Discriminate between parametric and non-parametric tests</li> <li>● To learn to apply statistical tests for data analysis for both large and small samples</li> <li>● To understand Goodness of Fit &amp; its interpretation Concept of Correlation &amp; Regression, ANOVA &amp; its variation as per Design of Experiments</li> </ul>	<p>Chi square test and its interpretation</p> <p>a. General features, goodness of fit</p> <p>b. Independence of Attributes</p> <p>Correlation and Regression and its interpretation</p> <p>a. Basic concepts</p> <p>b Linear regression and correlation coefficient</p> <p>Regression and prediction</p> <p>c. Rank correlation, Product-moment method</p> <p>Analysis of Variance and its interpretation</p> <p>a. One-factor analysis of variance</p> <p>b. Two-factor analysis of variance</p> <p>Design of Experiments</p> <p>a. Completely randomized design</p> <p>b. Randomized block design</p> <p>c. Latin square design</p> <p>d. Factorial design</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 4:*****Data Presentation & Analysis******15 lectures***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>➤ To develop skills for preparation of research proposals</p> <p>➤ To understand the components of a research report &amp; Prepare Research Report &amp; Research Proposal</p>	<p>Presentation of Data</p> <p>a. Tabulation and Organization of data- frequency distributions, cumulative frequency distribution, contingency tables</p> <p>b. Graphical presentation of data- histogram, frequency polygon, ogive, stem and leaf plot, box and whiskers plot,</p> <p>Graphs for nominal and ordinal data- pie diagram, bar graphs of different types, graphs for relation between two variables, line diagram.</p> <p>Use of illustrations</p> <p>Cautions in visual display of data</p> <p>The Research Report</p> <p>Basic components of a research report- prefatory material, introduction and Review of Related Literature, Methodology, Results, Discussion, Conclusion, Summary, Abstract, Bibliography and Appendices</p> <p>Students to design a research study on a topic-</p> <ul style="list-style-type: none"> <li>- specify type of research</li> <li>- sample selection</li> <li>- protocol/operationalization</li> <li>- tools</li> <li>- tests for statistical analysis</li> </ul> <p>Preparation of a Research Proposal</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**References:**

- Information, National Centre for Biotechnology; Pike, U. S. National Library of Medicine 8600 Rockville; MD, Bethesda; USA, 20894. "National Center for Biotechnology Information". [www.ncbi.nlm.nih.gov](http://www.ncbi.nlm.nih.gov).
- Utts, Jessica M. (2005). Seeing through statistics (3rd ed.). Belmont, CA: Thomson, Brooks/Cole. ISBN 978-0534394028. OCLC 56568530.
- B., Jarrell, Stephen (1994). Basic statistics. Dubuque, Iowa: Wm. C. Brown Pub. ISBN 978-0697215956. OCLC 30301196.
- Econometrics. McGraw-Hill Irwin. Gujarati, Damodar N. (2006).
- Introduction to Biostatistics. A Guide to Design, Analysis, and Discovery. Academic Press. ISBN 978-0-12-262270-0.
- "Null hypothesis". [www.statlect.com](http://www.statlect.com). Retrieved 2018-05-08.

**Journals:**

- Essentials of Biostatistics in Public Health & Essentials of Biostatistics Workbook: Statistical Computing Using Excel". Australian and New Zealand Journal of Public Health. **33** (2): 196–197. 2009. doi:10.1111/j.1753-6405.2009.00372.x. ISSN 1326-0200.
- "Biometrical Journal - Wiley Online Library". [onlinelibrary.wiley.com](http://onlinelibrary.wiley.com).
- "Communications in Biometry and Crop Science". [agrobiol.sggw.waw.pl](http://agrobiol.sggw.waw.pl).
- "Statistical Applications in Genetics and Molecular Biology". [www.degruyter.com](http://www.degruyter.com). 1 May 2002.
- "Statistical Methods in Medical Research". SAGE Journals.
- "Pharmaceutical Statistics - Wiley Online Library". [onlinelibrary.wiley.com](http://onlinelibrary.wiley.com).
- "Statistics in Medicine - Wiley Online Library". [onlinelibrary.wiley.com](http://onlinelibrary.wiley.com).

Course Title: **APPLIED FOOD SCIENCE AND PRODUCT MODIFICATION (Pr)**

Course Code: **MCND304**

**Course Description**

The course is designed to impart knowledge of development of a new product and prepare new products based on special dietary requirements, functionality, convenience and improvisation of existing traditional Indian foods.

**Course Outcomes:**

At the end of the course, the learner will be able to:

- Address problem of targeted population with regards to availability of a food product that can suit their nutritional demands
- Design products or advice changes in the dietary habits of individuals without major changes in their traditional recipes.
- Combine different cooking styles and strategies to modify an existing product to enhance its flavor and/or nutritional value.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND304	Applied food science and product modification	120	4	-	4	50	50	100

**Evaluation**

Evaluation	Details	Marks
Internal	Journal work & assignment/ project submission	50
External	Practical examination test & Viva Voce	50
	<b>Total marks</b>	<b>100</b>



**Contents:****Module 1:****Conduction of Tests****(40 lecture)**

<b>Objectives</b>	<b>Contents</b>	<b>Evaluation (25 M)</b>
To understand sample preparations, Sensory evaluation Techniques & microbial Analysis	Conducting the Test: <ul style="list-style-type: none"> <li>- Preparing samples</li> <li>- Presenting samples</li> <li>- Using reference samples</li> <li>- Reducing panel response error</li> <li>- Consumer oriented tests</li> <li>- Product oriented tests</li> <li>- Shelf life studies</li> <li>- Product matching</li> <li>- Product mapping</li> </ul> Taint Investigation and Prevention	Students Will be evaluated on basis of development/ modification, standardization of recipe, literature review and journal competition

**Module 2:****Modification of consistency and cooking process****(40 lectures)**

<b>Objective</b>	<b>Content</b>	<b>Evaluation</b>
To understand application of different cooking methods on food.	Reducing viscosity and bulk in foods Increasing energy density Applications of fermentation, germination, malting	Students Will be evaluated on basis of development/ modification, standardization of recipe, literature review and journal competition.

