PERIYAR UNIVERSITY

Periyar Palkalai Nagar, Salem-636011

Department of Nutrition and Dietetics

M.Phil. Clinical Nutrition and Dietetics

[Choice Based Credit System (CBCS)]

REGULATIONS AND SYLLABUS
(w.e.f.2018-2019)

PERIYAR UNIVERSITY

DEPARTMENT OF NUTRITION AND DIETETICS

VISION

To impart a solid understanding of standards of clinical nutrition and dietetics practice and develop essential leadership skills to play a pivotal role to promote nutrition and healthy lifestyle choices in our society and beyond.

MISSION

- To develop experts in clinical nutrition practice from a wide range of perspectives within the health system, from disease prevention to palliation.
- To generate a team of well-equipped clinical nutrition practitioners to help the community in maintenance of optimal health and well-being.
- To expose students to research and practice in the field of nutrition and dietetics by developing newer food formulas in the prevention and treatment of lifestyle diseases.

PROGRAM SPECIFIC OUTCOME (PSO)

The M.Phil. students of Clinical Nutrition and Dietetics Program will be

PSO1: Using domain knowledge and procedural assertiveness of clinical nutrition and dietetics and relevant disciplines to develop robust society.

PSO2: Applying principles of diet when planning food and nutrition programmes and supervising meal preparations in hospitals and other food service establishments.

PSO3: Educating the community on recommended dietary modifications based on the severity of illness and complications of disease.

PSO4: Exhibiting constant enhancement in their profession through life-long learning thereby escalating human wellness either as sovereign patient counsellors or as a team with multidisciplinary healthcare approach.

Graduate Attributes (GA) for Clinical Nutrition and Dietetics Programme

1. GA1: Obtain the knowledge of clinical nutrition and dietetics, and work independently as self-driven, lifelong learners and innovators so as to prevent or treat diseases being faced by the humans.

2. GA2: Work in association with the health care team and apply the knowledge of the subject in novel situations to solve new problems.

3. GA3: Think critically and apply appropriate contemporary research techniques, resources and modern devices to compute nutritional needs with appropriate consideration for public health and safety, food safety and security.

4. GA4: Identify and evaluate the needs of the society significant with food in all contexts, like food safety and security, health and sanitation, environment, and gender concerns.

5. GA5: Dynamic involvement in the community settings and working towards the attainment of wholesome nutritious communal along with the administrators.

Programme Outcomes (PO) for Clinical Nutrition and Dietetics

On completion of M.Phil. programme, the students are expected to

PO1: Critical Thinking: Acquire the knowledge of clinical nutrition and dietetics, relate to scientific issues so as to prevent or treat diseases being faced by the humans. Identify, formulate, research literature, and solve nutritional deficiencies using fundamentals of clinical nutrition and dietetics, physiology, food science and biochemistry and relevant domain disciplines. Create, select, adapt and apply appropriate techniques, resources and modern devices to compute nutritional needs with a thoughtfulness of the limitations**.**

PO2: Effective Communication: Researching and informing the patient and the healthcare team the complexity of the disease, the burdens of feeding and the decisions that may help determine the route of care for the patient, such as more aggressive or palliative care. Also, by effective report writing, presentations and documentations, communicate efficiently with the needy about the importance of healthy individual and society.

PO3: Social Interaction: Recognize and assess societal, environmental, health, safety, and cultural issues related to food within local and global contexts.

PO4: Effective Citizenship: Active in the patients care as the consultant dietician or community dietician or in a medical team reporting on the nutritional status of the patient or community to the health governing bodies.

PO5: Professional Ethics: Hold up and commit to professional ethics and ethical regulations, responsibilities, and norms of professional nutrition and dietetics practice.

PO6: Sustainability: Develop innovative food products or substitutes or alternate solutions to create value and wealth for the betterment of the individual and society at large.

PO7: Self Directed and Life Long Learning: Recognize the need and have the ability, to engage in independent learning for continual development as a health professional.

PSO-PO Mapping:

PSO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
PSO1							
PSO2							
PSO3							
PSO4							

PO-GA Mapping:

PO/GA	GA1	GA2	GA3	GA4	GA5
PO1					
PO2					
PO3					
PO4					
PO5					
PO6					
PO7					

Program Educational Objectives (PEO):

At the end of the program the students will obtain:

PEO1: Technical Proficiency

Succeed as clinical nutritionist, dieticians and will become productive and valued professionals in the sphere of Medical Nutrition Therapy.

PEO2: Professional Growth

Continue to develop as promising healthcare connoisseurs through life-long learning and higher education in the field of nutrition and dietetics.

PEO3: Management skills

Exercise entrepreneurial qualities in a responsive, ethical and innovative manner by setting up own diet clinics.

POs Consistency with PEOs

PEO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
PEO1	✓	✓	✓	✓	✓	✓	
PEO2	✓	✓	✓	✓	✓	✓	✓
PEO3							✓

PERIYAR UNIVERSITY, SALEM

Department of Nutrition and Dietetics

Degree of Master of Philosophy (M. Phil) in Clinical Nutrition and Dietetics

RULES AND REGULATIONS FOR ADMITTING THE STUDENTS FOR FULL-TIME M.PHIL PROGRAMME

The following are the rules and regulation for admitting candidates in **M.Phil., (Clinical Nutrition and Dietetics)** programme in Periyar University, Salem from the Academic Year 2018 – 19 and thereafter.

1. Eligibility:

Candidates who have qualified for Post Graduate degree in Home Science/ Clinical Nutrition and Dietetics/ Food Science and Nutrition /Food Service Management and Dietetics /Human Science/ Nutrition and Dietetics/ Foods and Nutrition/Nursing/Applied Nutrition/Biomedical Sciences/ Biochemistry/Clinical Biochemistry/ Biotechnology/Life Science and M.A Home Economic /Post Graduate in Allied Health Sciences of any University recognized by the Syndicate as equivalent shall be eligible to register for the Degree of Master of Philosophy (M.Phil) in Clinical Nutrition and Dietetics and undergo the prescribed course of study in the University

2. Department

For the candidates, who seek admission into M.Phil., course shall have obtained a minimum of 55% marks in his/her Master's Degree. However, for the candidates belonging to SC/ST community and those who have qualified for the Master's degree before 01.01.1991 the minimum eligibility marks shall be 50% in the Master's Degree.

3. Duration:

The duration of the M. Phil course shall be over a period of One Year from the commencement of the course in each academic year.

