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*
Semester I						
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	-
124411/ 124412/ 124413	*Introduction to Entrepreneurship / Clinical Diagnostics/ Advanced Nutrition I (Macronutrients & Water)	Major (Elective)	4	100	50	50
134411/ 134431	Research Methodology (MSc) / Project in Dietetics (PGD)	Minor Stream (RM)	4	100	50	50
End of Semester I			**22**	**550**	**300**	**250**
Semester II						
214411	Advanced Nutrition II (Micronutrients)	Major (Core)	4 (2 + 2)	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	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
Exit with PG Diploma in Dietetics (* recommend to undertake 6 months' internship)			**22**	**550**	**300**	**250**

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

Year II

Sr.No.	*Courses*	*Type of Course*	*Credits*	*Marks*	*Int*	*Ext*
Semester III						
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	50	0
324421/ 324422	Functional Foods and Nutraceuticals / Drug Nutrient Interaction	Major (Elective)	4	100	50	50
354431	Research Project	RP	4	100	50	50
End of Semester III			**22**	**550**	**300**	**250**
Semester IV						
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	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
End of Semester IV			**22**	**550**	**300**	**250**

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

**Minor project or Applied Food Science and Product Modification will be done in groups.

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

Course Syllabus

Semester III

3.1 Major (Core):

Course Title **Subject Code**	**Statistical Application in Research** **314411**
Course Credits	**4**
Course Outcomes	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
Module 1 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Analyze parametric and non-parametric test
	2. Apply the statistical programs for data management
Content Outline	**Introduction to Statistics** Definition, conceptual understanding of statistical measures, popular concepts and misuse of statistics **Normal Distribution and its Properties** a. Normal distribution b. Binomial distribution c. Probability, use of normal probability tables, area under normal distribution curve d. Parametric and non-parametric tests **Data Management** Planning for data analysis – coding of responses, preparation of code book, Coding of data Use of statistical programs - MS Excel – SPSS
Module 2 (Credit 1)	
Learning Outcomes	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.
Content Outline	**Data Analysis** a. Quantitative analysis, descriptive statistics, inferential statistics : Uses and limitations, Summation sign and its properties b. Proportions, percentages, ratios c. Measures of central tendency-mean, median, mode-arithmetic mean and its uses, mid – range, geometric mean, weighted mean 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 e. Large and Small Sample tests and interpretation -. Z-test for single proportions and difference between proportions -. Large sample test for single mean and difference between means -. Small sample tests- 't'-test, paired 't'-test, 'F' Test
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Interpret chi square test, correlation & regression
	2. Distinguish between experiment designs
Content Outline	**Chi square test and its interpretation** a. General features, goodness of fit b. Independence of Attributes **Correlation and Regression and its interpretation** a. Basic concepts b Linear regression and correlation coefficient Regression and prediction c. Rank correlation, Product-moment method **Analysis of Variance and its interpretation** a. One-factor analysis of variance b. Two-factor analysis of variance **Design of Experiments** a. Completely randomized design b. Randomized block design c. Latin square design d. Factorial design
Module 4 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to

	1. Discuss the presentation of Data
	2. Prepare research proposal
Content Outline	**Presentation of Data** a. Tabulation and Organization of data- frequency distributions, cumulative frequency distribution, contingency tables 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 Cautions in visual display of data **The Research Report** Basic components of a research report- prefatory material, introduction and Review of Related Literature, Methodology, Results, Discussion, Conclusion, Summary, Abstract, Bibliography and Appendices Students to design a research study on a topic- - specify type of research - sample selection - protocol/operationalization - tools - tests for statistical analysis **Preparation of a Research Proposal**
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

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- 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
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3.2 Major (Core):

Course Title **Subject Code**	**Pediatric Nutrition** **314412**
Course Credits	**4 (2 Th+2 Pr)**
Course Outcomes	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
Theory **Module 1 (Credit 1)**	
Learning Outcomes	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.
Content Outline	**Infant and Young Child Feeding Practices Breast feeding:** Composition of Human Milk, Recommendations, exclusive breastfeeding, prelacteal feeds, duration of breastfeeding, advantages of breast feeding, contraindications, types of Infant formulas. Complementary feeding, issues and concerns Growth, Development and Nutrition al Requirements of Infants/Children/Adolescents Growth, development and body composition from infancy, preschool, childhood, puberty and adolescence Nutritional requirements at different stages of infancy, childhood and adolescence, factors influencing food intake, packed lunch