**Module 3:**  
**Food product Modification**  
**(40 lectures)**

Objective	Content	Evaluation
<ul style="list-style-type: none"> <li>● To understand usage of different food ingredients based on their cooking properties</li> <li>To understand the procedure of new product development by modifying traditional recipe</li> </ul>	<p>Use of different food ingredients for development of health foods – artificial sweeteners, modified starches, fat replacers, increasing fibre content, functional ingredients, low sodium food adjuncts, protein concentrates, whey.</p> <p>New Food Products Definition, Classification</p> <p>2. Characterization Factors shaping new product development-Social concerns, health concerns impact of technology and market place influence.</p> <p>3: Planning, standardizing and testing the product, nutritional content</p> <p>Tapping traditional foods and unconventional sources of foods.</p> <p>Modifying traditional foods</p> <p>Planning, standardizing and testing the product, nutritional content</p>	<p>Students Will be evaluated on basis of development/ modification, standardization of recipe, literature review and journal competition</p>

***References:***

1. Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992): Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.
2. Amerine, M.A.; Pangborn, R.M.; Roessler, E.B. (1965): Principles of Sensory Evaluation. Academic Press, New York.
3. Kapsalis, J.G. (1987): Objective Methods in Food Quality Assessment. CRC Press, Florida.
4. Martens, M.; Dalen, G.A.; Russwurm, H. (eds) (1987): Flavour Science and Technology. John Wiley and Sons, Chichester.
5. Moskowitz, H.R. (eds) (1987): Food Texture: Instrumental and Sensory Measurement. Marcel Dekker Inc. New York.
6. Lawless, H.T. and Klein, B.P. (1991): Sensory Science Theory and Applications in Foods. Marcel Dekker Inc.
7. Jellinek, G. (1985): Sensory Evaluation of Food Theory and Practice. Ellis Horwood, Chichester.
8. Piggott, J.R. (ed) (1988): Sensory Analysis of Foods. Elsevier Applied Science, London.

9. Meilgaard, M.; Civille, G.V.; Carr, B.T. (1987): Sensory Evaluation Techniques, Vols. I and II, CRC Press, Florida.

**Journals:**

1. International Journal of Food Science and Technology.
2. Food Technology
3. Journal of Food Technology
4. Trends in Food Science and Technology
5. Critical Reviews in Food Science and Nutrition

***Course Title: GERIATRIC NUTRITION******Course code MCND305******Course Description:***

This course enables students to know the importance of nutritional care for the elderly and the effects of various diseases on nutritional status. To understand the specific needs of the elderly and the effects of various diseases on nutritional status.

***Course Outcomes:***

At the end of the course, the learner will be able to:

- Develop skills required for planning of appropriate nutritional care based on pathophysiology, prevention/ and treatment of the various diet-related disorders/ diseases.
- Competent to recommend / provide appropriate nutritional care based on pathophysiology and also the treatment of the various diet-related disorders.
- Understand the multifaceted aspects of aging and become competent to provide nutritional and health care for the elderly

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND305	Geriatric Nutrition	60	4	3	1	2/50	2/50	100

**Evaluation:**

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

**MODULE 1:**  
**Process of Aging**  
**15 lectures**

Objectives	Content	Evaluation
<ul style="list-style-type: none"> <li>➤ To understand the process of aging and natural changes associated with it.</li> <li>➤ To understand the effect of these changes on the nutritional status for the elderly population.</li> </ul>	<p><b>The Ageing Society-</b></p> <ul style="list-style-type: none"> <li>● Global and Indian scenario</li> <li>● Epidemiology</li> <li>● Life Expectancy vs Life Span</li> <li>● Usual vs Successful Ageing</li> <li>● Changes associated with the Ageing process</li> <li>● Cellular aspects of aging</li> <li>● Physiological changes: body composition gastrointestinal, cardiac, respiratory, renal, muscular, skeletal, neural (including brain and spinal cord), endocrine and metabolic, changes and impact on health and nutritional status</li> <li>● Functional manifestations of aging: constipation, impaired fluid and electrolyte balance, altered thermoregulation, sleep disturbances</li> </ul>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 2:**  
**Theories of Aging**

Objectives	Content	Evaluation
<p>To understand the various theories influencing the aging process</p> <p>To understand the nutritional requirements of the elderly and thus promoting successful aging methods</p>	<p><b>Common molecular theories of aging and nutritional interventions</b></p> <p>Factors influencing aging – endogenous and exogenous</p> <p>Benefits of calorie restriction and exercise</p> <p>Nutritional requirements – factors influencing and dietary plans for senior citizens</p> <p>Promoting successful aging-traditional and modern methods</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

*15 lectures*

**MODULE 3:**  
**Health status of elderly population**  
*15 lectures*

Objectives	Content	Evaluation
<p>To understand the factors affecting health status in elderly</p> <p>To understand the common diseases faced by the elders, their etiology, pathogenesis and nutritional guidelines.</p>	<p><b>Nutritional and health status of elderly.</b></p> <p>Factors influencing food consumption and nutritional status of elderly</p> <p>Undernutrition in the Elderly – risk factors,</p> <p>Common diseases in elderly: Etiopathogenesis, manifestations and interventions -</p> <p>Gastrointestinal disturbances, cardiac, renal, respiratory diseases, mental changes including depression, dementia, Parkinson's, Alzheimer's, bone and muscle-related abnormalities, Sarcopenia, frailty</p> <p>Role of Nutrition in prevention of age-related diseases</p> <p>Nutrient drug interactions</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 4:**  
**Field visits & Practical Exposure**  
**15 lectures**

Objectives	Content	Evaluation
To understand the nutritional assessment tools available for elders  To understand the various policies and programs developed for the elderly	Assessment of nutritional status – mini nutrition index, assessment of frailty Policies and programs of the government and NGO sector pertaining to the elderly Promoting fitness and well-being- use of various modern and traditional approaches	nts Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

NOTE: Module 4 is to be done through field visits and as independent project through the following:

1. Visit to old age homes
2. Assessment of physical fitness, food intake and nutritional status
3. Planning and preparation of diets for the elderly in health and sickness.
4. Developing protocol for promoting fitness and health vis-à-vis health status/disease.

**References:**

- 1) Sara Diana Garduno Diaz, Geriatric Nutrition (2019)
- 2) Ronald Ross Watson, Nutrition and Functional Foods for Healthy Aging, (2017)
- 3) Panda U N, An Introduction To Geriatrics Managing the problems of the Elderly, (2016)
- 4) Handbook of Nutrition in the Aged, 4<sup>th</sup> edition, (2008)
- 5) John E. Morley, David R. Thomas, Geriatric Nutrition, (2007)

**Journals:**

- 1) Journal of the American Geriatric Society
- 2) The Journal of Nutrition, Health and Aging
- 3) Journal of Nutrition in Gerontology and Geriatrics

**Course Title: PEDIATRIC NUTRITION****Course code: MCND306A****Course Description:**

This course imparts knowledge about the importance of appropriate nutritional status for a growing child and use of nutritional therapy to manage clinical conditions if any.