4. Course of Study:

The course of study of the degree shall consist of (a) Part-I comprising three Theory papers according to the Syllabus prescribed by the Board of Studies. Of which the third paper should be the Guide paper(s). The Guide paper syllabus is related to the expertise of the concern faculty and (b) Part-II Dissertation and *viva voce*.

5. Course Scheme and Scheme of Examinations for M. Phil (Clinical Nutrition and Dietetics) with effect from 2018-2019 onwards

Subject Code	Title of the Paper	Credits	Internal Mark/25	External Mark/75	Total Marks /100
18UPCND2C01	Advanced Research Methods and Statistics in Nutrition	4	25	75	100
18UPCND2C02	Advances in Clinical Nutrition and Dietetics	4	25	75	100
18UPCND2C03 (18UPCND2C03.1 to 18UPCND2C03.8)	Guide paper	4	25	75	100
18UPCND2D01	Dissertation and *viva voce*	12			200
	Total	**24**			**500**

6. Question paper setting

The following question paper pattern will be adopted

Part A 5 X 5 = 25 marks (Internal choice)

Part B 5 X 10 = 50 marks (Internal choice)

7. Viva-Voce will be conducted with the following members

Guide as Chairman, External examiner from other University from the related area as Member of the Board of Valuation. Double valuation procedure will be adopted for Dissertation, one by the respective guide and the other by the external examiner, preferably by the *viva-voce* examiner.

8. Scheme of Examinations

Part-I Theory Examination: (Three Theory Papers)

The examination of theory papers and Dissertation shall be held at the end of the year as per the examination procedures with the concurrence of Head of the Department. The duration for each paper shall be 3 hours carrying a maximum of 75 marks for theory papers and 200 marks is allotted for Dissertation and *viva voce*.

The examiners will be appointed from the panel of four names of each papers submitted by the Departments concerned. If the awarded total mark varies more than 10% between the Internal and External examiners, the paper will be valued by a third examiner whose award of marks will be final.

Part-II-Dissertation and *viva voce*

The exact title of the Dissertation shall be intimated within one month after the completion of the Theory paper examination. Candidates shall submit the Dissertation to the University through the Supervisor and Head of the Department at the end of the academic year from the commencement of

the course, which shall be valued by internal examiner (Supervisor) and one external examiner appointed by the University from a panel of four names sent by the supervisor through the Head of the Department.

The examiners who value the Dissertation shall report on the merit of candidates as "Highly Commended" (75% and above) or "Commended" (50% and above and below 75%) or "Not Commended" (below 50%).

If one examiner commends the Dissertation and the other examiner, does not commend, the Dissertation will be referred to a third examiner and the third valuation shall be final. Submission or resubmission of the Dissertation will be allowed twice a year.

Passing Minimum:

A candidate shall be declared to have passed part-I of the examination if he/she secured not less than 50% of the marks in each paper including paper-III for which examination is conducted internally. A candidate shall be declared as pass in the Dissertation *viva voce* examination if his/her dissertation is at least commended. All other candidates shall be declared to be failed in the examination. All other parts of general rules for M.Phil programme is applicable henceforth or modifications in rules and regulations.

Restriction in number of chances:

No candidate shall be permitted to reappear for the written examination in any paper on morethan two occasions or to resubmit a Dissertation not more than two times. Candidates shall haveto qualify for the degree passing all the written papers and dissertation within a period of threeyears from the date of commence of the course.

Conferment of Degree:

No candidate shall be eligible for conferment of the M.Phil. Degree in Clinical Nutrition and Dietetics unless he/she isdeclared to be passed both in the Theory papers and Dissertation and *viva voce* of the examination as per the Regulations.

9. Qualifications for persons conducting the M. Phil., course

No teacher shall be recognized as a Supervisor unless he\she possesses a Ph. D., degree or two years of PG teaching experience after qualifying for M. Phil., or M.Litt., Degree.

M.Phil. Clinical Nutrition and Dietetics Course

Course Code & Title	18UPCND2C01 - ADVANCED RESEARCH METHODS AND STATISTICS IN CLINICAL NUTRITION AND DIETETICS
Cognitive Level	**K-1, K-2, K-3, K-4, K5 & K6**
Course Objectives	**The Course aims** • To understand the application of statistical tests for analysis and interpretation. • To relate the various research methods and techniques available to carry out effective research. • To enable students to develop appropriate research methodologies and to analyze the research outcomes of future research.

UNITS	Topics Details
UNIT I	**Nature, Methods and Techniques of Research** a) Research Methodology-Definition, objectives, deductive and inductive methods in research, Merits and demerits of conducting nutritional research in India, uses of information in research, avoiding subjectivity and achieving objectivity. b) Methods of study, Forms of scientific methods, Application of different methods to different fields, Techniques of study, Distinction between methods and techniques of research. c) Classification of research- Basic, Applied, Descriptive, Historical, Formulative or Exploratory, Experimental, Ex-post facto, The case study, Survey research, Evaluation research, Assessment study, Comparative method and its precautions, Inter disciplinary research-Essentials and need. d) Nutritional research in animals- Principles, Methods and Application.
UNIT II	**Problem Selection, Formulation and Hypothesis** a) Characteristics of Research of Monograph, Dissertation and Thesis. b) Selecting a topic for research, research problems – types, components, sources, survey of literature, technique of skimming. c) Work criteria of a good research problem- Formulating and stating, Definition, Delimitation, Justification, Evaluation. d) Hypothesis- Definition, Criteria, Process, Theory- Law- Axiom, Types, Functions, Forms and sources, Difficulties and utility, Testing the hypothesis.
UNIT III	**Research Design and Sampling Techniques** a) Research Design- Meaning, Need, Features, Concepts- Dependent and Independent, Extraneous, Control, Confounded relationship, Experimental and control groups, Relation between problem formulation and research design. b) Different Research designs in nutrition studies– Exploratory studies, Descriptive studies, Diagnostic studies, Experimental studies, Hypothesis-testing research studies, Major steps in preparing research design, evaluation, factors affecting, Conclusion.

	c) Experimental Designs- Basic principles, Types- Before and After without control design, Before and After with control design, After only with control design, C.R design, R.B. design, L.S. design, Factorial designs. d) Sampling- Definition, principles, types- probability and non-probability, Combination of probability and non-probability, Sampling and Non-sampling errors.
UNIT IV	**Statistical Application in Clinical Nutrition and Dietetics Research** a) Statistical Research-Percentages, Frequency distribution, Measures of central tendency – Mean, Median, Mode, Standard deviation. b) Measures of variability, Measurement of trend analysis and Methods of Correlation. c) Parametric tests of difference- T test, ANOVA, Parametric tests of association: Pearson's product moment co-relation, Regression Analysis. d) Non-parametric tests of difference - Mann-Whitney, Sign, Median, and Kruskal -Wallis, Chi square test, Non-parametric tests of association: Spearman's rank co-relation.
UNIT V	**Research Communication** a) Essentials of a scientific report, categories of audience report, oral report, written report, stages in preparing research report. b) Drafting report- first, second and end draft. Presentation of sampling errors, inconclusive or negative results in report, significance of report writing. c) Types of report- technical and popular, Structure of research report, Mechanics of writing research report. d) Ethics in Clinical Nutrition and Dietetics –Human-Animal research.