	Assessment of nutritional status and growth, growth charts and milestones Preterm/ VLBW infants – Complications, Role of parenteral and enteral nutrition (trophic feeds – gut priming) Undernutrition in childhood – PEM, FTT, SAM, Fe deficiency, Vitamin A deficiency – causes, consequences, management (in brief), Catch-up growth Over-nutrition - causes, consequences, management
Module 2 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe the nutritional requirements in management of special conditions
	2. Summarize food allergies
Content Outline	**Nutritional considerations for special conditions –** Nutritional Management of Inborn Errors of Metabolism – PKU, Maple syrup urine disease, Homocystinemia, Tyrosinemia, Galactosemia, Glycogen storage disorder Diarrhea and constipation – causes, consequences, management Epilepsy and dietary approaches – ketogenic diet, Atkins and recent advances 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 Nephrotic syndrome and CKD in children - Impact on growth and management Food Allergies
Practical Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Carry out pediatric nutritional assessments
	2. Plan dietary guidelines for infants, child and adolescence
Content Outline	**Pediatric Nutritional Assessment**:-. Anthropometric measurements, biochemical parameters, clinical and dietary assessment methods. Measuring, recording and plotting growth on growth charts. Use of growth reference/ standards (Field work)

	Normal nutrition for infants – Guidelines on breastfeeding and complementary feeding. Market survey of infant formulae and complementary foods. Planning complementary feeds as per the guidelines. Preparation of ARF. **Nutrition in childhood and adolescence**: Planning for preschool child, the school-aged child and adolescents
Practical Module 4 (Credit 1)	
Learning Outcomes	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
Content Outline	**Nutritional concerns:** - Guidelines for management for PEM, SAM, Fe deficiency and vitamin A deficiency **Nutritional requirements for Inborn Errors of Metabolism** - PKU, Maple syrup urine disease, Homocystinemia, Tyrosinemia, Galactosemia, Glycogen storage disorder **Nutritional Management of diarrhea** **Ketogenic diet, Atkins diet** **Feeding challenges for developmental disabilities, feeding devices** Nutritional requirements and management of - type 1 DM, nephrotic syndrome and CKD
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, 11th Edition (2020) Jones and Bartlett Publishers, Inc
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- 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):

Course Title **Subject Code**	**Geriatric Nutrition** **314413**
Course Credits	**4**
Course Outcomes	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
Theory Module 1 (Credit 1)	
Learning Outcomes	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
Content Outline	**The Ageing Process** a. The Ageing Society- Global and Indian scenario b. Epidemiology c. Life Expectancy vs Life Span d. Usual vs Successful Ageing **Changes associated with Ageing process** a. Cellular aspects of ageing 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 c. Functional manifestations of ageing: constipation, impaired fluid and electrolyte balance, altered thermoregulation, sleep disturbances
Module 2 (Credit 1)	

Learning Outcomes	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
Content Outline	**Theories of Aging** a. Common molecular theories of ageing and nutritional interventions b. Factors influencing ageing – endogenous and exogenous **Nutritional Requirements and Recommendations** a. Nutritional requirements – influencing factors and nutrient recommendations for senior citizens b. Benefits of calorie restriction and exercise c. Promoting successful ageing-traditional and modern methods
Module 3 (Credit 1)	
Learning Outcomes	After learning the module, learners will be able to
	1. Describe specific age related disorders and their nutritional care
	2. Summarize Drug-Nutrient Interactions
Content Outline	Nutritional and health status of elderly: Factors influencing food consumption and nutritional status of elderly, Undernutrition in the Elderly – risk factors 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 Role of Nutrition in prevention of age related diseases Nutrient drug interactions
Module 4 (Credit 1)	
Learning Outcomes	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

Content Outline	Assessment of geriatric nutritional status – mini nutrition index, assessment of frailty Policies and programmes of the government and NGO sector pertaining to the elderly Promoting fitness and well-being- use of various modern and traditional approaches
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	

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3.4 Major (Elective):