**Course outcomes:**

At the end of the course, the learner will be able to:

- Recognize common acute and chronic pediatric conditions, congenital and genetic syndromes and develop nutritional therapy regimen for the same.
- Understand and observe the effect of the clinical conditions on the nutritional status of the pediatric population.
- Utilize the course knowledge to develop an appropriate diet plan for the juvenile population.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND306 A	Pediatric Nutrition	60	4	2	2	2/50	2/50	100

**Evaluation:**

Evaluation	Details	Marks
Internal	Unit test, presentation/ class quizzes/ projects/ assignments	25
	Journal Writing and case study	25
External	Written Examination	50
	<b>Total marks</b>	<b>100</b>



**MODULE 1 (Th):*****Infant and Child feeding Practices******15 lectures***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<ul style="list-style-type: none"> <li>➤ To understand the significance of Breastfeeding and differentiate between the effect of breastfeeding and infant formula on nutritional status of the infant.</li> <li>➤ To understand the assessment of nutritional status, growth, and nutritional requirements of infants, children, and adolescents.</li> <li>➤ To understand the causes and consequences of under and over nutrition in children.</li> <li>➤ To understand the need, complications and delivery of nutritional support for children in critical conditions.</li> </ul>	<p><b>Infant and Young Child Feeding Practices</b></p> <ul style="list-style-type: none"> <li>a. Breastfeeding: Composition of Human Milk, Recommendations, exclusive breastfeeding, pre-lacteal feeds, duration of breastfeeding, advantages of breastfeeding, contraindications, types of Infant formulas.</li> <li>b. Complementary feeding, issues, and concerns</li> <li>c. Growth, Development and Nutritional Requirements of Infants/Children/Adolescents -</li> <li>d. Growth., development and body composition from infancy, preschool, childhood, puberty, and adolescence</li> <li>e. Nutritional requirements at different stages of infancy, childhood, and adolescence, factors influencing food intake, packed lunch</li> <li>f. Assessment of nutritional status and growth, growth charts and milestones</li> <li>g. Preterm/ VLBW infants – Complications, Role of parenteral and enteral nutrition (trophic feeds – gut priming)</li> <li>h. Undernutrition in childhood – PEM, FTT, SAM, Fe deficiency, vitamin A deficiency – causes, consequences, management (in brief), Catch-up growth</li> <li>i. Overnutrition - causes, consequences, management</li> </ul>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 2 (Th):****Nutritional Therapy Management****15 lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>To enable students to understand the etiology and nutritional considerations for special considerations such as</p> <ul style="list-style-type: none"> <li>- Inborn errors of Metabolism</li> <li>- Epilepsy</li> <li>- Developmental disabilities</li> <li>- Type 1 Diabetes</li> <li>- Kidney disorder</li> <li>- Diarrhea and Constipation</li> </ul> <p>To understand the concept of Food allergies</p>	<p>Nutritional Management of Inborn Errors of Metabolism - PKU, Maple syrup urine disease, Homocystinemia, Tyrosinemia, Galactosemia, Glycogen storage disorder</p> <p>Diarrhea and constipation - causes, consequences, management</p> <p>Epilepsy and dietary approaches – ketogenic diet, Atkins and recent advances</p> <p>Role of diet and nutritional challenges in developmental disabilities- autism spectrum disorders, cerebral palsy, Attention-deficit hyperactivity disorder</p> <p>Type 1 DM – Impact on growth and management</p> <p>Nephrotic syndrome and CKD in children - Impact on growth and management</p> <p>Food Allergies</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 3 (Pr):****Assessment of Nutritional Status****30 lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<ul style="list-style-type: none"> <li>➤ To be aware of various tools available for pediatric nutritional assessment, their use, and reference standards.</li> <li>➤ To understand the nutritional guidelines for</li> </ul>	<p><b>Pediatric Nutritional Assessment:</b> - . Anthropometric measurements, biochemical parameters, clinical and dietary assessment methods. Measuring, recording, and plotting growth on growth charts. Use of growth reference/ standards (Fieldwork)</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature</p>

<p>infants, childhood, and adolescence.</p>	<p><b>Normal nutrition for infants</b> – Guidelines on breastfeeding and complementary feeding. A market survey of infant formulae and complementary foods. Planning complementary feeds as per the guidelines. Preparation of ARF.</p> <p><b>Nutrition in childhood and adolescence:</b> Planning for preschool child, the school-aged child, and adolescents</p>	<p>reviews Assignments/ Presentations assigned/ conducted for each module</p>
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**MODULE 4 (Pr) :**  
***Nutrition Therapy in Clinical Conditions***  
**30 lectures**

Objectives	Content	Evaluation
<p>To understand various nutritional concerns, their requirements, and guidelines to plan diets for pediatric related nutritional disorders.</p>	<p><b>Nutritional concerns: -</b> Guidelines for management for PEM, SAM, Fe deficiency and vitamin A deficiency</p> <p><b>Nutritional requirements for Inborn Errors of Metabolism</b> - PKU, Maple syrup urine disease, Homocystinemia, Tyrosinemia, Galactosemia, Glycogen storage disorder</p> <p><b>Nutritional Management of diarrhea</b></p> <p><b>Ketogenic diet, Atkins diet</b></p> <p><b>Feeding challenges for developmental disabilities, feeding devices</b></p> <p>Nutritional requirements and management of - <b>type 1 DM, nephrotic syndrome and CKD</b></p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

***References:***

1. Susan H Konek, Patricia J Becker, Samour & King's Pediatric Nutrition in Clinical Care, Fifth Edition (2019)
2. Frank R. Greer, (2013), Pediatric Nutrition
3. B.Koletzko, Pediatric Nutrition in Practice, 2<sup>nd</sup> edition, (2015)
4. Kathy King, (2011), essentials of Pediatric Nutrition
5. Madhu Sharma, (2011), Therapeutic Pediatric Nutrition
6. Beth L. Leonberg, (2008), ADA Pocket Guide to Pediatric Nutrition Assessment
7. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10<sup>th</sup> Edition, W.B. Saunders Ltd.

***Journals:***

1. American Journal of Clinical Nutrition,
2. Archives of Diseases in Childhood,
3. Indian J of Pediatrics
4. Journal of Pediatric Gastroenterology and Nutrition

**Course Title: MATERNAL, INFANT & YOUNG CHILD NUTRITION**  
**Course code MCND306B**

***Course Description:***

This course aims to address the problems on infant and young child feeding practices. It will help students to gain knowledge to improve the nutritional status and health of children especially the under-three and consequently reduce infant and under-five mortality. In addition it also deals about maternal nutrition during pregnancy, lactation and infant and young child feeding practices.

