



**SNDT Women's University, Mumbai**

**Master of Science  
(Clinical Nutrition & Dietetics)**

**M. Sc.  
(Clinical Nutrition & Dietetics)**

*As per NEP-2020*

**Syllabus**

**(2023-24)**

## Postgraduate Programme

2023

### M.Sc. Clinical Nutrition & Dietetics

#### Structure with Course Titles

#### Postgraduate Programme of 2 years:

SN	Courses	Type of Course	Credits	Marks	Int	Ext
<b>Semester I</b>						
114411	Physiological Biochemistry (Th)	Major (Core)	4	100	50	50
114412	Human Physiology and Pathophysiology (Th)	Major (Core)	4	100	50	50
114413	Medical Nutrition Therapy - I Th.	Major (Core)	4	100	50	50
114424	Medical Nutrition Therapy - I Pr.	Major (Core)	2	50	50	0
124411/ 124412/ 124413	*Introduction to Entrepreneurship / Clinical Diagnostics/ Advanced Nutrition I (Macronutrients & Water)	Major (Elective)	4	100	50	50
134411/ 134431	Research Methodology (MSc)	Minor Stream (RM)	4	100	50	50
<b>End of Semester I</b>			<b>22</b>	<b>550</b>	<b>300</b>	<b>250</b>
<b>Semester II</b>						
214411	Advanced Nutrition II (Micronutrients)	Major (Core)	4	100	50	50
214412	Nutritional Assessment	Major (Core)	4	100	50	50
214413	Medical Nutrition Therapy - II Th.	Major (Core)	4	100	50	50
214424	Medical Nutrition Therapy - II Pr.	Major (Core)	2	50	0	50
224411/ 224412	*Hospital, Personnel and Food Service Management / Food Safety OR Nutrition for Exercise and Fitness	Major (Elective)	4	100	50	50
244441	Internship**	OJT	4	100	50	50
<b>Exit with PG Diploma in Dietetics</b> <b>(* recommend to undertake 6 months' internship)</b>			<b>22</b>	<b>550</b>	<b>250</b>	<b>300</b>

**Exit option: (44 credit) after Three-Year UG Degree****Year II**

<i>Sr.No</i>	<i>Courses</i>	<i>Type of Course</i>	<i>Credits</i>	<i>Marks</i>	<i>Int</i>	<i>Ext</i>
<b>Semester III</b>						
314411	Statistical Application in Research	Major (Core)	4	100	50	50
314412	Pediatric Nutrition	Major (Core)	4 (2+2)	100	50	50
314413	Geriatric Nutrition	Major (Core)	4	100	50	50
314414	Nutrition in Critical Care	Major (Core)	2	50	0	50
324421/ 324422	Functional Foods and Nutraceuticals / Drug Nutrient Interaction	Major (Elective)	4	100	50	50
354431	Research Project	RP	4	100	50	50
<b>End of Semester III</b>			<b>22</b>	<b>550</b>	<b>250</b>	<b>300</b>
<b>Semester IV</b>						
414411	Nutrigenetics and Nutrigenomics	Major (Core)	4	100	50	50
414412	Nutrition, Diet and Microbiome	Major (Core)	4	100	50	50
414413	Dietetic Techniques and Patient Counseling	Major (Core)	4 (2+2)	100	50	50
424411/ 424412	*Principles of Ayurvedic Dietetics / Public Nutrition and Health	Major (Elective)	4	100	50	50
454431	Dissertation	RP	6	150	100	50
<b>End of Semester IV</b>			<b>22</b>	<b>550</b>	<b>300</b>	<b>250</b>

\*Elective subjects will be offered only if there are a minimum of 10 students for the respective selected course.

#Nutrition in Diabetes Care / Cardiometabolic Health / Renal Nutrition/ Nutrition in Cancer will be offered as value-added course.

## Course Syllabus

### Semester III

#### 3.1 Major (Core):

<b>Course Title</b>	<b>Statistical Application in Research</b>
<b>Subject Code</b>	<b>314411</b>
<b>Course Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to
	1. Identify parametric and non-parametric tests
	2. Apply statistical tests for data analysis for both large and small samples
	3. Interpret the results of statistical analysis of data
	4. Summarize data and present it using tables and graphs
<b>Module 1(Credit 1) - Introduction to Statistics and Data Management</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Analyze parametric and non-parametric test
	2. Apply the statistical programs for data management
<b>Content Outline</b>	<b>Introduction to Statistics</b> Definition, conceptual understanding of statistical measures, popular concepts and misuse of statistics  <b>Normal Distribution and its Properties</b> a. Normal distribution b. Binomial distribution c. Probability, use of normal probability tables, area under normal distribution curve d. Parametric and non-parametric tests  <b>Data Management</b> Planning for data analysis – coding of responses, preparation of code book, Coding of data Use of statistical programs - MS Excel - SPSS
<b>Module 2(Credit 1) - Quantitative Data Analysis and Statistical Tests</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to

	1. Describe quantitative analysis, descriptive & inferential statistics.
	2. Apply large and small sample tests and interpret the results.
<b>Content Outline</b>	<p><b>Data Analysis</b></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 Grouped data-frequency distribution, histogram, frequency polygons, percentiles, quartiles, tertiles, ogive</p> <p>e. Large and Small Sample tests and interpretation</p> <ul style="list-style-type: none"> <li>- . Z-test for single proportions and difference between proportions</li> <li>- . Large sample test for single mean and difference between means</li> <li>- . Small sample tests- 't'-test, paired 't'-test, 'F' Test</li> </ul>
<b>Module 3(Credit 1) - Chi-Square, Correlation, and Experimental Design</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Interpret chi square test, correlation & regression
	2. Distinguish between experiment designs
<b>Content Outline</b>	<p><b>Chi square test and its interpretation</b></p> <p>a. General features, goodness of fit</p> <p>b. Independence of Attributes</p> <p><b>Correlation and Regression and its interpretation</b></p> <p>a. Basic concepts</p> <p>b Linear regression and correlation coefficient Regression and prediction</p> <p>c. Rank correlation, Product-moment method</p> <p><b>Analysis of Variance and its interpretation</b></p> <p>a. One-factor analysis of variance</p> <p>b. Two-factor analysis of variance</p> <p><b>Design of Experiments</b></p> <p>a. Completely randomized design</p> <p>b. Randomized block design</p> <p>c. Latin square design</p> <p>d. Factorial design</p>
<b>Module 4(Credit 1) - Data Presentation and Research Proposal Preparation</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to

	1. Discuss the presentation of Data
	2. Prepare research proposal
<b>Content Outline</b>	<p><b>Presentation of Data</b></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, Graphs for nominal and ordinal data- pie diagram, bar graphs of different types, graphs for relation between two variables, line diagram. Use of illustrations</p> <p>Cautions in visual display of data</p> <p><b>The Research Report</b></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><b>Preparation of a Research Proposal</b></p>

### **Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

- Assignment on a standard normal curve
- Assignment on calculation of descriptive statistics
- Assignment to test the hypothesis
- Assignment on sample size calculation