Course Outcomes	**On completion of the course, students should be able to**
	CO1: Define a research problem and draft a research design for solving. **CO2:** Apply the appropriate sampling techniques for projects. **CO3:** Plan and design tools for data collection. **CO4:** Interpret the results by performing statistical analysis.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	M	M	S	S	S	M	S	M	M	L	L
CO2	M	S	S	S	S	L	S	M	L	L	L
CO3	M	S	S	S	S	L	S	M	L	L	L
CO4	M	L	S	S	S	L	S	L	L	L	L

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests (Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	5	5	5	5
Understand	5	5	5	5
Apply	15	15	20	20
Analyse	15	15	15	15

Evaluate	10	10	15	15
Create	10	10	15	15
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Kothari.C.R -Research Methodology, Methods and Techniques, Fourth edition, 2019, New Age International Publisher.
- Gupta.S.C - Fundamentals of Applied Statistic, Sultan Chand and Sons
- Gupta.S.P., Statistical Methods,2018, Sultan Chand and Sons

Reference Books:

- Van Maanen - Qualitative Methodology, 1983, Sage Publication
- Kerlinger - Foundation of Educational Research, Wadsworth Publishing Company
- Bryman A. and Cramer D - Quantitative Data Analysis for Social Scientist, Rev.Ed.
- Ranjit kumar- Research Methodology, 4th Ed. Edition, 2014, Sage Publishing.
- P.N.Arora and P.K.Malhan (2010) Biostatistics Himalaya Publishing House.
- Scrimshaw NS and Gleason GR: Rapid Assessment Procedures, Qualitative Methodologies for Planning and Evaluation of Health Related Programmes. International Nutrition Foundation for Developing Countries, Boston.

Web Resources:

- https://explorable.com/research-methodology
- *https://www.mbaknol.com/research-methodology/the-basic-types-of-research*

Course Code & Title	18UPCND2C02 - ADVANCES IN CLINICAL NUTRITION AND DIETETICS
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To enable the students to understand formal nutrition care process along with overview of nutrigenomics. • To acquire skill on Clinical assessment techniques and enhance the quality of health. • To relate the diet and drug interactions for sustainable nutritional status.

UNITS	Topics Details
UNIT I	**Nutrigenetic and nutrigenomics** a) The human genome projects-introduction, clinical applications b) Geno type and nutrition assessment c) Genetic fundamentals-nutrigenetic and nutrigenomics, genetic basics, mode of inheritance and penetrance-mendelian inheritance, mitochondrial inheritance d) Disease at chromosomal level-epigenetics and genomic imprinting e) Disease at molecular level-genetic metabolic disorders, sex-linked disorder f) Disease at mitochondrial level g) Genetics and nutrition therapy -nutritional genomic influences on metabolic process, nutritional genomic influences on gene expression, genetic variability.
UNIT II	**Screening of dietary and clinical data** a) Nutritional imbalance, b) Nutritional screening, c) Nutritional assessment- Medical History, Social history, Medication history, Diet history, Nutrient intake analysis, Anthropometry d) Nutrition focused physical examinations -Physical signs, immune function, hand grip dynamometry, biochemical analysis e) Classifying malnutrition
UNIT III	**Assessment of laboratory data** a) Definitions and usefulness of nutrition laboratory data- specimen types, assay types b) Nutrition and interpretation of routine medical laboratory test-clinical chemistry panels, complete blood count, urine analysis c) Assessment of hydration status d) Assessment for protein calorie malnutrition-hormonal and cell mediated response to stress, nitrogen balance, hepatic transport proteins, c-reactive proteins, creatinine, immunocompetences e) Laboratory data for nutritional anaemia- classifications of anaemia, iron deficiency anaemia, macrocytic anaemia associated with B-vitamin deficiencies f) Markers of malabsorption-fecal fat, fat soluble vitamins g) Chronic disease risk assessment -lipid indices of cardiovascular risk, inflammation, indices of oxidative stress, antioxidant status, markers of oxidative stress.

UNIT IV	**Effects of food and drug interactions** a) Pharmacological aspects of food drug interactions -pharmaco dynamics b) Risk factors for food drug interactions-phamaco-genomics c) Effects of food on drug therapy -drug absorption, medical entral nutrition interactions, drug distributions, drug metabolism and drug excretion d) Effects of drug on food and nutrition-nutrient absorption, nutrient metabolism, nutrient excretion e) Modification of drug action by food and nutrients f) Effects on drug on nutritional status -oral, taste and smell, GI effects, appetite changes, organ system toxicity, glucose levels g) Excipients and food drug interactions h) Medical nutrition therapy
UNIT V	**Nutrition for sports and exercise performance** a) Energy production-ATP, aerobic and anaerobic pathway, energy continuum b) Fuel for contracting muscles- sources of fuel, intensity, duration, effects of training c) Nutritional requirements of exercise d) Weight management e) Macronutrients -carbohydrate, protein, fat f) Micronutrients -vitamins and minerals g) Fluids -fluid balance, daily fluid needs, fluid replacements, fluid absorption h) Other considerations -alcohol, caffeine i) Ergogenic aids

Course Outcomes	**On completion of the course, students should be able to**
	CO1: Elucidate the relationship between gene and nutrition. **CO2:** Acquaint on nutritional screening techniques and their purposes. **CO3:** Describe the diagnostic test. **CO4:** Appraise on food and drug interactions **CO5:** Apply the art and science of sports nutrition for the wellness of sports personnel.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	M	M	S	S	S	S
CO2	S	S	S	S	L	L	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	L	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	5	5	10	10
Understand	5	5	10	10
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	10	10	20	20
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
- B. Srilakshmi- Dietetics, 2019, 8th Edn, New Age International Pvt. Ltd. New Delhi.