***Course outcomes:***

At the end of the course, the learner will be able to:

- Understand the physiological changes in pregnancy and lactation.
  - Explain and discuss the growth and developmental during conception and childhood
  - Apply their knowledge in community and public nutrition/health programmes

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND306B	Maternal, Infant & Young Child Nutrition	60	4	4		2/50	2/50	100

Evaluation:

Evaluation	Details	Marks
Internal	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	50
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

**MODULE 1:**  
***Maternal Nutrition and fetal Development***  
***15 lectures***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>To understand the importance and role of nutrition during pregnancy, and the nutritional requirements during pregnancy</p> <p>To understand the Physiology and endocrinology of pregnancy and the developing fetus.</p>	<p>Importance of Maternal Nutrition during Pregnancy :</p> <p>Importance of nutrition prior to and during pregnancy.</p> <p>Pre-requisites for successful outcome.</p> <p>Effect of undernutrition on mother-child dyad including pregnancy outcome and Maternal and Child Health – Short term and Long term.</p> <p>Physiology and endocrinology of pregnancy and embryonic and fetal growth and development</p> <p>Nutritional requirements during pregnancy</p> <p>Congenital malformations, fetal alcohol syndrome and gestational diabetes mellitus.</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 2:**  
***Lactation and Infant Feeding***  
***15 lectures***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>To understand the physiology and endocrinology of lactation and management of lactation issues.</p> <p>To understand the human milk composition and role of exclusive breastfeeding</p>	<p>Lactation and Infant feeding</p> <p>Unit 1. Development of mammary tissue and role of hormones</p> <p>Unit 2. Physiology and endocrinology of lactation – Synthesis of milk components, let down reflex, role of hormones, lactational amenorrhea, effect of breastfeeding on maternal health</p> <p>Unit 3. Human milk composition and factors affecting breastfeeding and fertility, maternal nutritional status and milk composition.</p> <p>Unit 4. Management of lactation – Prenatal breastfeeding skills education. Rooming-in, problems – sore nipples, engorged breast, inverted nipples</p> <p>Unit 5. Exclusive breastfeeding</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 3:**  
***Infant Nutrition***  
***15 lectures***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
<p>To understand the infant physiology, normal growth patterns and its monitoring</p> <p>To understand the persisting malnutrition and its types in children</p>	<p>Infant physiology and the preterm and LBW infants: Implications for feeding and management.</p> <p>Growth and development during infancy, childhood and adolescence.</p> <p>a. Normal pattern of growth and development</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

	b.: Norms/standards for growth c: Growth monitoring and promotion, WHO growth charts d. types of malnutrition, growth faltering, Failure to thrive	
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**MODULE 4:**  
**Programs and Policies for India**  
**15 lectures**

Objectives	Content	Evaluation
<p>To understand the latest policies and programs available to improve nutritional status of maternal and child nutrition</p> <p>To understand the concept of complementary feeding and issues relate with it.</p>	<p>Current Situation in India in terms of Nutrition Indicators on IYCF</p> <ul style="list-style-type: none"> <li>- Present policies and programs to improve nutrition status</li> <li>- Policies and programmes for promoting maternal and child nutrition &amp; health.</li> </ul> <p>International, national and state level</p> <p>Complementary Feeding</p> <p>Frequency, quality, quantity, consistency, diversity</p> <p>Responsive feeding and behavior problems in children</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**References:**

1. World Health Organization. (2012). Combined course on growth assessment and IYCF counseling.
2. [https://www.who.int/nutrition/publications/IYCF\\_Participants\\_Manual.pdf](https://www.who.int/nutrition/publications/IYCF_Participants_Manual.pdf)
3. Health Spoken Tutorial, IIT Bombay - [https://www.youtube.com/channel/UCmyV3lKT1Gs1AfgtV8pp\\_\\_Q](https://www.youtube.com/channel/UCmyV3lKT1Gs1AfgtV8pp__Q)
4. Maa Guideline, INDIA



**Course Title: SAM (SEVERE ACUTE MALNUTRITION) & MAM (MODERATE ACUTE MALNUTRITION) MANAGEMENT**

**Course Code :MCND306C**

**Course Description:**

- This course aims at giving knowledge about malnutrition which is common amongst all the vulnerable groups.
- To have a understanding of how to identify the at risk individuals, screening them and giving them proper nutritional care will be the other aim of this course. Severe acute malnutrition and Moderate acute malnutrition remains a major killer of children under five years of age.
- Thus to know about its diagnosis, causes and its prevention is very important. This course will impart knowledge in students about the role of therapeutic nutrition in the management of SAM/MAM

**Course Outcome:**

At the end of the course, the learner will be able to:

- Discuss the concept of malnutrition, its types, causes and treatment.
- Relate to the complication of this condition and its effect on the individual and to the society.
- Apply the knowledge for management of SAM/MAM and explain the role of therapeutic nutrition in its management.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND306C	SAM (Severe Acute Malnutrition) & MAM (Moderate Acute Malnutrition) Management	60	4	4		2/50	2/50	100

<b>Evaluation</b>	<b>Details</b>	<b>Marks</b>
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>

*Content*

**MODULE 1:  
Understanding Malnutrition  
15 lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
To understand the term malnutrition, its types, symptoms, causes and criteria to diagnose malnutrition	What is Malnutrition? <ul style="list-style-type: none"> <li>● Prevalence in the world and in India</li> <li>● Nutrients deficiency causing malnutrition</li> <li>● Other causes of undernutrition in children</li> <li>● Pathophysiology</li> <li>● Undernutrition &amp; child mortality</li> <li>● Different types of malnutrition</li> <li>● Sign &amp; symptoms of acute malnutrition</li> <li>● WHO growth charts</li> <li>● Criteria to diagnose acute Malnutrition</li> </ul>	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**MODULE 2:  
Management of SAM  
15 lectures**

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
Understand the management of SAM and role of therapeutic nutrition in its management	Management of SAM (6 months to 59 months) <ul style="list-style-type: none"> <li>□ Nutrients required for catch up growth</li> <li>□ Measurement of weight, height and MUAC</li> </ul>	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/

	<input type="checkbox"/> Difference between complicated Vs non-complicated SAM <input type="checkbox"/> Protocols for Community based Acute Malnutrition (CMAM) <input type="checkbox"/> Therapeutic diets for CMAM program <input type="checkbox"/> Ready to use Vs home-cooked diets <input type="checkbox"/> Protocols for Facility-based management of acute malnutrition <input type="checkbox"/> brief overview F-75 & F100 formulas <input type="checkbox"/> Monitoring <input type="checkbox"/> Discharge criteria and follow up <input type="checkbox"/> Homemade recipes for SAM children	conducted for each module
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**MODULE 3:*****Management of MAM******15 lectures***