### **Bibliography:**

- Banerje, B. (2018): Mahajan's Methods in Biostatistics for Medical Students and Research Workers, 9th edition, Jaypee Brothers
- Chowdhary, N. and Hussain, S. (2021): Handbook of Research and Publication Ethics, 1st edition, Bharti Publications
- Jain, R.K. (2021): Research Methodology: Methods & Techniques, 5th edition, Vayu Education of India VEI Publishers
- Kothari, C.R. and Gang, G. (2019): Research Methodology: Methods & Techniques, 4th edition, New Age International Publishers
- Nelson, M. (2020): Statistics in Nutrition & Dietetics, 1st edition, Wiley-Blackwell
- Ramalingam, A.T. and Kumar, SN. (2018): Essentials of Research Methodology, 1st edition, Jaypee Brothers

### 3.2 Major (Core):

<b>Course Title</b>	<b>Pediatric Nutrition</b>
<b>Subject Code</b>	<b>314412</b>
<b>Course Credits</b>	<b>4 (2 Th+2Pr)</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to
	1. Discuss the nutritional requirements at different stages from infancy through adolescence and the recommendations/guidelines of expert groups.
	2. Analyze the importance of nutritional care and nourishment of children with various ailments.
	3. Describe the specific needs of children and the effects of various diseases on nutritional status and nutritional requirements at these stages of the life cycle
	4. Plan appropriate nutritional care based on pathophysiology, prevention/ and treatment of the various diet-related disorders/ diseases
<b>Theory - Module 1(Credit 1) - Infant and Child Nutrition</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Relate to complementary feeding along with its concerns.
	2. Discuss the growth, development, body composition & nutritional guidelines at different stages.
<b>Content Outline</b>	<p><b>Infant and Young Child Feeding Practices Breast feeding:</b></p> <p>Composition of Human Milk, Recommendations, exclusive breastfeeding, prelacteal feeds, duration of breastfeeding, advantages of breast feeding, contraindications, types of Infant formulas.</p> <p>Complementary feeding, issues and concerns</p> <p>Growth, Development and Nutritional Requirements of Infants/Children/Adolescents</p> <p>Growth, development and body composition from infancy, preschool, childhood, puberty and adolescence</p> <p>Nutritional requirements at different stages of infancy, childhood and adolescence, factors influencing food intake, packed lunch</p>

	<p>Assessment of nutritional status and growth, growth charts and milestones</p> <p>Preterm/ VLBW infants – Complications, Role of parenteral and enteral nutrition (trophic feeds – gut priming)</p> <p>Undernutrition in childhood – PEM, FTT, SAM, Fe deficiency, Vitamin A deficiency – causes, consequences, management (in brief), Catch-up growth</p> <p>Over-nutrition - causes, consequences, management</p>
<b>Module 2(Credit 1) - Special Pediatric Nutrition</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Describe the nutritional requirements in management of special conditions
	2. Summarize food allergies
<b>Content Outline</b>	<p><b>Nutritional considerations for special conditions –</b></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 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, 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>
<b>Practical - Module 3(Credit 1) - Pediatric Nutrition Assessment</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Carry out pediatric nutritional assessments
	2. Plan dietary guidelines for infants, child and adolescence
<b>Content Outline</b>	<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 (Field work)



	<p><b>Normal nutrition for infants</b> – Guidelines on breastfeeding and complementary feeding. 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>
<b>Practical - Module 4(Credit 1) - Nutrition for PEM and Disorders</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Plan out nutritional guidelines for PEM, SAM cases
	2. Identify the feeding challenges for developmental disabilities
<b>Content Outline</b>	<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 - type 1 DM, nephrotic syndrome and CKD</p>

#### **Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

- Plotting of growth charts activity
- Nutritional assessment of children
- Preparing of ARF
- Preparation of complementary feeds

#### **Bibliography:**

- A. Catherine Ross , Benjamin Caballero Professor, Robert J. Cousins, Katherine L. Tucker : Modern Nutrition in Health & Diseases, 11<sup>th</sup> Edition (2020) Jones and Bartlett Publishers, Inc
- Escott-Stump, S. (2022): Nutrition and Diagnosis Related Care, 9th Edition, American Dietetic Association,U.S.
- Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10th Edition, Churchill Livingstone.
- Janice L Raymond, MS, RDN, CSG and Kelly Morrow, MS, RDN, FAND (2023): Krause’s Food Nutrition and Diet Therapy, 16th Edition, W.B. Saunders Ltd.

### 3.3 Major (Core)

<b>Course Title</b>	<b>Geriatric Nutrition</b>
<b>Subject Code</b>	<b>314413</b>
<b>Course Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to
	1. Discuss the multifaceted aspects of aging and specific needs of elderly
	2. Analyze the effects of various diseases on the nutritional status of the elderly
	3. Describe the nutritional requirements of the elderly and the recommendations/guidelines of expert groups
	4. Plan and recommend appropriate nutritional care based on pathophysiology, prevention/ and treatment of the various diet-related disorders/ diseases
<b>Theory - Module 1(Credit 1) - Physiological Changes in Aging</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Discuss the physiological and functional changes associated with ageing
	2. Determine the impact of these changes on nutritional status and nutrients requirements of the elderly
<b>Content Outline</b>	<p><b>The Ageing Process</b></p> <ul style="list-style-type: none"> <li>a. The Ageing Society- Global and Indian scenario</li> <li>b. Epidemiology</li> <li>c. Life Expectancy vs Life Span</li> <li>d. Usual vs Successful Ageing</li> </ul> <p><b>Changes associated with Ageing process</b></p> <ul style="list-style-type: none"> <li>a. Cellular aspects of ageing</li> <li>b. 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> </ul>

	<ul style="list-style-type: none"> <li>c. Functional manifestations of ageing: constipation, impaired fluid and electrolyte balance, altered thermoregulation, sleep disturbances</li> </ul>
<b>Module 2(Credit 1) - Aging Theories and Nutritional Needs</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Discuss the factors that influence the ageing process
	2. Describe the nutritional recommendations for the elderly and factors that influence their nutrient requirements
<b>Content Outline</b>	<p><b>Theories of Aging</b></p> <ul style="list-style-type: none"> <li>a. Common molecular theories of ageing and nutritional interventions</li> <li>b. Factors influencing ageing – endogenous and exogenous</li> </ul> <p><b>Nutritional Requirements and Recommendations</b></p> <ul style="list-style-type: none"> <li>a. Nutritional requirements –influencing factors and nutrient recommendations for senior citizens</li> <li>b. Benefits of calorie restriction and exercise</li> <li>c. Promoting successful ageing-traditional and modern methods</li> </ul>
<b>Module 3(Credit 1) - Age-Related Disorders and Nutrition</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Describe specific age related disorders and their nutritional care
	2. Summarize Drug-Nutrient Interactions
<b>Content Outline</b>	<p>Nutritional and health status of elderly: Factors influencing food consumption and nutritional status of elderly, Undernutrition in the Elderly – risk factors</p> <p>Common diseases in elderly: Etiopathogenesis, manifestations and interventions - 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>
<b>Module 4 (Credit 1) - Geriatric Nutrition Assessment and Care</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to