Course Title **Subject Code**	**Nutrition in Critical Care** **314414**
Course Credits	**2**
Course Outcomes	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
Theory Module 1 (Credit 1)	
Learning Outcomes	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
Content Outline	**Nutritional support systems and other life – saving measures for the critically ill:** Enteral and parenteral nutrition support. Role of immune enhancers, conditionally essential nutrients, immune suppressants, and special diets in critical care. **Enteral Nutrition :** a. Various sites for Enteral nutrition b. In brief, discussion on Ryle's tube and its care c. Types of feeds, advantages and disadvantage of home-based feeds, Commercial formula feeds d. Incorporation of easily digestible foods e. Requirements of nutrients according to problems eg. Renal, respiratory etc **Total Parental Nutrition**: a. The importance of TPN b. Long term effect of its use c. Site of TPN and its care d. Composition **Diet related ethical issues in the terminally ill** **Nutritional Support System and Complications including refeeding syndrome and rehabilitation diets.** *Evaluation: Market survey on availability, composition and price of EN and TPN formulations*
Module 2 (Credit 1)	
Learning Outcomes	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
Content Outline	**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:** CV complications Stroke Respiratory failure Multi organ failure Hepatic failure Surgery and its complications Sepsis and burns *Evaluation: Review of evidence – based guidelines for the above conditions* *Discussion and presentation on evidence-based guidelines*
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.	

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3.5.1 Major (Elective):

Course Title **Subject Code**	**Functional Foods and Nutraceuticals** **324421**
Course Credits	**4**
Course Outcomes	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
Theory Module 1 (Credit 1)	
Learning Outcomes	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
Content Outline	**Introduction:** Definition, history, classification – Type of classification (Probiotics, probiotics and synbiotics; Nutrient vs. Non-nutrient; according to target organ; according to source or origin) Metabolism of xenobiotics (review) **Probiotics** a. Taxonomy and important features of probiotic microorganisms b. Health effects of probiotics including mechanism of action. c. Probiotics in various foods: fermented milk products, non-milk products etc. d. Quality Assurance of probiotics and safety **Prebiotics** 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: a. Non-digestible carbohydrates/oligosaccharides b. Dietary fibre c. Resistant starch

	d. Gums
Module 2 (Credit 2)	
Learning Outcomes	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
Content Outline	**Potential health benefits of the following functional foods:** 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: a. Polyphenols: Flavonoids, catechins, isoflavones, tannins Curcumin, Resveratrol b. Phytoesterogens/ Isoflavones c. Phytosterols d. Glucosinolates e. Pigments : Lycopene, Carotenoids f. Organo sulphur compounds g. Other components – Phytates, Protease inhibitors, saponins, Amylase inhibitors, haemagglutinins
Module 3 (Credit 1)	
Learning Outcomes	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
Content Outline	**Non- nutrient effect of specific nutrients:** Proteins, Peptides and nucleotides, Conjugated linoleic acid and n3 fatty acids, Vitamins and Minerals **Active biodynamic principles in spices, condiments and other plant materials and their evidence based effects**
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

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- Wildman, R.E.C. ed. (2019): Handbook of Nutraceuticals and Functional Foods, 3rd edition, CRC Press

3.5 RP

Course Title **Subject Code**	**Research Project** **354431**
Course Credits	**4**
Course Outcomes	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
Module 1 (Credit 1) Formulation of problem	

Learning Outcomes	After learning the module, learners will be able to
	1. Recognize and undertake research problem.
Content Outline	• Identifying research gaps and formulating research questions. • Sources of research problems (literature, real-world issues, academic curiosity). • Techniques for developing research questions. • Writing clear and measurable research objectives.
Module 2 (Credit 2) Review of Literature	
Learning Outcomes	After learning the module, learners will be able to
	1. Review the existing literature
Content Outline	• Conducting comprehensive literature searches using databases and other resources. • Evaluating and selecting relevant literature. • Organizing literature into themes and developing a theoretical framework. • Writing a coherent and critical literature review.
Module 3 (Credit 1) Designing Research proposal	
Learning Outcomes	After learning the module, learners will be able to
	1. Apply critical thinking to the problem selected for research
Content Outline	• Components of a research proposal (title, abstract, introduction, etc.). • Selecting appropriate research design (exploratory, descriptive, experimental). • Methodology: data collection methods and sampling techniques. • Writing and structuring the research proposal.
Module 4 (Credit 1) Planning tools & techniques for data collection	
Learning Outcomes	After learning the module, learners will be able to
	1. Able to design the research work and plan the execution.
Content Outline	• Use Gantt charts, timelines, and milestones for project planning and resource allocation. • Address ethical considerations, including obtaining informed consent. • Conduct data collection through surveys, interviews, and observations, ensuring ethical guidelines. •
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.