<b>Objectives</b>	<b>Content</b>	<b>Evaluation</b>
To understand the management of MAM and role of therapeutic nutrition in MAM	Management of MAM(6 months to 59 months) <ul style="list-style-type: none"> <li>● Definition</li> <li>● Nutrients required for management of MAM</li> <li>● Therapeutic diets for MAM children</li> <li>● Discharge and follow up</li> </ul> Counseling for parents of SAM/MAM children	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**MODULE 4:**  
**Management of SAM & MAM patients**  
**15 lectures**

Objectives	Content	Evaluation
understand the SAM/MAM management of under 6 months	SAM/MAM Management of under 6 months <input type="checkbox"/> Protocol for SAM Management of under 6 months old babies <input type="checkbox"/> Prevalence of SAM for under 6 months <input type="checkbox"/> Management of SAM outpatient and inpatient <input type="checkbox"/> Breastfeeding counseling with 45 points <input type="checkbox"/> Supplementary Suckling Technique <input type="checkbox"/> Growth Monitoring <input type="checkbox"/> Discharge and follow up	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**References:**

1. Updates on the management of severe acute malnutrition in infants and children, Guideline, WHO, (2013)
2. Praveen Kumar, Piyush Gupta, Severe Acute Malnutrition, (2017)
3. Johanna B. Knudsen, Malnutrition: Risk Factors, Health Effects and Prevention, (2012)
4. WHO
5. Community management of acute malnutrition CMAM guidelines, (2017)

**VALUE-ADDED COURSE**

**Course title: Modifying traditional foods for different clinical conditions**

**Course description:** the course is designed to provide knowledge and skills about modifying food products to make it more appropriate for any clinical condition.

**Learning outcome:** Students will be able to:

Understand the different methods and domains of modifying a recipe

Develop skills to standardize a new recipe for best acceptability from the target audience

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
	Modifying traditional foods for different clinical conditions	30	2	-	2	25	25	50

**Module 1:****Common non communicable diseases and product modification****7 lectures**

OBJECTIVES	CONTENT	EVALUATION
<p>This module will enable students to: understand common modifications that can be made in order to enhance the taste/acceptability of any recipe. Understand changes that can be made in order to make the recipe disease specific</p>	<p><b>Chronic non-communicable diseases and other conditions - implications for dietary management</b>  <b>Exercise:</b> Listing of chronic Non-communicable diseases – diabetes mellitus, cardiovascular disease, renal disease, hypertension, obesity, celiac disease and gluten sensitivity, chronic pulmonary disease, cancer, post surgical including bariatric surgery</p> <p><b>Common modifications that are required to make food palatable</b>            Foods and/or nutrients that need to be restricted or given additionally            To be listed separately for lacto-ovo-vegetarians, lacto-vegetarians, vegans and non-vegetarians            How to improve palatability of recipes            Wherever applicable how to reduce glycemic index, glycemic load</p>	<p>Students will be evaluated based on case study planning/ journal completion/ presentations/ assignments/ projects</p>

**Module 2:**  
**Traditional foods**  
**8 lectures**

<b>OBJECTIVES</b>	<b>CONTENT</b>	<b>EVALUATION</b>
This module will enable students to: Understand different type of traditional foods that are commonly consumed in the country.	<p><b>Traditional foods popular in different communities/regions of India</b></p> <p>Survey of different communities- focus on ready to eat and shelf stable foods/recipes</p> <p>Each student to survey 10-15 families including food adjuncts, sweets. Routine preparations excluded</p> <p><b>Survey of patients – for identifying traditional foods that are attractive and/or difficult to give up</b></p> <p>Students will work in groups. Each group will be assigned one specific clinical condition. Each group member will discuss with individual patients about the same. Together each group should be able to identify at least 10 foods that have potential to be modified</p>	Students will be evaluated based on case study planning/ journal completion/ presentations/ assignments/ projects

**Module 3:**  
**Modification and standardization of recipes:**  
**15 lectures**

<b>OBJECTIVES</b>	<b>CONTENT</b>	<b>EVALUATION</b>
This module will enable students to: <ul style="list-style-type: none"> <li>Develop a modified food product and standardize it.</li> </ul>	<p><b>Ways to modify recipes:</b></p> <p>(a) Domestic level</p> <p>(b) Substitution of ingredients</p> <p>(c) Addition of newer ingredients</p> <p>(d) Combination of methods</p> <p>Exercise based on foods listed in previous module</p> <p><b>Modification and standardization of two traditional recipes:</b></p> <p><b>1 shelf stable and 1 ready-to – eat</b></p> <p><b>Calculation of content of relevant nutrients</b></p> <p><b>Report writing</b></p>	Students will be evaluated based on case study planning/ journal completion/ presentations/ assignments/ projects

**Evaluation**

<b>Evaluation</b>	<b>Details</b>	<b>Marks</b>
Internal	Journal writing/presentation/ submissions	<b>25</b>
External	Viva Voce	<b>25</b>
	<b>Total Marks</b>	<b>50</b>

**Semester IV**

<b>Sr. No.</b>	<b>Course</b>	<b>No of lecture</b>	<b>T.C.</b>	<b>Th Cr.</b>	<b>Pr. Cr</b>	<b>Internal marks</b>	<b>External marks</b>	<b>Total marks</b>
<b><i>Core component</i></b>								
<b>1</b>	Dissertation – Pr	<b>240</b>	<b>8</b>	<b>-</b>	<b>8</b>	<b>100</b>	<b>100</b>	<b>200</b>
<b>2</b>	Internship- Pr	<b>240</b>	<b>8</b>	<b>-</b>	<b>8</b>	<b>100</b>	<b>100</b>	<b>200</b>
<b>3</b>	Public Nutrition and Health	<b>60</b>	<b>4</b>	<b>4</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>100</b>
<b>4</b>	CBCS 1: Dietetic Techniques and Patient Counselling	105	4	1	3	<b>50</b>	<b>50</b>	<b>100</b>
<b>5</b>	CBCS 2: Functional Foods	<b>60</b>	<b>4</b>	<b>4</b>	<b>-</b>	<b>50</b>	<b>50</b>	<b>100</b>
<b><i>Short Term Course</i></b>								
<b>1</b>	Renal Nutrition and its Management	30	2	-	2	50	50	100

**Course Title: PUBLIC NUTRITION AND HEALTH**  
**Course code MCND403**

**Course Description:**

Public Nutrition and Health course aim to impart knowledge about the nutritional status of the population at large, with a specific focus on those identified vulnerable in the population. It also emphasizes on the prevention of diseases and promotes health. It makes an individual familiar with various strategies and programs available for the population by government organizations.