	1. Carry out geriatric nutritional assessment
	2. Plan out nutritional guidelines for elderly in health and sickness
<b>Content Outline</b>	<p>Assessment of geriatric nutritional status – mini nutrition index, assessment of frailty</p> <p>Policies and programmes of the government and NGO sector pertaining to the elderly</p> <p>Promoting fitness and well-being- use of various modern and traditional approaches</p>

### **Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

- Nutritional assessment of geriatric population
- Food Product development for elderly
- Measuring appetite/sleep index
- Assessment of fitness of elderly and suggest remedies

### **Bibliography:**

- Bagchi, K. & Puri, S. (Ed) (1999): Diet and Aging – Exploring Some Facets. Soc. For Gerontological Research, New Delhi and Help Age India, New Delhi.
- Bales, C.W., Locher, J.L., Saltzman, E. (2016): Handbook of Clinical Nutrition & Aging, 3rd edition, Humana Press
- Chaudhary, A. (Ed) (2001): Active Aging in the New Millennium, Pub. Anugraha, Delhi.
- Fauci, S.A. et al (2008): Harrison’s Principles of Internal Medicine, 17th Edition, McGraw Hill.
- Garrow, J.S., James, W.P.T. and Ralph, A. (2000): Human Nutrition and Dietetics, 10<sup>th</sup> Edition, Churchill Livingstone.
- Guyton, A.C. and Hall, J.E. (2020): Textbook of Medical Physiology, 3rd South Asia Edition, Elsevier Health Science
- Janice L Raymond, MS, RDN, CSG and Kelly Morrow, MS, RDN, FAND (2023): Krause’s Food Nutrition and Diet Therapy, 16th Edition, W.B. Saunders Ltd.
- Malavolta, M., Mocchegiani, E. (2016): Molecular Basis of Nutrition & Aging, 1st edition, Academic Press
- Sharma, O.P. (Ed.) (1999): Geriatric Care in India – Geriatrics and Gerontology: A Textbook, M/s. ANB Publishers.
- Williams, S.R. (2016): Basic Nutrition and Diet Therapy, 1st South Asia Edition, Elsevier India.

### 3.4 Major (Elective):

<b>Course Title</b>	<b>Nutrition in Critical Care</b>
<b>Subject Code</b>	<b>314414</b>
<b>Course Credits</b>	<b>2</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to
	1. Discuss the physiology, metabolism and special requirements of the critically ill patients.
	2. Identify the special nutritional support techniques and feeding formulations to meet nutritional needs of critically ill patients
<b>Theory - Module 1(Credit 1) - Nutritional Support in Critical Care</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Differentiate between different nutritional support systems, indications for use, their administration, and complications
	2. Describe the composition of different formulations used in enteral and parenteral nutrition
<b>Content Outline</b>	<p><b>Nutritional support systems and other life – saving measures for the critically ill:</b> 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> <ol style="list-style-type: none"> <li>a. Various sites for Enteral nutrition</li> <li>b. In brief, discussion on Ryle’s tube and its care</li> <li>c. Types of feeds, advantages and disadvantage of home-based feeds, Commercial formula feeds</li> <li>d. Incorporation of easily digestible foods</li> <li>e. Requirements of nutrients according to problems eg. Renal, respiratory etc</li> </ol> <p><b>Total Parenteral Nutrition:</b></p> <ol style="list-style-type: none"> <li>a. The importance of TPN</li> <li>b. Long term effect of its use</li> <li>c. Site of TPN and its care</li> <li>d. Composition</li> </ol> <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>

	<i>Evaluation: Market survey on availability, composition and price of EN and TPN formulations</i>
<b>Module 2(Credit 1) - Critical Illnesses and Nutrition</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Determine the pathophysiologic, metabolic and clinical aspects of various critical care conditions
	2. Discuss the specific nutritional requirements and management of the conditions
<b>Content Outline</b>	<p><b>Patho-physiological, clinical and metabolic aspects, special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses, nutritional screening and nutritional status assessment of the critically ill, recommendations and guidelines of expert groups, role of immune enhancers, conditionally essential nutrients:</b></p> <p>CV complications Stroke Respiratory failure Multi organ failure Hepatic failure Surgery and its complications Sepsis and burns</p> <p><i>Evaluation: Review of evidence – based guidelines for the above conditions</i></p> <p><i>Discussion and presentation on evidence-based guidelines</i></p>

### **Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

- Nutritional assessment of critical care patients.
- Product development for special conditions.
- Preparation of enteral nutrition feeds.
- Market survey of nutrition supplements.

### **Bibliography:**

- Dixit, S., Zirpe, K., Khatib, K., Joshi, A., Kulkarni, S. (2017): Principles in Critical Care Nutrition (ICSSM), 1st edition, Jaypee Brothers Medical Publishers
- Faber, P., Siervo, M. (2014): Nutrition in Critical Care, 1st edition, Cambridge University Press
- Janice L Raymond, MS, RDN, CSG and Kelly Morrow, MS, RDN, FAND (2023): Krause's Food Nutrition and Diet Therapy, 16th Edition, W.B. Saunders Ltd.
- Rajendram, R., Preddy, V.R., Patel, V.B. (2015): Diet and Nutrition in Critical Care, Volume 2, Springer-Verlag New York Inc.

- Shikora, S.A. and Blackburn, G.L. (Ed) (1999). Nutritional Support – Theory and Therapeutics, Chapman and Hall, ITP (International Thomson Publishing)
- Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (Ed) (2013): Modern Nutrition in Health and Disease, 11th Edition, Lippincott Williams and Wilkins
- Torosian, M. H. (editor) (1995) Nutrition for the Hospitalised Patient. Basic Science & Principles of Practice
- Zaloga, G.P. (1994): Nutrition in Critical Care, Times Mirror/Mosby

### 3.5.1 Major (Elective):

<b>Course Title</b>	<b>Functional Foods and Nutraceuticals</b>
<b>Subject Code</b>	<b>324421</b>
<b>Course Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to -
	1. Gain knowledge about functional foods and nutraceuticals along with their mode of action
	2. Describe the health effects of various functional foods and nutraceuticals
	3. Apply the principles of functional foods and nutraceuticals into practice
<b>Theory - Module 1(Credit 1) - Basics of Functional Foods and Nutraceuticals</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Define and classify functional foods / nutraceuticals
	2. Describe the health impact and mode of action of probiotics and prebiotics
<b>Content Outline</b>	<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>Metabolism of xenobiotics (review)</p> <p><b>Probiotics</b></p> <ol style="list-style-type: none"> <li>Taxonomy and important features of probiotic microorganisms</li> <li>Health effects of probiotics including mechanism of action.</li> <li>Probiotics in various foods: fermented milk products, non-milk products etc.</li> <li>Quality Assurance of probiotics and safety</li> </ol> <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> <ol style="list-style-type: none"> <li>Non-digestible carbohydrates/oligosaccharides</li> <li>Dietary fibre</li> <li>Resistant starch</li> </ol>



	d. Gums
<b>Module 2(Credit 2) - Health Benefits of Functional Foods</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Discuss the active biodynamic principles and physiological action of several classes of functional foods
	2. Describe their role in health promotion and disease risk reduction
<b>Content Outline</b>	<p><b>Potential health benefits of the following functional foods:</b>  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:</p> <ol 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>Organosulphur compounds</li> <li>Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins</li> </ol>
<b>Module 3(Credit 1) - Effects of Nutrients and Spices on Health</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Identify non- nutrient effects of specific nutrients
	2. Describe the active biodynamic principles and health effects of various spices and condiments
<b>Content Outline</b>	<p><b>Non- nutrient effect of specific nutrients:</b>  Proteins, Peptides and nucleotides, Conjugated linoleic acid and n3 fatty acids, Vitamins and Minerals</p> <p><b>Active biodynamic principles in spices, condiments and other plant materials and their evidence based effects</b></p>

### Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):

- Market survey of Indian nutraceuticals.
- Write review paper on spices and condiments used as nutraceuticals.
- Assignment on medicinal herbs and their functional properties.

### Bibliography:

- A. Catherine Ross , Benjamin Caballero Professor, Robert J. Cousins, Katherine L. Tucker : Modern Nutrition in Health & Diseases, 11<sup>th</sup> Edition (2020) Jones and Bartlett Publishers, Inc
- Agarwal, A. and Udipi, S. (2022): Textbook of Human Nutrition, 2nd edition, Jaypee Brothers Medical Publishers
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### 3.5.2 Major (Elective):

<b>Course Title Subject Code</b>	<b>Drug Nutrient Interaction 324422</b>
<b>Course Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to -
	1. Define medication interactions with nutrients and Drug reaction and disposition
	2. Elucidate how medications affect nutritional status and how food
	3. Understand the drug and nutrient interactions at different stages of life
	4. Understand the drug and nutrient interactions in different disease conditions or treatment
<b>Module 1 (Credit 1) - Drug-Nutrient Interaction Basics</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to -
	1. Classify the drugs and drug-nutrients
	2. Understand drug-nutrient interactions
<b>Content Outline</b>	<b>Introduction to Drug-Nutrition Interactions and the Impact of Nutritional status on drug disposal and its outcome</b>  a. Introduction and Classification of Drug-Nutrient Interactions b. Drug Reaction and Disposition c. Drug Transporters d. Drug-Metabolizing Enzymes e. Nutrient Disposition and Response
<b>Module 2 (Credit 1) - Food Impact on Drug Metabolism</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to -
	1. Comprehend drug metabolism
	2. Understand the influence of food and dietary components on drugs
	3. Associate the effects of drugs on food intakes

<b>Content Outline</b>	<b>Food Nutrients or Supplements' Impact on Drug Disposal and Impact</b> <ol style="list-style-type: none"> <li>a. Drug Absorption with Food</li> <li>b. Effects of Specific Foods and Dietary Components on Drug Metabolism</li> <li>c. Food's Effect on Drug Absorption, Drug Transport, Drug Metabolism, Drug Utilization, Drug Excretion</li> <li>d. Drug Effects on Food Intake</li> <li>e. Positive Drug-Nutrient Interactions</li> <li>f. Drug-Induced Changes to Nutritional Status</li> <li>g. Influence of Protein-Calorie Malnutrition on Medication</li> <li>h. Influence of Overweight and Obesity on Medication</li> <li>i. Interaction of Natural Products with Medication and Nutrients</li> </ol>
<b>Module 3 (Credit 1) - Life Stage Drug-Nutrient Interactions</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to -
	1. Understand the drug nutrient interactions in different stages of life.
<b>Content Outline</b>	<b>Drug Nutrient Interaction in Different Life Stages</b> <ol style="list-style-type: none"> <li>a. Drug-Nutrient Interactions in Infancy and Childhood</li> <li>b. Drug-Nutrient Interaction Considerations in Pregnancy and Lactation</li> <li>c. Drug-Nutrient Interactions in the Elderly</li> </ol>
<b>Module 4 (credit 1) - Drug-Nutrient Interactions in Diseases</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to -
	1. Understand the drug nutrient interactions in specific medical conditions
<b>Course Content</b>	<b>Drug Nutrient Interaction In Specific Conditions</b> Drug-Nutrient Interactions in <ol style="list-style-type: none"> <li>a. Patients Receiving Enteral Nutrition</li> <li>b. Patients Receiving Parenteral Nutrition</li> <li>c. Immune Function</li> <li>d. Cancer</li> <li>e. Transplantation</li> <li>f. Chronic Infections</li> </ol>

**Assignments/Activities towards Comprehensive Continuous Evaluation (CCE):**

1. Methods to lower the Risk of Drug-Nutrient Interactions
2. Drug Nutrient Interaction in Neuro-psychological conditions
3. Drug classification and mechanism of action
4. Contraindications of Ayurvedic, Allopathic and Homeopathic medications

## **Bibliography:**

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### 3.5 Research Project

<b>Course Title</b>	<b>Research Project</b>
<b>Subject Code</b>	<b>354431</b>
<b>Course Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to
	1. Demonstrate mastery of parametric and non-parametric statistical tests through application in data analysis.
	2. Evaluate and critique quantitative analysis methods, demonstrating proficiency in interpreting large and small sample tests for inferential statistics.
	3. Synthesize advanced statistical techniques such as chi-square tests, correlation, and regression to analyze complex datasets and draw meaningful conclusions.
	4. Construct comprehensive research proposals, integrating data presentation techniques and discussing experimental designs with clarity and precision
<b>Module 1(Credit 1) - Formulation of problem</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Recognize and undertake research problem.
<b>Content Outline</b>	<ul style="list-style-type: none"> <li>• Identifying research gaps and formulating research questions.</li> <li>• Sources of research problems (literature, real-world issues, academic curiosity).</li> <li>• Techniques for developing research questions.</li> <li>• Writing clear and measurable research objectives.</li> </ul>
<b>Module 2(Credit 2) - Review of Literature</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Review the existing literature
<b>Content Outline</b>	<ul style="list-style-type: none"> <li>• Conducting comprehensive literature searches using databases and other resources.</li> <li>• Evaluating and selecting relevant literature.</li> <li>• Organizing literature into themes and developing a theoretical framework.</li> <li>• Writing a coherent and critical literature review.</li> </ul>
<b>Module 3(Credit 1) - Designing Research proposal</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Apply critical thinking to the problem selected for research

<b>Content Outline</b>	<ul style="list-style-type: none"> <li>• Components of a research proposal (title, abstract, introduction, etc.).</li> <li>• Selecting appropriate research design (exploratory, descriptive, experimental).</li> <li>• Methodology: data collection methods and sampling techniques.</li> <li>• Writing and structuring the research proposal.</li> </ul>
<b>Module 4 (Credit 1) - Planning tools &amp; techniques for data collection</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	1. Able to design the research work and plan the execution.
<b>Content Outline</b>	<ul style="list-style-type: none"> <li>• Use Gantt charts, timelines, and milestones for project planning and resource allocation.</li> <li>• Address ethical considerations, including obtaining informed consent.</li> <li>• Conduct data collection through surveys, interviews, and observations, ensuring ethical guidelines.</li> <li>•</li> </ul>

#### **Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

- **Module 1:** Continuous assessment involves monitoring students' ability to identify research gaps, formulate clear research questions, and articulate measurable research objectives.
- **Module 2:** Assess students' proficiency in conducting comprehensive literature searches, evaluating and synthesizing relevant literature, and developing a coherent theoretical framework for their research.
- **Module 3:** Evaluate students' application of critical thinking in selecting appropriate research designs, developing methodologies for data collection, and structuring a research proposal effectively.
- **Module 4:** Assess students' competence in using planning tools like Gantt charts for project management, addressing ethical considerations in data collection, and applying qualitative and quantitative analysis methods to interpret research findings.