Reference Books:

- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001,W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics ¸ 3 edition 2009,Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick: Normal And Therapeutic Nutrition,17 th Edn, Macmillan Publishing Company.
- Shills and Young- Modern Nutrition In Health And Disease,2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
- Whitney, E. N. and C. B. Cataldo, Understanding Normal and Clinical Nutrition, 1983, West Pub.
- Williams S. R. Essentials of Nutrition and Diet Therapy**,** 4th edn, 1986, Mosby College Pub. S. Louis.

Web Resources:

- www.anme.com.mx/libros/PrinciplesofNutrition.pdf
- *https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf*
- *krishikosh.egranth.ac.in*

Course Code & Title	**18UPCND2C03.1 - ADVANCED MEDICAL NUTRITION THERAPY**
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To discuss the key elements of nutritional assessment and diet therapy. • Describe the nutritional alterations during various disease states and relate this information to support nutrition intervention strategies in individuals during altered pathological states. • To interpret information from medical, social and nutritional histories, combined with biochemical and anthropometrical indices during different pathophysiological states to assess nutritional status, develop nutrition care plans and solve nutritional problems of special groups- pediatrics and geriatrics.

UNITS	Topic Details
UNIT-I	**Introduction to Medical Nutrition Therapy** a) Medical Nutrition Therapy –Definition, Significance. b) Dieticians – Definition, Types and Role in health care. c) Nutrition Care Process- Nutrition assessment, Nutrition diagnosis, Nutrition intervention, and Nutrition monitoring and evaluation, Documentation. d) Therapeutic diets- Types of dietary adaptations for therapeutic Needs, Normal Nutrition: A base of therapeutic diet, diet prescription, constructing therapeutic diets, routine hospital diets, feeding techniques. e) Nutrient and Drug Interaction- Basic concepts, effect of nutrition on drugs, drug effects on nutritional status, drug and drug interaction, clinical significance and risk factors for drug-nutrient interactions, guidelines to lower risk and wise use of drugs.
UNIT –II	**Medical Nutrition Therapy during Stress** a) The stress response – Definition, Different phases. b) Surgery - Physiological response to surgery, stages of convalescence, pre-operative nutrition care and post-operative nutrition care. c) Burns -Classification, complications, dietary management, mode of feeding-nutrition support, non-dietary treatment of bums. d) Trauma – Physiological, metabolic, hormonal responses to injury, dietary management. e) Sepsis-Systemic metabolic responses, catabolic responses, dietary management of sepsis with or without MODS.
UNIT- III	**Medical Nutrition Therapy in Pediatric Specific Diseases** a) Assessment of nutritional status in children using appropriate tools and markers, Identify specific pediatric nutritional concerns. b) Nutrients requirements in well and diseased children. Failure to thrive – Definition, causes and the criteria for diagnosis.

	c) Pediatric Specific Disease - Pediatric obesity - Health risks associated with pediatric obesity, the role of medical nutrition therapy and the various levels of management of pediatric obesity. d) Cystic Fibrosis -Definition and its manifestations, nutritional management of the cystic fibrosis throughout the life cycle. e) Low Birth Weight Infants - Define prematurity and classifications of low birth weight. Describe the nutritional needs and unique challenges faced by premature and low birth weight infants.
UNIT- IV	**Medical Nutrition Therapy in Geriatric Disease State** a) Physical and Physiological Changes in old age b) Nutritional Changes and Requirement and Nutritional Assessment c) Health and Feeding Problems among Elderly d) Nutritional management of common geriatric disorders – osteoporosis, osteomalacia, Parkinson's disease and Alzheimer's disease e) Nutrition and oral health - common oral problems, interrelationship between nutrition / nutritional status and oral health.
UNIT- V	**Medical Nutrition Therapy in Inborn Errors of Metabolism and Gene Regulation** a) Phenylketonuria, Tyrosinemia, Maple Syrup Urine Disease, Homocystinuria, Galactosemia- Etiopathology, Clinical features and complications, Role of diet. b) Gene Expression - An Overview. c) Nutrigenomics- Role of Specific Nutrients in Controlling Gene Expression – Proteins, Lipids, Fuel Molecules and Lipogenesis, Minerals, Vitamins.

Course Outcomes	**On completion of the course, students should be able to**
	CO1: Elucidate the relationship between gene and nutrition. **CO2:** Acquaint on nutritional screening techniques and their purposes. **CO3:** Describe the diagnostic test. **CO4:** Appraise on food and drug interactions **CO5:** Apply the art and science of sports nutrition for the wellness of sports personnel.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	M	M	S	S	S	S
CO2	S	S	S	S	L	L	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	L	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	5	5	10	10
Understand	5	5	10	10
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	10	10	20	20
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Kane and Prelack, Advanced Medical Nutrition Therapy, Jones and Bartlett Learning, 2019.
- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
- B. Srilakshmi- Dietetics, 2019, 8th Edn, New Age International Pvt. Ltd. New Delhi.

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- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics ¸ 3 edition 2009,Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick: Normal And Therapeutic Nutrition,17 th Edn, Macmillan Publishing Company.
- Shills and Young- Modern Nutrition In Health And Disease,2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
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- Williams S. R. Essentials of Nutrition and Diet Therapy**,** 4th edn, 1986, Mosby College Pub. S. Louis.

Web Resources:

- www.anme.com.mx/libros/PrinciplesofNutrition.pdf
- *https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf*
- *krishikosh.egranth.ac.in*

Course Code & Title	**18UPCND2C03.2 - ADVANCED COMMUNITY NUTRITION**
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To understand the importance of nutritional status and assessment of nutritional status. • To describe the measures to overcome food and nutritional problems. • To enlighten on the organisations involved in promoting nutrition.