Course outcomes:

At the end of the course, the learner will be able to:

- Relate with Health care facilities available in the community and the country.
- Develop skills for identifying at risk or vulnerable population of the community by the use of various health indicators.
- Investigate about various nutritional problems prevalent in society and their preventive and therapeutic measures.
- Understand and construct strategies, policies, and programs available to improve the nutritional status of the society.
- Apply the skills for formulation and execution of plans to prevent &/or manage prevalent nutritional problems affecting the society using evidence-based information.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
<b>MCND403</b>	Public Nutrition & Health	60	4	4	-	2/50	2/50	100

Evaluation	Details	Marks
Internal	Unit test (offline/ online)	25
	Continuous evaluation: Projects/ Quiz/ Class tests/ Assignment & Presentations.	25
External	Written examination test	50
	<b>Total marks</b>	<b>100</b>



**MODULE 1:**  
**Basics of Public Health and Food security**  
**20 lectures**

Objectives	Content	Evaluation
<p>➤ Understand the role of food and nutrients in health and diseases, and have knowledge for various health indicators.</p> <p>➤ -Understand concepts of Food and Nutrition, socio-cultural aspects of nutrition and their implication on Nutrition Health</p> <p>➤ Understand populational dynamics applicable in the society/ community, and the concept of food security and their impact on nutritional strategies and policies.</p>	<p><b>Concept of public nutrition</b></p> <p>A. Relationship between health and nutrition B. Role of public nutritionists in the health care delivery</p> <p><b>Sectors and Public Policies relevant to nutrition and health.</b></p> <p><b>Primary Health Care of the Community</b></p> <p>A. National Health Care Delivery System B. Determinants of Health Status</p> <p>c. Indicators of Health</p> <p><b>Population Dynamics</b></p> <p>a. Demographic transition b. Population structure c. Fertility behavior d. Population policy e. Fertility f. The interrelationship between Nutrition and Quality of Life</p> <p><b>Food and Nutrition Security</b></p> <p>a. Food production</p> <ul style="list-style-type: none"> <li>❖ Access</li> <li>❖ Distribution</li> <li>❖ Availability</li> <li>❖ Losses</li> <li>❖ Consumption</li> </ul> <p>b. Food Security</p> <p>c. Socio-cultural aspects and Dietary Patterns:</p> <p>Their implications for Nutrition and Health</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 2:**  
**Nutritional Status and Problems**  
**20 lectures**

Objectives	Content	Evaluation
<p>-To Understand the Nutrition and Non-nutritional indicators and various assessment methods used on fields</p> <p>-To Understand the causes /determinants and consequences of nutritional problems in Indian society</p>	<p><b>Nutritional Status</b></p> <p>A. Determinants of nutritional status of individual and populations</p> <p>B. Nutrition and Non-nutritional indicators</p> <ul style="list-style-type: none"> <li>❖ Socio-cultural</li> <li>❖ Biologic</li> <li>❖ Environmental</li> <li>❖ Economic</li> </ul> <p>c: Assessment of the nutritional status of individuals of different ages- MUAC, Wt for age, Ht for age, Wt for ht, Ponderal index, BMI</p> <p>Applications and limitations in different field situations- choice of an indicator</p> <p><b>Major Nutritional Problems</b> – etiology, prevalence, clinical manifestations, preventive and therapeutic measures for:</p> <p>A. Macro and micronutrient deficiencies</p> <p>B. Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism, and fluorosis.</p> <p>C. Overweight, obesity and chronic degenerative diseases</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**MODULE 3:**  
**Preventive Nutritional Approaches**  
**20 lectures**

Objectives	Content	Evaluation
<ul style="list-style-type: none"> <li>➤ -To understand various approaches and strategies that can be used for nutrition and health intervention programs and policies</li> <li>➤ To learn lifestyle and behavior changes using nutritional counseling techniques.</li> <li>➤ To understand various factors that exerts effect on nutritional policies and affects health status of the population.</li> </ul>	<p><b>Approaches and Strategies for improving nutritional status and health:</b></p> <p>a. National Food, Nutrition and Health Policies</p> <p>- Plan of action and programs</p> <p>b. Programmatic options- their advantages and demerits.</p> <p>Feasibility</p> <p>Political support</p> <p>Available resources (human, financial, infrastructural)</p> <p>c. Case studies of selected strategies and programs: their rationale and context, how to select interventions from a range of possible options:</p> <p>d. Health-based interventions, Food-based interventions including fortification and genetic improvement of foods, supplementary feeding, Nutrition education for behavior change.=</p> <p>Health economics and economics of malnutrition</p> <p>a. Its impact on productivity and national development</p> <p>b. Cost-Benefit</p> <p style="padding-left: 40px;">Cost-effectiveness</p> <p style="padding-left: 40px;">Cost efficiency</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>

**References:**

1. Sali Edelstein, Ph.D., RD, (2011) Nutrition in Public Health, A handbook for developing programs and services
2. Arlene Spark, (2007) Nutrition in Public Health, Principles, Policies and Practice
3. Michael J. Gibney (Editor), Barrie M. Margetts (Editor), John M. Kearney (Editor), Lenore Arab (Editor), (2004) Public Health Nutrition (The Nutrition Society Textbook)
4. National food and nutrition policy- WHO
5. Aggarwal A, Monsivais P, Drewnowski A (2012) Nutrient intakes linked to better health outcomes are associated with higher diet costs in the US. PLoS One 7(5). doi: 10.1371/journal.pone.003753
6. WHO; UNICEF. Integrated Management of Childhood Illness, chart booklet. Geneva: WHO; 2008.
7. SCN News, UN ACC/SCN Subcommittee on Nutrition.
8. State of the World's Children, UNICEF.
9. Census Reports.
10. FAO reports

**Journals:**

Public Health Nutrition

Nutrition and Health

**Course Title: DIETETIC TECHNIQUES AND PATIENT COUNSELLING**  
**Course code : MCND404A**

**Course Description:**

This course will enable students to understand various ways to develop teaching aids and understand counselling strategies to counsel and educate an individual and group.