## Semester IV

### Syllabus Contents

#### 4.1 Major (Core)

<b>Course Title</b>	<b>Nutrigenetics And Nutrigenomics</b>
<b>Subject Code</b>	<b>414411</b>
<b>Course Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to <ol style="list-style-type: none"><li>1. Analyze the genetic components involved in human nutrition</li><li>2. Correlate nutrition with genetics.</li><li>3. Tailor the dietetic advice to patients based on nutrigenetics and counsel the patient.</li></ol>
<b>Module 1 (Credit 1) - Introduction to Human Genetics</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to <ol style="list-style-type: none"><li>1. Describe the basics of genetics and the normal physiology of DNA</li><li>2. Identify diseases with genetic inheritance patterns</li></ol>
<b>Content Outline</b>	<b>Introduction to Human Genetics</b> <ul style="list-style-type: none"><li>▪ Definition of gene, genome, DNA, allele, chromosome. Mitosis and Meiosis.</li><li>▪ Mendelian Principles- Chromosome Theory of Heredity (Sutton-Boveri), Inheritance patterns, the phenomenon of Dominance, Recessive, and Codominance.</li><li>▪ Inheritance patterns in Humans (Sex-linked, Autosomal, Mitochondrial, Unifactorial, Multi-factorial).</li><li>▪ Molecular effects of genetic variation- polymorphism, genetic linkage- linkage disequilibrium, haplotype, copy number variants, and mutations. Hardy-Weinberg equilibrium. Gene nomenclature</li></ul>
<b>Module 2 (Credit 1) - Introduction to Nutrigenetics and Nutrigenomics</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to <ol style="list-style-type: none"><li>1. Describe the history of genetics in nutrition</li><li>2. Analyze the relationship between nutrition, environment and genomics</li><li>3. Discuss the interactions of epigenetic changes and nutrient components</li></ol>
<b>Content Outline</b>	<b>Introduction to Nutrigenetic and Nutrigenomics</b> <ul style="list-style-type: none"><li>• Introduction to Epigenomics, Molecular mechanisms of Epigenomics, Epigenomics and Nutrition (Molecular bases of gene-gene and gen-environment interaction), Epigenomics and disease,</li><li>• What is Nutrigenetics and Nutrigenomics? How are they different from each other? Nutrigenomic interactions [direct and indirect method].</li><li>• History of Nutrigenetics- Phenylketonuria, MTHFR genes, Where Nutrigenetics differences comes from- Nutritional Relativism, Nutrigenetics and the early life origins of health and diseases.</li></ul>



<b>Module 3 (Credit 1) - Nutrigenetics and Nutrigenomics of Metabolic Health</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	<ol style="list-style-type: none"> <li>1. Examine the genetics of obesity and metabolic health</li> <li>2. Evaluate the influence of genes on response to dietary interventions</li> </ol>
<b>Content Outline</b>	<b>Nutrigenetics and Nutrigenomics of Metabolic Health</b> <ul style="list-style-type: none"> <li>• Brief Overview of lipid metabolism</li> <li>• Genetic disorders of lipid metabolism</li> <li>• SNPs associated with Lipid profile – ABCG8, CELSR, LDLR, ABCA1, CETP, APOA1, APOA5, GCKR gene.</li> <li>• Genomics of eating behaviour and appetite regulation (HPA, serotonin)</li> <li>• Genetics of body composition; from obesity to extreme leanness, Genetic implication of energy homeostasis, Genetic variation with influence on the individualized response to weight loss diet: FTO Gene as evident, Genetics variation with influence on the individualized body fat percentage: ADRB3, BDNF, FTO, MC4R, SH1B2, TMEM18.</li> <li>• Nutrient-gene interaction studies, lifestyle intervention studies</li> </ul>
<b>Module 4 (Credit 1) - Effective Health Coaching and Nutrigenetic Counseling</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to
	<ol style="list-style-type: none"> <li>1. Counsel patients effectively based on the principles of nutrigenetics</li> </ol>
<b>Content Outline</b>	<b>Effective Health Coaching and Nutrigenetic Counselling</b> <ul style="list-style-type: none"> <li>• Conducting health history questionnaires, health goals, identifying physiological parameters that are essential for the ideal diet planning</li> <li>• Purpose of Effective Counselling, explain Nutrigenetic recommendations and diet plan, Planning the grocery list.</li> </ul>

### **Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

1. Review current ICMR/NIN guidelines for diet in adults
2. Report on factors affecting genetic changes and epigenetics
3. Formation of a health assessment questionnaire focusing on nutrigenetics.
4. Role play of effective nutrigenetic counselling

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## 4.2 Major (Core)

<b>Course Title</b>	<b>NUTRITION, DIET AND MICROBIOME</b>
<b>Subject Code</b>	<b>414412</b>
<b>Course Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to <ol style="list-style-type: none"> <li>1. Elaborate on the field of human microbiome in health</li> <li>2. Discuss the role of human microbiome in health and disease.</li> <li>3. Apply the concepts of microbiology in dietetic practice</li> </ol>
<b>Module 1(Credit 1) - Introduction to Human Microbiome</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to <ol style="list-style-type: none"> <li>1. Elaborate on the importance of human microbiome</li> <li>2. Illustrate the stages of microbiome development</li> </ol>
<b>Content Outline</b>	<b>Introduction to Human Microbiome</b> <ul style="list-style-type: none"> <li>• Various microbes in human body</li> <li>• Importance of microbiome in human health</li> <li>• Microbiota development in all organ systems (microbiota in different niches like respiratory tract, gut microbiota, vaginal and reproductive tract etc.)</li> <li>• Life changing events and personal microbiota development.</li> </ul>
<b>Module 2 (Credit 1) - Human Microbiome Across the Lifespan</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to <ol style="list-style-type: none"> <li>1. Illustrate the relationship between microbiome and immunity</li> <li>2. Justify the role of microbiome in healthy ageing</li> </ol>
<b>Content Outline</b>	<b>Human Microbiome Across the Lifespan</b> <ul style="list-style-type: none"> <li>• Microbiota development in all epochs of life</li> <li>• Role of microbiota in aging including healthy aging and role in longevity and ageing related diseases</li> <li>• Role of microbiota in infancy and childhood immunity</li> </ul>
<b>Module 3 (Credit 1) - Microbiota in Diet and Disease</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to <ol style="list-style-type: none"> <li>1. Review the significance of microbiome in specific diseases</li> <li>2. Design therapies for healthy microbiome</li> </ol>
<b>Content Outline</b>	<b>Microbiota in Diet and Disease</b> <ul style="list-style-type: none"> <li>• Obesity</li> <li>• Malabsorption syndrome</li> <li>• SIBO</li> <li>• GI Cancers</li> <li>• IBD/IBS</li> <li>• GI Surgery</li> </ul> <b>Microbial therapies and diagnostics and personalized therapies</b>
<b>Module 4 (Credit 1) - Applicability and Societal Impact</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to <ol style="list-style-type: none"> <li>1. Associate microbiome with medical therapy</li> <li>2. Practice the use of metagenome and other genome data sets</li> </ol>
<b>Content Outline</b>	<b>Applicability and Societal Impact</b>