UNITS	Topic Details
UNIT-I	**Introduction to Community Nutrition** a) Community Nutrition- Definition, Concepts, Scope, Future Projections. Community- Characteristics, Types. b) Family- Characteristics, Features, Types, Functions. c) Health Care- Concept, Levels, Health care delivery, Role of community nutritionist in health care delivery, Factors affecting community health. d) Malnutrition- Types, Aetiology, Prevalence, Consequence, Impact on national development, Indicators, Prevention.
UNIT –II	**Assessment of Nutritional Status** a) Nutritional Status and Nutritional Assessment- Definition, Need, Goals, Aims and Objectives, Methods of Assessment. b) Direct Methods- Anthropometry, Biochemical, Biophysical, Clinical, Dietary Assessment, Functional Assessment. c) Indirect Methods -Vital Health statistics, Ecological Factors Assessment.
UNIT- III	**Strategies to Combat Community Nutrition Problems** a) Integrated Approaches to Combat Malnutrition - Agriculture Planning, Role of Food Technology, Food fortification and enrichment, Environmental Sanitation and Health. b) Food and Nutrition Security – Definition, Determinants, Framework for assessment, Key to food and nutrition security, Factors underlying the current status of food and nutrition security, Food security system in India. c) Nutrition Intervention Programmes- Objectives and Operation of ICDS, Nutrient Deficiency Control Programmes, Food Supplementation Programmes, Food Security Programmes.
UNIT- IV	**Agencies and Organisations to Combat Malnutrition** a) National organizations - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD, CSWB, SSWB, National nutrition strategy. b) International organizations - FAO, WHO, UNICEF UNESCO, CARE, AFPRO, World Bank. c) Voluntary Non-Governmental agencies - Action against Hunger, Feed the Children, World Food Programme, Smile foundation, Tuberculosis Association of India

UNIT- V	**Nutrition Education** a) Nutrition Education- Nature and Importance to the Community, Objectives, Training Workers in Nutrition Education, and Extension Work.
	b) Principles of Planning, Executing and Evaluating Nutrition Education Programmes. **c)** Problems of Nutrition Education Programmes and Approaches to overcome.

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Relate health, nutrition and population dynamics of a community. **CO2:** Assess the nutritional status of individuals. **CO3:** Compile the nutritional interventions provided by the government and the role of organisations in combating malnutrition. **CO4:** Describe the importance of nutrition education.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests (Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	5	5	15	15
Understand	5	5	15	15
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	10	10	10	10
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Suryatapadas –Textbook of Community Nutrition, 2016, Academic Publishers
- Prabha Bisht- Community Nutrition in India, 2017, Star Publications.
- B.Srilakshmi - Nutrition Science, 2006, New Age International.
- Swaminathan.M- Advanced Textbook on Food & Nutrition Vol 1& 2, Bappco.

Reference Books:

- Park A., Textbook of Preventive and Social Medicine, Twenty Third edition, 2015, Bhanot.
- Gibney MJ - Public Health Nutrition, 2nd Edn, John Wiley &Sons.
- Jellife D.B- Assessment of Nutrition Status of the Community, 1966, WHO, Geneva.

Web Resources:

- https://www.nutrition.gov
- http://www.ninindia.org/community.htm
- https://www.nhp.gov.in/healthlyliving/healthy-diet

Course Code & Title	**18UPCND2C03.3 - ADVANCED NUTRACEUTICALS AND FUNCTIONAL FOODS**
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To provide an understanding on the health promoting nutritional factors and bioactive constituents present in foods. • To widen the knowledge of the potential health implications of functional foods and mechanisms of action of nutraceuticals on humans. • To vision the impact of globalization on health and food products.

UNITS	Topic Details
UNIT-I	**Introduction to Nutraceuticals and Functional Foods** a) Nutraceuticals and Functional Foods - Definition, History and Classification. b) Perceived Effects of Functional Foods in Disease Prevention. c) Probiotics, Prebiotics and Synbiotics- Definition, Characteristics, Mechanism of action.
UNIT –II	**Probiotics and Prebiotics** a) Probiotics Microorganisms- Taxonomy and important features of probiotic microorganism- Lactobacillus, Bifidobacterium. b) Probiotics -Sources, Health benefits, Quality assurance of probiotics and safety. c) Prebiotics- Oligosaccharides, Dietary Fibre, Resistant starch, Gums - Classification, Functions.
UNIT- III	**Pigments as Nutraceuticals** a) Carotenoids- Chemistry, Classification, Structure and Health benefits. b) Lycopene- Structure, Sources, Metabolism of action, Health benefits, Commercial products of lycopene. c) Anthocyanins and Anthoxanthins- Structure, Sources, Functions. d) Curcumin- Structure, Sources, Metabolism of action, Effect of processing, Health benefits, Commercial products of Curcumin.

UNIT- IV	**Polyphenols** a) Flavonoids- Classification, Structure, Sources, Effects of processing, Health benefits. b) Tannins- Definition, Types, Structure, Metabolism, Effects of processing, Health benefits. c) Catechins - Classification, Structure, Sources, Effects of processing, Health benefits. d) Resveratrol – Chemistry, Sources, Effects of processing, Metabolism and bioavailability, Health benefits, Perspective of food application of resveratrol.
UNIT- V	**Nutraceuticals in Spices and Condiments** a) Cinnamaldehyde, Crocin and Luteolin - Chemistry, Sources, Effects of processing, Metabolism and bioavailability, Health benefits, Perspective of food applications. b) Organosulphur compounds- Types, Structure, Sources, Effects of processing, beneficial health effects. c) Phytoestrogens and Phytosterols- Classes, Sources, Effects of processing, Health benefits. d) Glucosinolate- Definition, Structure, Sources, Effects of processing, metabolic and health effects.

Course Outcomes	**On completion of the course, students should be able to**
	CO1: Compile the updates on link between nutrition and medicine. **CO2:** Assess the properties and functions of probiotics and prebiotics as nutraceuticals. **CO3: C**omprehend the role of nutraceuticals as pigments **CO4:** Describe the polyphenols. **CO5:** Determine the health benefits of spices and condiments.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	M	M	S	S	S	S	S
CO3	S	S	S	S	L	L	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests (Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	5	5	15	15
Understand	5	5	15	15
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10

Create	10	10	10	10
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Mary, K. Schmidl - Essentials of Functional Foods, 2000, Culinary and hospitality industry publication services.
- Robert Easy Wildman - Handbook of Nutraceuticals and Functional Foods, 2001, Culinary and hospitality industry publication services, 2000.

Reference Books:

- Chatwick, R - Functional Foods, 2003, Springer.
- Mazza, G. - Functional Foods- Biochemical and processing aspects, 1998, Culinary and hospitality industry publication services.
- Paresh, C. Dutta, Phytosterols as Functional Food Components and Nutraceuticals, 2004, Marcel Dehker Inc, New York.
- Guo M. - Functional Foods – Principles and technology, 2009, Wood head publishing company, UK.