**Course Outcome:**

At the end of the course, the learner will be able to:

- Gain skills and understand underlying strategies for counselling patients
- Design effective aids and presentation which can be applied for communicating to individual/ mass population.
- Discuss the process of counselling and nutritional assessment

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
MCND404A	Dietetic Technique and Patient Counselling	105	4	1	3	2/50	2/50	4/100

**Evaluation**

Evaluation	Details	Marks
Internal	Unit test, presentation/ class quizzes/ projects/ assignments	50
External	Written Examination	50
	<b>Total marks</b>	<b>100</b>

**Contents:**

**Module 1:**  
**The Counselling process**  
**15 lectures**

Objective	Topic & Details	Evaluation
<ul style="list-style-type: none"> <li>● To learn the practical application of clinical/therapeutic knowledge.</li> <li>● To understand the characteristics of client and develop counselling strategies for the same</li> <li>● To learn the essential qualities required for a counsellor</li> </ul> <p>To learn ways to obtain relevant information about the client and his medical and diet history</p> <ul style="list-style-type: none"> <li>● To learn about various theories used to formulate key techniques for counselling</li> <li>● To learn the skill of building rapport with client and gain soft and communication skills</li> </ul>	<p><b>Counselling</b> – Definition, Expectations, goals, scope and limits.</p> <p><b>Counsellor</b> – Characteristics of an effective counselor</p> <p><b>The Client</b> – Characteristics, expectations</p> <p><b>The Counselling Process:</b> <b>Techniques for obtaining relevant information</b></p> <ol style="list-style-type: none"> <li>1. Clinical Information</li> <li>2. Medical History and General Profile</li> <li>3. Dietary Diagnosis <ul style="list-style-type: none"> <li>● Assessing food and nutrient intakes</li> <li>● Lifestyles, physical activity, stress</li> </ul> </li> <li>4. Nutritional Status</li> <li>5. Correlating relevant information and identifying areas of need <ul style="list-style-type: none"> <li>Stage I: Problem exploration and clarification</li> <li>Stage II: Developing new perspectives and setting goals</li> <li>Stage III: Implementation follow up and evaluation</li> </ul> </li> </ol> <p><b>Counselling Theories and Approaches:</b> <b>Key Concepts and Techniques</b></p> <p><b>Counselling techniques, strategies and communication skills</b></p> <p>Rapport building and opening techniques</p> <p>Questioning, listening, reflecting, acceptance, silence, leading reassurance, non-verbal behaviour, terminating skills.</p> <p><b>Group Counselling</b></p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**Module 2:**  
**Resource Development**  
**30 lectures**

Objective	Topic & Details	Evaluation
To learn and develop resources and aids required for educating the individual or for obtaining authentic information from the client	<b>Developing resources and aids for education and counseling</b>	Students will be evaluated based on case study planning/ journal completion/ presentations/ assignments/ projects

**Module 3:**  
**The Counselling process**  
**60 lectures**

Objective	Topic & Details	Evaluation
<ul style="list-style-type: none"> <li>● To learn the difference and strategies used for working with IPD/ OPD patients.</li> </ul> <p>To develop and follow and monitor the diet plan designed.</p>	<p><b>Working with:</b></p> <ol style="list-style-type: none"> <li>1. Hospitalised patients (adults, pediatric, elderly, handicapped), adjusting and adopting to individual needs</li> </ol> <p><b>Outpatients (adults, pediatric, elderly, handicapped), patients education, techniques and modes</b></p> <p><b>Follow up Monitoring and Evaluation of outcome: Home visits.</b></p>	Students will be evaluated based on case study planning/ journal completion/ presentations/ assignments/ projects

**References:**

1. Gable, J. (1997): Counselling Skills for Dietitians, Blackwell Science.
2. Holli, B.B. and Calabrese, R.J. (1998): Communication and Education Skills for Dietetics Professionals. Lippin Cott Williams & Wilkins, New York.
3. Curry, R.K. and Jaffe, A. (1998): Nutrition Counselling and Communication Skills, W.B. Saunders Co. London.
4. Hosking, G. and Powell, R. (1985): Chronic Childhood Disorders; Wright, Bristol.
5. O'Deughterty, M.M. (1983): Counselling the chronically ill child; The Lewis Publishing Co. Vermont, 1983.
6. Shillitee Psychology and Diabetes, Chapman & Hall Ltd., London, 1988.

**Course Title: FUNCTIONAL FOODS****Course code : MCND404B*****Course Description:***

This course is designed to explore research based knowledge about specific food products or nutrients having health benefits that can prevent, manage clinical conditions

***Course Outcome:***

At the end of the course, learners will be able to:

- Understand the concept of functional food and active components of food.
- Apply research-based knowledge and evidence-based facts of functional foods for preventive and therapeutic nutrition.
- Discuss the mechanism of action for functional food and its safe intake levels.

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
<b>MCND404B</b>	Functional Foods	4	4	4	-	2/50	2/50	100 Marks

Evaluation	Details	Marks
Internal	Unit test, presentation/ class quizzes/ projects/ assignments	<b>50</b>
External	Written Examination	<b>50</b>
	<b>Total marks</b>	<b>100</b>



**Contents:****Module 1:****Introduction to Functional Foods, Prebiotic and Probiotic****15 lectures**

<b>Objectives</b>	<b>Topics and Details</b>	<b>Evaluation</b>
To learn about the functioning and benefits for prebiotics, probiotics and symbiotics	<p><b>Introduction:</b> Definition, history, classification – Type of classification (Probiotics, probiotics and synbiotics; Nutrient vs. Non-nutrient; according to target organ; according to source or origin).</p> <p><b>Probiotics</b></p> <p>a. Taxonomy and important features of probiotic micro-organisms.</p> <p>b. Health effects of probiotics including mechanism of action.</p> <p>c. Probiotics in various foods: fermented milk products, non-milk products etc.</p> <p>d. Quality Assurance of probiotics and safety.</p> <p><b>Prebiotics</b></p> <p>Unit 1. Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food -applications for the following:</p> <ul style="list-style-type: none"> <li>● Non-digestible carbohydrates/oligosaccharides:</li> <li>● Dietary fibre</li> <li>● Resistant starch</li> <li>● Gums</li> </ul> <p>Application for gut microflora, GI dysfunctions, Immune related disorders and infections</p>	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module

**Module 2:**  
**Biodynamic principles and their Health benefits**  
**30 lectures**

Objectives	Topics and Details	Evaluation
<p>To understand plant based functional ingredients and food's chemistry and benefits</p> <p>To learn their application in suitable clinical conditions</p>	<p><b>Potential health benefits of the following biodynamic principles:</b></p> <p>Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential</p> <ul style="list-style-type: none"> <li>● Polyphenols: Flavonoids, catechins, isoflavones, tannins Curcumin, Resveratrol</li> <li>● Phytoestrogens/ Isoflavones</li> <li>● Phytosterols</li> <li>● Glucosinolates</li> <li>● Pigments : Lycopene, Carotenoids</li> <li>● Organo sulphur compounds</li> <li>● Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins</li> </ul>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**Module 3:**  
**Spices, Condiments and other plant materials and their therapeutic application**  
**15 lectures**