	<ul style="list-style-type: none"> <li>• Role and applicability of microbiome in pharmacy and medical therapy</li> <li>• Approaches to study the Microbiome in healthy and diseased states using data sets like metagenome transcriptome genome and other omics approaches.</li> </ul>
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**Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

1. Enlist the significant microbes in health and disease
2. Conduct a market survey of nutraceuticals containing microbes
3. Design audio visual aids to illustrate microbiome development.

**Bibliography:**

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### 4.3 Major (Core)

<b>Course Title</b>	<b>DIETETIC TECHNIQUES AND PATIENT COUNSELLING</b>
<b>Subject Code</b>	<b>414413</b>
<b>Course Credits</b>	<b>4 (2 credits theory + 2 credits practical)</b>
<b>Course Outcomes</b>	<p>After going through the course, learners will be able to</p> <ol style="list-style-type: none"> <li>1. Elaborate the principles and procedures of nutrition counseling and the role of the counselor.</li> <li>2. Discuss (a) lifestyles influence health and well-being; (b) acute and chronic disease affects the emotional and psychological state and the behavior of the individuals.</li> <li>3. Counsel patients using various techniques.</li> <li>4. Apply various types and techniques of counseling to motivate patients to achieve well-being.</li> </ol>
<b>Module 1 (Credit 1) (Theory) - Introduction to Counseling</b>	
<b>Learning Outcomes</b>	<p>After learning the module, learners will be able to</p> <ol style="list-style-type: none"> <li>1. Elaborate on effective counselling and the role of counsellor</li> <li>2. Practice patient evaluation and realistic goal setting</li> </ol>
<b>Content Outline</b>	<p><b>Introduction to Counselling</b>  Counselling – Definition, Expectations, goals, scope and limits.  Counsellor – Characteristics of an effective counselor  The Client – Characteristics, expectations  The Counselling Process:  Techniques for obtaining relevant information</p> <ul style="list-style-type: none"> <li>• Clinical Information</li> <li>• Medical History and General Profile</li> <li>• Dietary Diagnosis</li> <li>• Assessing food and nutrient intakes</li> <li>• Lifestyles, physical activity, stress</li> <li>• Nutritional Status</li> <li>• Correlating relevant information and identifying areas of need</li> </ul> <p>Stage I: Problem exploration and clarification  Stage II: Developing new perspectives and setting goals</p> <ul style="list-style-type: none"> <li>• Stage III: Implementation follow up and evaluation</li> </ul>
<b>Module 2 (Credit 1) (Theory) - Counseling Techniques</b>	
<b>Learning Outcomes</b>	<p>After learning the module, learners will be able to</p> <ol style="list-style-type: none"> <li>3. Apply the various counselling techniques</li> <li>4. Conduct individual and group counselling</li> </ol>
<b>Content Outline</b>	<ul style="list-style-type: none"> <li>• <b>Counselling Theories and Approaches: Key Concepts and Techniques</b></li> </ul> <p>Counselling techniques, strategies and communication skills  Rapport building and opening techniques  Questioning, listening, reflecting, acceptance, silence, leading reassurance, non-verbal behaviour, terminating skills.</p> <ul style="list-style-type: none"> <li>• <b>Group Counselling</b></li> </ul>
<b>Module 3 (Credit 1) (Practical) - Education Resource Development</b>	
<b>Learning Outcomes</b>	<p>After learning the module, learners will be able to</p> <ol style="list-style-type: none"> <li>1. Design auditory and visual resources for nutrition education</li> </ol>
<b>Content Outline</b>	<b>Developing resources and aids for education and counseling</b>

<b>Module 4 (Credit 1) (Practical) - Patient Counseling in Clinical Settings</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to 1. Counsel hospitalized patients for nutrition therapy
<b>Content Outline</b>	<ul style="list-style-type: none"> <li>• <b>Working with:</b> <ol style="list-style-type: none"> <li>1. Hospitalised patients (adults, pediatric, elderly, handicapped), adjusting and adopting to individual needs</li> </ol>           Outpatients (adults, pediatric, elderly, handicapped), patients' education, techniques and modes         </li> <li>• <b>Follow up Monitoring and Evaluation of outcome: Home visits.</b></li> </ul>

**Activities towards Comprehensive Continuous Evaluation (CCE):**

1. Role play between dietitian and client/patient in an OPD/clinic setting
2. Plan creative resources for nutritional education
3. Visit to hospital.

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#### 4.4.1 Major (Elective)

<b>Course Title</b>	<b>PRINCIPLES OF AYURVEDIC DIETETICS (TH.)</b>
<b>Subject Code</b>	<b>424411</b>
<b>Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to:
	<ol style="list-style-type: none"> <li>1. Discuss the Ayurvedic concepts of food and nutrition</li> <li>2. Acquire skills to correlate the interrelationships of food science, human nutrition and Ayurvedic principles for public health.</li> <li>3. Develop better diet planning skills for various stages of life and diseases integrating Ayurvedic knowledge with Modern Dietetics/Medical Nutrition Therapy</li> <li>4. Contribute towards healthy human society.</li> </ol>
<b>Module 1 (Credit 1) - Ayurvedic Perspectives of Health</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to:
	<ol style="list-style-type: none"> <li>1. Explore the philosophy about Health in both traditions and modern systems of medicine, identify areas for integration and the lessons that can be learned and integrated into modern dietetic practices</li> <li>2. Discuss Prakriti and its implications for dietetic practice and dietary recommendations</li> <li>3. Assess Prakriti using validated tools</li> </ol>
<b>Content outline</b>	<b>Ayurvedic Perspectives of Health</b> <ul style="list-style-type: none"> <li>• Health in Traditional Health Care System and Modern Sciences</li> <li>• Ayurvedic Perspective of Health to Diseases Continuum</li> <li>• Ayurvedic Fundamentals: <i>Tridosh Siddhant</i> and <i>Samanya Vishesh Siddhant</i></li> <li>• Constitution of Body and its Constituents: Ayurvedic and Current Perspective of Physiology and Metabolism</li> <li>• Prakriti and its Determinants</li> <li>• Prakriti in Health and Disease: Ayurvedic Perspective</li> </ul>
<b>Module 2 (Credit 1) - Concept of Agni and Digestion</b>	
<b>Learning Outcomes</b>	After learning this module, learners will be able to:
	<ol style="list-style-type: none"> <li>1. Elaborate the concept of Agni, digestion and correlate these with modern concepts including gut microbiome, its role in health and disease</li> <li>2. Incorporate the Ayurvedic principles for daily diet and seasonal (<i>Ritu</i>) regimes and in dietetic practice for health and well-being</li> </ol>
<b>Content Outline</b>	<b>Concept of Agni and Mahasrotas</b> <ul style="list-style-type: none"> <li>• Agni in Ayurveda and its relation to Health and Diseases</li> <li>• Concordance between Ayurvedic Concepts of Agni and Molecular Nutrition</li> <li>• <i>Concept of Ojas</i></li> <li>• Microbiome and its Role in Health</li> <li>• Concepts of Digestion in Ayurveda</li> <li>• AharvidhiVisheshayatana</li> <li>• Daily Diet and Seasonal Regimes</li> </ul>