Web Resources:

- https://www.nutraceuticalsworld.com/
- https://www.nutraingredients.com/

Course Code & Title	**18UPCND2C03.4 – MEDICAL NUTRITION THERAPY FOR NON-COMMUNICABLE DISEASES**
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To understand the etiology, symptoms and complications of Non-Communicable diseases. • To enable the students to recommend and provide appropriate nutritional care and dietary management for prevention and treatment of the various Non-Communicable diseases.

UNITS	Topic Details
UNIT-I	**Gastro Intestinal Diseases and Disorders** a) Gastritis, Peptic ulcer, Dyspepsia, Esophagitis and Dumping Syndrome, Flatulence, Diarrhea, Dysentery, Constipation, GERD, , Tropical sprue, Diverticular disease, Colon cancer, Ulcerative colitis and Crohn's Disease- a) Etiology b) Signs & symptoms c) Nutritional objectives and Dietary management. b) Malabsorption Syndrome - Celiac disease, Steatorrhea, Inflammatory Bowel Disease, Lactose Intolerance- a) Etiology b) Signs & symptoms c) Nutritional objectives and Dietary management.
UNIT –II	**Liver, Gallbladder and Pancreatic Disorders** a) Viral Hepatitis, Liver Cirrhosis, Hepatic Encephalopathy or Hepatic Coma – Etiology, Signs & symptoms, Nutritional objectives and Dietary management. b) Gall Bladder and Biliary Tract Diseases - Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis -Etiology, Signs & symptoms, Nutritional objectives and Dietary management. c) Pancreatitis and Zollinger- Ellison Syndrome - Etiology, Signs & symptoms, Nutritional objectives and Dietary management. d) Diagnostic tests – Liver function tests, Gall bladder function tests, Pancreatic function tests.
UNIT- III	**Renal Disorders** a) Kidney – Physiology and functions. b) Renal Disorders - Glomerulonephritis, Nephrotic Syndrome, Acute Renal Failure, Chronic Renal Failure, End Stage Renal Disease-Dialysis and Kidney Transplant – Etiology, Clinical Signs and Symptoms, Dietary and Non- Dietary Management c) Nephrolithiasis/Renal Calculi – Aetiology, Types of calculi and nutritional care- acid and alkaline ash diet, Use of sodium, potassium and phosphorus exchange lists in diet planning of kidney diseases patient. d) Renal function tests.

UNIT- IV	**Cancer** a) Cancer – Development, Characteristics, Identification, Types. b) Etiology – Genetic, Environmental, Dietary, Non-Dietary, Stress factors, Clinical manifestations and Nutritional problems associated with cancer. c) Nutritional requirement, Dietary management of cancer patients, Feeding problems associated with cancer therapy. d) Cancer Prevention – Guidelines, Recent research findings related to cancer prevention, Role of antioxidants.
UNIT- V	**Arthritis and Gout** a) Arthritis – Types, Causes, Symptoms, Diagnosis, Dietary management- Anti-inflammatory diet. b) Gout – Etiopathology, Role of Protein and Purines, Clinical Features and Complications, Dietary Management of Gout.

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Elucidate the aetiology, signs and symptoms of diseases. **CO2:** Explain the different diseases affecting the organs. **CO3:** Describe the diagnostic test. **CO4:** Deliver nutritional management for metabolic and degenerative disease conditions. **CO5:** Determine the dietary essentials for recovery and maintenance of various diseases.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	M	M	S	S	S	S
CO2	S	S	S	S	L	L	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	L	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests(Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	5	5	15	15
Understand	5	5	15	15
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	10	10	10	10
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
- B. Srilakshmi- Dietetics, 2019, 8th Edn, New Age International Pvt. Ltd. New Delhi.

Reference Books:

- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001,W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics ¸ 3 edition 2009,Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick: Normal And Therapeutic Nutrition,17 th Edn, Macmillan Publishing Company.
- Shills and Young- Modern Nutrition In Health And Disease,2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
- Whitney, E. N. and C. B. Cataldo, Understanding Normal and Clinical Nutrition, 1983, West Pub.
- Williams S. R. Essentials of Nutrition and Diet Therapy**,** 4th edn, 1986, Mosby College Pub. S. Louis.

Web Resources:

- www.anme.com.mx/libros/PrinciplesofNutrition.pdf
- *https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf*
- *krishikosh.egranth.ac.in*

Course Code & Title	**18UPCND2C03.5 – BAKERY TECHNOLOGY AND FOOD QUALITY CONTROL**
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To enable students to understand the concepts of food processing in snack production. • To develop skill in innovation of healthy bakery foods production. • To enlighten on the basics of food safety and quality control.

UNITS	Topic Details
UNIT-I	**Breads, Buns and Pizza Base** a) Ingredients & processes. b) Stages in processing bread- Weighing, mixing fermentation, Knock-back, Dividing & Rounding, Intermediate proofing, Moulding & Panning, Final Proofing, Baking, Booking, Slicing, Packaging. c) Bread making Method and their advantages and disadvantages- Straight dough method, Salt delayed method, no time dough method, Ferment & dough method, Continuous bread making process, Chorleywood process. d) Characteristics of good bread.
UNIT –II	**Biscuits, Cookies, Crackers & Cakes** a) Biscuits, Cookies, Crackers -Ingredients & processes, equipment's used, product quality characteristics, faults and corrective measures. b) Cakes - Ingredients & processes for cakes, Equipment's used, product quality characteristics, faults and corrective measures. Different types of icings. c) Modified Bakery Products - Modification of bakery products for people with special nutritional requirements e.g. high fibre, low sugar, low fat, gluten free bakery products. d) Impact of bakery products on health, Nutritional importance of modified bakery products.
UNIT- III	**Grain based Snack** a) Whole grains- roasted, toasted, puffed, popped and flakes. b) Coated grains- salted, spiced and sweetened. c) Flour based- batter and dough based products.
UNIT- IV	**Fruit and Vegetable based Snacks** a) Chips, wafers, technology for coated nuts - salted, spiced. b) Sweetened- chikkis, manufacturing technology of extruded snack foods. c) Basic principle of unit operations such as frying, baking and drying, toasting, roasting and flaking, popping, blending, coating, chipping in snack food processing industries.