Objectives	Topics and Details	Evaluation
<p>To learn about the active ingredient, present naturally in spices, herbs and other plant based foods, their implication and benefits for clinical conditions, sports etc.</p>	<p><b>Active biodynamic principles in spices, condiments and other plant materials and their evidence-based effects</b></p> <p>Application of functional food(s) for:</p> <ol style="list-style-type: none"> <li>1. Communicable and infectious diseases AIDS/ HIV, air-borne, vector-borne, food-borne, water-borne diseases</li> <li>2. Non communicable diseases: obesity and metabolic syndrome, cardiac disorder, liver and kidney issues, endocrine abnormalities</li> <li>3. Cancer prevention and management of symptoms</li> <li>4. At different life stages</li> <li>5. Sports athletes</li> <li>6. Neurological health</li> </ol>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

**References:**

1. Cho S. S. and Dreher, M.L. (2001): Handbook Dietary Fibre, Marcel Dekker Inc., New York.
2. Yurawecz, M.P., M.M. Mossoba, J.K.G. Kramer, M.W. Pariza and G.J. Nelson eds (1999) Advances in Conjugated Linoleic Acid Research, Vol. 1. AOCS Press, Champaign.
3. Wildman, R.E.C. ed. (2000) Handbook of Nutraceuticals and Functional Foods, CRC Press, Boca Raton.
4. Fuller, R. ed. (1992) Probiotics the scientific basis, London: Chapman and Hall, New York.
5. Fuller, R. ed. (1997) Probiotics Applications and Practical Aspects, London: Chapman and Hall, New York.
6. Salminen, S. A. Von Wright (eds) (1998): Lactic acid bacteria: microbiology and functional aspects, 2<sup>nd</sup> edition, Marcell Dekker Inc. New York.
7. Goldberg, I. Ed (1994): Functional Foods: Designer Foods, Pharma Foods, Nutraceuticals, Chapman & Hall, New York.
8. Wood, B.J.B. ed. (1992): The lactic acid bacteria in health and disease, Elsevier Applied Science, London.
9. Gibson, G., Williams, C. eds (2000): Functional Foods. Woodhead Publishing Ltd. U.K.
10. Young, J. (1996): Functional Foods: Strategies for successful product development. FT Management Report Pearson Professional Publishers, London.
11. Frei, B. (1994): Natural antioxidants in human health and disease. Academic Press, San Diego.
12. Tannock, G.W. (1999): Probiotics: A critical review, Horizon Scientific Press, UK

**VALUE-ADDED SHORT-TERM COURSE**  
**RENAL NUTRITION AND ITS MANAGEMENT**  
**FOR**  
**MSc Clinical Nutrition & Dietetics students**

**(Super specialty Short term value Added course)**

**Course Description:** The course presents a holistic perspective of renal diseases with course topics on assessment and screening of kidney diseases to understanding the effects of metabolism of each disease

**Learning Outcomes:** students will learn about nutritional screening and assessment in CKD, methods to improve nutritional status, oral nutritional considerations, need for oral nutritional supplements, enteral feeding, parenteral nutrition and management of other issues in renal diseases

Code No.	Course	No of lec	T.C.	Th Cr.	Pr. Cr	Internal	External	Total
	Renal Nutrition and its Management	30	2					

**2 credits**

**Duration: 30 hours**

**Module 1:**

**Renal Anatomy & Physiology, and effect of Kidney diseases on Human Body**

**10 lectures**

Objectives	Content	Evaluation
The module will enable students to: <ul style="list-style-type: none"> <li>● Understand the normal physiology and deviations in the body on manifestation of diseases.</li> <li>● Understand the methods of nutritional assessment related to kidney diseases</li> </ul>	Renal Anatomy and pathophysiological changes in kidney disorders  Alteration of renal functions in various renal disorders  A brief review and classification of kidney diseases.  Nutritional Assessment & Screening in kidney diseases  <b>Effect of kidney disease on</b> <ul style="list-style-type: none"> <li>● Metabolism of various kidney diseases</li> <li>● Hormonal Function</li> </ul>	Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/

<ul style="list-style-type: none"> <li>Understand the generic basis of nutrition for renal diseases</li> </ul>	<ul style="list-style-type: none"> <li>Ca, PO<sub>4</sub>&amp; Vit D<sub>3</sub></li> <li>Lipid Metabolism</li> <li>Anaemia</li> </ul> <p><b>Dietary Salt intake in hypertension &amp; kidney disease</b></p> <p><b>Clinical Diet &amp; Nutritional Assessment</b></p> <ul style="list-style-type: none"> <li>Dietary modification of macro and micro nutrients</li> <li>Clinical nutritionist approach to medical nutrition therapy in renal diseases</li> </ul>	<p>conducted for each module</p>
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**Module 2:**

**Nephrotic Syndrome, Acute and Chronic Kidney Disease & Dialysis**

**10 lectures**

Objectives	Content	Evaluation
<p>This module will enable students to:</p> <ul style="list-style-type: none"> <li>Understand the etiology pathophysiology, and Therapeutic nutrition management of nephrotic syndrome, AKD, CKD.</li> <li>Understand the need, types and nutrition management for patient undergoing dialysis</li> </ul>	<p><b>Nutritional consequences &amp; management of Nephrotic syndrome</b></p> <p><b>Nutrition in paediatric kidney disease including nephrotic syndrome</b></p> <p><b>Nutritional Management in Acute Kidney injury</b></p> <p><b>Nutritional interventions in slowing progression of Chronic Kidney Disease (CKD)</b></p> <p><b>Nutritional Management in pre-dialysis patient</b></p> <p><b>Nutritional management in Dialysis patient</b></p> <p>Types of dialysis and their nutritional care</p> <p>Haemodialysis</p> <p>Peritoneal Dialysis</p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews</p> <p>Assignments/ Presentations assigned/ conducted for each module</p>

Module 3:Kidney Transplant, Special cases in Kidney diseases10 lectures

Objectives	Content	Evaluation
<p>This module will enable students to: Understand the nutritional concerns for pre- and post-kidney transplant patient, ICU management. Understand the nutritional principles for planning an appropriate diet for patients suffering from renal disorders accompanied with other conditions.</p>	<p><b>Pre transplant/Acute/Post transplant:</b> Nutritional considerations in patient post kidney transplant</p> <p><b>Nutritional management in kidney transplant (immediate&amp; long term)</b></p> <p><b>Nutritional Management in kidney disease in the ICU</b></p> <p>Enteral</p> <p>Parental</p> <p><b>Special cases in kidney disease &amp; Nutrition management</b></p> <p><b>Obese</b></p> <p><b>Diabetes</b></p> <p><b>Hepatic Disease</b></p> <p><b>Stone Formers</b></p> <p><b>Cardio vascular Disease</b></p>	<p>Students Will be evaluated based on their performance in Quizzes/ Class tests/ Unit test/ Projects/ literature reviews Assignments/ Presentations assigned/ conducted for each module</p>