<b>Module 3 (Credit 1) - Ayurvedic Food Classification</b>	
<b>Learning Outcomes</b>	After learning this module, learners will be able to: <ol style="list-style-type: none"> <li>1. Classify foods as per the Ayurvedic principles</li> <li>2. Integrate the Ayurvedic principles of <i>Pathya Apathya</i> and <i>ViruddhaAnna</i> in dietetic practice for health and well-being</li> <li>3. Incorporate the concepts of <i>Langhan and rasayana</i> into dietetic prescriptions for patient health and well-being</li> </ol>
<b>Content Outline</b>	<b>Poshan and Ahar: Compatibility and Langhan</b> <ul style="list-style-type: none"> <li>• Classification of food material as per Classical Ayurvedic Texts</li> <li>• Ayurvedic Properties of food material</li> <li>• <i>Pathyapathya</i></li> <li>• <i>Viruddha Anna</i></li> <li>• Concept of Fasting and its applications in Ayurveda</li> <li>• Caloric Restrictions and Types of Diet</li> <li>• Healthy Ageing &amp; Rasayana</li> </ul>
<b>Module 4 (Credit 1) - Ayurvedic Food Properties and Sensory Evaluation</b>	
<b>Learning Outcomes</b>	After learning this module, learners will be able to: <ol style="list-style-type: none"> <li>1. State the terminologies used to describe the properties Ayurvedic classification of foods and the properties ascribed to them</li> <li>2. Describe the Ayurvedic concept of taste, their functions and relevance to health</li> <li>3. Elaborate the concordance with modern food science and sensory evaluation science and know the differences</li> <li>4. Apply the knowledge about <i>Sanskar (Ayurvedic perspective)</i> and modern understanding of Food Processing and Food Science and their effects on foods and their properties and use the knowledge in dietary prescriptions</li> </ol>
<b>Content Outline</b>	<b>Poshan and Ahar: Dravyaguna Aspect</b> <ul style="list-style-type: none"> <li>• Terminology used in Ayurveda to describe properties of food material: <i>Dravya, Guna, Karma, Rasa, Veerya, Vipak, Prabhav</i></li> <li>• Concept of Taste, functions and relation to health</li> <li>• Taste Receptors and Food Science</li> <li>• Sanskar vis a vis Food Processing</li> <li>• Modern Nutrition &amp; Dietetics</li> <li>• Ayurvedic Properties of Food Material: <i>Dravyaguna</i></li> </ul>

**Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

1. Conduct *prakriti* assessment using standard tools
2. Develop recipes based on Ayurvedic principles of food

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- Mann, J., & Truswell, A. S. (Eds.). (2017). Essentials of human nutrition. Oxford University Press.

#### 4.4.2 PUBLIC HEALTH AND NUTRITION

<b>Course Title</b>	<b>PUBLIC HEALTH AND NUTRITION</b>
<b>Subject Code</b>	<b>424412</b>
<b>Course Credits</b>	<b>4</b>
<b>Course Outcomes</b>	After going through the course, learners will be able to <ol style="list-style-type: none"> <li>1. Develop a holistic knowledge base and understanding of the nature of important nutritional problems and their prevention and control for the disadvantaged and upper socio-economic strata in society</li> <li>2. Discuss the causes /determinants and consequences of nutritional problems in society</li> <li>3. Identify the various approaches to nutrition and health interventions, programmes and policies.</li> </ol>
<b>Module 1 (Credit 1) - Introduction to Public Health Nutrition</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to <ol style="list-style-type: none"> <li>1. Explore the domain of public health nutrition</li> <li>2. Discuss food and nutrition security in India</li> </ol>
<b>Content Outline</b>	<ul style="list-style-type: none"> <li>• <b>Concept of public nutrition</b> <ol style="list-style-type: none"> <li>a. Relationship between health and nutrition</li> <li>b. Role of public nutritionists in the health care delivery               <ul style="list-style-type: none"> <li>• <b>Sectors and Public Policies relevant to nutrition and health.</b></li> <li>• <b>Primary Health Care of the Community</b> <ol style="list-style-type: none"> <li>a. National Health Care Delivery System</li> <li>b. Determinants of Health Status</li> <li>c. Indicators of Health                   <ul style="list-style-type: none"> <li>• <b>Population Dynamics</b> <ol style="list-style-type: none"> <li>a. Demographic transition</li> <li>b. Population structure</li> <li>c. Fertility behavior</li> <li>d. Population policy</li> <li>e. Fertility</li> <li>f. Interrelationship between Nutrition and Quality of Life                   <ul style="list-style-type: none"> <li>• <b>Food and Nutrition Security</b> <ol style="list-style-type: none"> <li>a. Food production                   <ol style="list-style-type: none"> <li>i. Access</li> <li>ii. Distribution</li> <li>iii. Availability</li> <li>iv. Losses</li> <li>v. Consumption</li> </ol> </li> <li>b. Food Security</li> <li>c. Socio-cultural aspects and Dietary Patterns: Their implications for Nutrition and Health</li> </ol> </li> </ul> </li> </ol> </li> </ul></li></ol> </li> </ul></li></ol> </li> </ul>
<b>Module 2 (Credit 1) - Nutritional Status and Problems</b>	
<b>Learning Outcomes</b>	After learning the module, learners will be able to <ol style="list-style-type: none"> <li>1. Analyze the determinants of nutritional status</li> <li>2. Discuss the occurrence and therapies of nutritional problems</li> </ol>
<b>Content Outline</b>	<ul style="list-style-type: none"> <li>• <b>Nutritional Status</b> <ol style="list-style-type: none"> <li>a. Determinants of nutritional status of individual and populations</li> <li>b. Nutrition and Non-nutritional indicators               <ol style="list-style-type: none"> <li>i. Socio-cultural</li> <li>ii. Biologic</li> <li>iii. Environmental</li> </ol> </li> </ol> </li> </ul>