UNIT- V	**Food Safety and Quality Control** a) Definition of Quality Assurance (QA), Difference between Quality Assurance and Quality Control, Definition of Total Quality Control, its nature, approaches and role of management, Definition of Statistical Quality control (SQC), determining the need for SQC, Definition – control chart, uses process control. b) Hazard Analysis Critical Control Point (HACCP): History, structure, pre- requites and HACCP applications, HACCP based SOPs. c) Principles, Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP), Good Agricultural Practice (GAP), Good Veterinary Practice (GVP). d) Storage and distribution of food, sanitation and safety in food services.

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Elucidate the breads production process. **CO2:** Explain the different types of biscuits, cookies and crackers. **CO3:** Describe the importance of grain based snacks. **CO4:**Deliver the nutritional significance of fruit and vegetable based snack. **CO5:** Determine the food safety and food quality control aspects.

COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	M	M	S	S	S	S
CO2	S	S	S	S	L	L	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	L	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	5	5	15	15
Understand	5	5	15	15
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	10	10	10	10
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Dubey, S.C. (2007). Basic Baking 5th Ed. Chanakya Mudrak Pvt. Ltd.
- Raina et.al. (2003). Basic Food Preparation-A Complete Manual. 3rd Ed. Orient Longman Pvt. Ltd.
- Manay, S. & Shadaksharaswami, M. (2004). Foods: Facts and Principles, New Age Publishers.

Reference Books:

- Barndt R. L. (1993). Fat & Calorie – Modified Bakery Products, Springer US.
- Samuel A. Matz (1999). Bakery Technology and Engineering, PAN-TECH International Incorporated.
- FaridiFaubion (1997). Dough Rheology and Baked Product Texture, CBS Publications.
- Samuel A. Matz (1992). Cookies & Cracker Technology, Van Nostrand Reinhold.
- The training manual for Food Safety Regulators. Vol.II- Food Safety regulations and food safety management. (2011) Food safety and Standards Authority of India. New Delhi
- Mortimre, S., and Wallace, C., (2005) HACCP: A practical approach, 2nd Ed, Aspen Publication
- Surak, J.G., and Wilson, S. (2007) American Society for Quality, 2nd Ed., Quality Press

Web Resources:

- www.anme.com.mx/libros/PrinciplesofNutrition.pdf
- *https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf*
- *krishikosh.egranth.ac.in*

Course Code & Title	**18UPCND2C03.6- PERISHABLE AND NON-PERSHABLE FOOD TECHNOLOGY**
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To understand and develop technological knowledge in perishable food products. • To comprehend the concepts of processing non-perishables foods. • To impart the scientific knowledge of food principles required to become successful food scientists and nutritionist who can work in industry, government or academia or as entrepreneurs.

UNITS	Topic Details
UNIT-I	**Technology of Milk and Egg Processing** a) Sources and composition of milk, processing of market milk, Standardization, toning, homogenization, pasteurization, sterilization, storage, packaging, transportation and distribution of milk. b) Processed milk products - Cream, butter, ghee, cheese, condensed milk, evaporated milk, whole and skimmed milk powder, ice cream, khoa, channa, paneer, Judging and grading of milk and its products. c) Egg Processing Technology -Structure and composition-nutritive value and functional properties of eggs. d) Factors affecting egg quality and measures of egg quality. Recent development in eggs processing.
UNIT –II	**Technology of Meat and Fish Processing** a) Meat -Sources and types of meat, meat products in India, its importance in national economy, Recent trends in meat processing. b) Slaughtering of animals and poultry, inspection and grading of meat, Factors affecting post-mortem changes, properties and shelf-life of meat. c) Fish- Types of fish, composition, structure and post-mortem changes in fish. d) Fish protein concentrates (FPC), fish protein extracts (FPE), fish protein hydrolysis (FPH).
UNIT- III	**Fruit and Vegetable Processing Technology** a) Principle and methods of Fruit and Vegetable processing Technology-Composition and related quality factors for processing. b) Principles of storage of fruits and vegetables. c) Types of storage- Natural, ventilated low temperature storage, Controlled Atmosphere and Modified Atmosphere storages, Fruit product order and quality control.

UNIT- IV	**Cereals and Millets** a) Wheat - Structure and nutrient distribution, types, milling of wheat, quality of flour and flour treatment. b) Rice – Structure and nutritive value, milling-parboiling of rice, effect of aging of rice, rice products-enrichment with vitamin and minerals, by product utilization,Production and quality of breakfast cereals, macaroni products and malt. c) Millets - Introduction to millets, new varieties, production trends of - barley, oat, corn, sorghum, pearl millet and foxtail millet-Chemical constituents-processing, d) Pearling and malting of millets, wet and dry milling, germ oil, Preparation of extruded products and their derivatives.
UNIT- V	**Pulses and Oil Seeds** a) Pulses- composition, importance in Indian diet, Types of pulses and legumes, principles of pulse milling, different methods of dhal milling, milling of major legumes. b) Uses of by products, recent development in pulse technology. c) Oilseeds- Types, Importance of fats and oils in human nutrition, Chemical, physical and functional properties of fats and oils, suitability of oil seeds for processing, importance of oil seeds processing in India. d) Preparation of protein concentrates and isolates and their use in high protein foods, Fermented and traditional products from oil seeds.

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Elucidate the processing of milk and egg. **CO2:** Explain the technologies involved in meat and fish processing. **CO3:** Describe the technologies involved in fruit and vegetable processing. **CO4:** Deliver the nutritional significance of cereals and millets. **CO5:** Determine the technologies in pulses and oil seeds.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	M	M	S	S	S	S
CO2	S	S	S	S	L	L	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	L	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	Continuous Assessment Tests(Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	5	5	15	15
Understand	5	5	15	15
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	10	10	10	10
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Srilakshmi B. - Food Science, 7th edn, 2018, New Age International (P) Ltd. Publishers,
- Swaminathan.A - Food Science And Experimental Foods, 1979, Ganesh Publishers.
- Manay S. N., -Foods, Facts and Principles, Wiley Eastern, New Delhi.

Reference Books:

- Potter, N. and Hotchkiss, J.H- Food Science, Fifth ed., 1986, CBS Publishers and Distributors, New Delhi.
- Girdharilal, G.S. Sidappa and G.L. Tandon -Preservation of Fruits and Vegetables¸ (2nd Ed), 1996, New Delhi: Indian Council of Agricultural Research
- Paul P.C. And Palmer H.H.-Food Theory And Application,1972, John Wiley And Sons, London
- Bennion, Marion and O. Hughes - Introductory Foods, 1986, Mac millan N. Y.
- P J Fellows- Food Processing Technology: Principles and Practice, 4th Edn, Elsevier.
- Janet D Ward and Larry T Ward- Principles of Food Science, 2012, Good heart-Willcox Company.