	<p>iv. Economic</p> <p>c: Assessment of nutritional status of individuals of different ages- MUAC, Weight for age, Height for age, Weight for height, Ponderal index, BMI</p> <p>Applications and limitations in different field situations- choice of an indicator</p> <ul style="list-style-type: none"> <li>• <b>Major Nutritional Problems</b> – etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: <ul style="list-style-type: none"> <li>a. Macro and micro nutrient deficiencies</li> <li>b. Other nutritional problems like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis.</li> <li>c. Overweight, obesity and chronic degenerative diseases</li> </ul> </li> </ul>
<b>Module 3 (Credit 2) - Strategies and Health Economics</b>	
<b>Learning Outcomes</b>	<p>After learning the module, learners will be able to</p> <ol style="list-style-type: none"> <li>1. Develop strategies for improvement of nutritional status</li> <li>2. Correlate public nutritional concerns with health economics</li> </ol>
<b>Content Outline</b>	<p><b>Approaches and Strategies for improving nutritional status and health:</b></p> <ol style="list-style-type: none"> <li>a. National Food, Nutrition and Health Policies <ul style="list-style-type: none"> <li>- Plan of action and programmes</li> </ul> </li> <li>b. Programmatic options- their advantages and demerits. <ol style="list-style-type: none"> <li>i. Feasibility</li> <li>ii. Political support</li> <li>iii. Available resources (human, financial, infrastructural)</li> </ol> </li> <li>c. Case studies of selected strategies and programmes: their rationale and context, how to select interventions from a range of possible options:</li> <li>d. Health-based interventions, Food-based interventions including fortification and genetic improvement of foods, supplementary feeding, Nutrition education for behaviour change.</li> </ol> <ul style="list-style-type: none"> <li>• <b>Health economics and economics of malnutrition</b> <ol style="list-style-type: none"> <li>a. Its impact on productivity and national development</li> <li>b. Cost-Benefit <ol style="list-style-type: none"> <li>i. Cost effectiveness</li> <li>ii. Cost efficiency</li> </ol> </li> </ol> </li> </ul>

**Assignments / Activities towards Comprehensive Continuous Evaluation (CCE):**

1. Assessment of nutritional status of adults in community
2. Develop cost effective recipes for micronutrient deficiencies
3. Plan an outreach programme for nutritional awareness

**Bibliography:**

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#### 4.5 DISSERTATION

<b>Course Title</b>	<b>Dissertation</b>	
<b>Subject Code</b>	<b>454431</b>	
<b>Course Credits</b>	<b>6</b>	
<b>Sr. No.</b>	<b>Modules and Outcomes</b>	<b>Course Contents</b>
<b>Course Outcomes:</b>	<p>At the end of this course Learners will be able to –</p> <ul style="list-style-type: none"> <li>- Demonstrate mastery of parametric and non-parametric statistical tests through application in data analysis.</li> <li>- Evaluate and critique quantitative analysis methods, demonstrating proficiency in interpreting large and small sample tests for inferential statistics.</li> <li>- Synthesize advanced statistical techniques such as chi-square tests, correlation, and regression to analyze complex datasets and draw meaningful conclusions.</li> <li>- Construct an argument based on their prior research proposal, integrating data analysis and presentation techniques and drawing summary and conclusion with clarity and precision.</li> </ul>	
	<p><b>Data collection/ analysis</b></p> <ul style="list-style-type: none"> <li>• Gather and finalize any remaining data required for the dissertation.</li> <li>• Ensure all data is complete, validated, and ready for analysis.</li> <li>• Conduct final data analysis using appropriate statistical methods.</li> <li>• Validate findings and ensure they align with research objectives and hypotheses.</li> </ul>	
	<p><b>Finalization of chapters of Introduction &amp; Methodology</b></p> <ul style="list-style-type: none"> <li>• Review and finalize the introduction chapter, providing a clear rationale and background for the study.</li> <li>• Refine the methodology chapter, detailing the research design, sampling methods, and data collection procedures.</li> <li>• Ensure all methodological aspects are well-documented and align with the research questions.</li> <li>• Incorporate any feedback or suggestions to enhance the clarity and coherence of these chapters.</li> </ul>	
	<p><b>Finalization of Results and Discussion</b></p> <ul style="list-style-type: none"> <li>• Analyse and interpret the final results obtained from the data analysis.</li> <li>• Present findings in a clear and structured manner, using tables, graphs, and figures as needed.</li> <li>• Discuss the implications of the results in relation to the research questions and existing literature.</li> <li>• Address any unexpected findings or limitations and provide possible explanations.</li> </ul>	
	<p><b>Finalization of Summary and Conclusion</b></p> <ul style="list-style-type: none"> <li>• Summarize the key findings of the dissertation in the summary chapter.</li> <li>• Discuss the significance of the findings and their contributions to the field of study.</li> <li>• Revisit the research objectives and evaluate whether they have been met.</li> </ul>	

	<ul style="list-style-type: none"> <li>• Craft a well-rounded conclusion that reflects on the overall research journey and its implications.</li> </ul>
	<p><b>Approval of final draft of the dissertation and research article</b></p> <ul style="list-style-type: none"> <li>• Submit the final draft of the dissertation to the academic advisor or committee for review and approval.</li> <li>• Address any feedback or revisions requested by the advisor or committee to ensure the dissertation meets academic standards.</li> <li>• Simultaneously, students will prepare a research article based on their dissertation findings for submission to an international journal of high repute.</li> <li>• The article should be structured according to the journal's guidelines, emphasizing the novelty, significance, and implications of the research</li> </ul>
	<p><b>Submission of dissertation and Viva voce</b></p> <ul style="list-style-type: none"> <li>• Submit the approved dissertation to the academic institution by the specified deadline.</li> <li>• Ensure the dissertation adheres to all formatting and documentation requirements for final submission.</li> <li>• Concurrently, students will finalize the research article based on their dissertation findings for submission to the international journal.</li> <li>• Prepare for the viva voce (oral defense) examination, which includes defending both the dissertation and the research article before a panel of examiners.</li> <li>• Demonstrate in-depth knowledge, critical thinking, and the ability to articulate and defend research findings during the viva voce.</li> </ul>

**Dissertation Assessment Template:**

INTERNAL ASSESSMENT <b>(25)</b>			<b>TOTAL Marks Obtained</b>
	Proposal (15)		
	Understanding of concept & Execution (10)		
<b>TOTAL Marks out of 25</b>			
INTERNAL ASSESSMENT <b>(25)</b>	<b>(A) General</b>		
	Punctuality, Sincerity, Perseverance, Commitment, Attitude		
	<b>TOTAL</b>	<b>Out of 15</b>	
	<b>(B) Skills</b>		
	Use of Resources, Literature, Use of Technology, Communication, Any other		
	<b>TOTAL</b>	<b>Out of 10</b>	
<b>TOTAL Marks (by the internal supervisor) out of 50</b>			
		INTERNAL EXAMINER	EXTERNAL EXAMINER
JOINT ASSESSMENT <b>(100)</b>	Dissertation (50)		
	Viva Voce (50)		
	<b>TOTAL</b>		
	TOTAL (Average of the two)		
<b>OVERALL TOTAL (OUT OF 150)</b>			