- **Web Resources:**
- https://guides.libraries.psu.edu/foodscience
- https://www.nal.usda.gov/fnic/food-science-and-technology
- https://foodinfo.ifis.org

Course Code & Title	**18UPCND2C03.7- THERAPEUTIC DIET FOR CARDIOVASCULAR DISEASE**
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To impart knowledge and understanding in the area of cardiovascular diseases. • To study the etiology, symptoms and medical nutrition therapy in various diseases. • To develop students to become health care professionals for services in various fields of clinical nutrition and related areas such as hospitals, academics, research, industry, community service. • To develop capacities and abilities and enable them to pursue research in Clinical Nutrition and Food Science.

UNITS	Topic Details
UNIT-I	**Introduction to Heart** a) Cardiovascular System - Structure of heart, conducting system of heart, heart rate and regulation, cardiac cycle, b) Blood –Functions, composition, blood clotting, blood groups, blood vessels-artery, vein capillaries, blood circulation-greater, lesser.
UNIT –II	**Dietary management of Hypo and Hypertension** a) Dietary management of Hypotension and Hypertension i) Definition, Classification and Cause ii) Signs & Symptoms and Complications iii) Dietary management -Diet related factors influencing hypertension, DASH diet - Lifestyle modification b) Hypertension – Level of sodium restriction diet, dangers of severe sodium restriction.
UNIT- III	**Diet in Cardiovascular diseases** a) Diet in Cardiovascular diseases: Aetiology, Symptoms, Risk factors, pathophysiology, dietary management and prevention of Dyslipidemia, Atherosclerosis, Angina pectoris, Coronary Artery Disease, Myocardial Infarction, Ischemic Heart Disease, Rheumatic Heart Disease (RHD), Congestive Cardiac Failure (CCF), Hypercholesterolemia. b) Prevention through life style modifications c) Dietary management - Low fat, low cholesterol and medium chain triglyceride diet -Role of nutraceutical and functional foods in the prevention of cardiovascular diseases.

UNIT- IV	**Lipids and its interrelationship with cardiovascular diseases** a) Lipids and their Metabolism – Classification, sources, functions and metabolism. b) Digestion and absorption, Deposition and storage of lipids. c) Role of essential fatty acids and Lipoproteins, Role of Triglycerides and Cholesterol d) Oxidation of fatty acids, Synthesis of fatty acids, Biosynthesis of triglycerides and phosphatides.
UNIT- V	**Treatment and management of cardiovascular diseases** a) Treatment - Drugs like Anti -hypertensive, Diuretics, lipid lowering drugs. b) Management – Nutrition education and counselling, physical exercise, yoga and meditation, stress management.

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Outline the vital concepts of physiology of heart and its implications in normal body maintenance. **CO2:** Explain the dietary management of hyper and hypo tension. **CO3:** Describe the role of diet in cardiovascular diseases. **CO4:** Deliver the nutritional significance of lipids. **CO5:** Determine the treatment and management of cardiovascular disease.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	M	M	S	S	S	S
CO2	S	S	S	S	L	L	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	L	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests(Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	5	5	15	15
Understand	5	5	15	15
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	10	10	10	10
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
- B. Srilakshmi- Dietetics, 2019, 8th Edn, New Age International Pvt. Ltd. New Delhi.

Reference Books:

- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001,W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics ¸ 3 edition 2009,Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick : Normal And Therapeutic Nutrition,17 th Edn, Macmillan Publishing Company.
- Shills and Young- Modern Nutrition In Health And Disease,2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
- Whitney, E. N. and C. B. Cataldo, Understanding Normal and Clinical Nutrition, 1983, West Pub.
- Williams S. R. Essentials of Nutrition and Diet Therapy**,** 4th edn, 1986, Mosby College Pub. S. Louis.

Web Resources:

- www.anme.com.mx/libros/PrinciplesofNutrition.pdf
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- *krishikosh.egranth.ac.in*

Course Code & Title	**18UPCND2C03.8- THERAPEUTIC DIET FOR DIABETES MELLITUS**
Cognitive Level	**K-1, K-2, K-3, K-4, K-5 &K-6.**
Course Objectives	**The Course aims** • To impart knowledge and understanding in the area of Diabetes mellitus. • To study the etiology, symptoms and medical nutrition therapy in diabetes mellitus. • To develop capacities and abilities and enable them to pursue research in Clinical Nutrition and Food Science.

UNITS	Topic Details
UNIT-I	**Diabetes mellitus** a) Prevalence, Types, Etiology and Signs and Symptoms b) Factors affecting normal blood glucose levels c) Impaired glucose homeostasis d) Diagnostic test for diabetes
UNIT –II	**Dietary Management of Diabetes** a) Food exchange list, b) Glycemic index of foods, Carbohydrate counting and Resistant starch c) Sweeteners and sugar substitutes d) Meal planning approaches - With and without Insulin and during sickness. e) Role of nutraceutical and functional foods in the prevention of Diabetes mellitus.
UNIT- III	**Management of Hypoglycemia** a) Types, symptoms and fasting state hypoglycemia b) Postprandial or reactive hypoglycemia. c) Dietary treatment in reactive hypoglycemia.
UNIT- IV	**Long term complications:** a) Macro vascular complication: It includes coronary artery disease, cerebral vascular and peripheral vascular disease – type, risk factors and intervention strategies. b) Micro vascular complication: Diabetes Eye disease, Neuropathy, Nephropathy – Disease stage, diagnosis and treatment. Other complications (foot, skin, gastrointestinal disorders, endocrine disease, psychological factors, etc.)

UNIT- V	**Treatment and Management of Diabetes Mellitus** a) Medications- Oral hypoglycemic drugs and Insulin. b) Lifestyle modification and exercise to manage diabetes mellitus. c) Practical management of Diabetes: Dietary management, insulin and oral therapy, Avoiding and managing hypo and hyperglycemia, Self- management strategies during special situations (sick days, travel, hypoglycemic events), Newer trends in management. d) Special considerations: Diabetes in children and adolescents, Diabetes in pregnancy, Diabetes in the elderly, Diabetes & infection, Diabetes in people living in poverty, surgical considerations in Diabetes.

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Outline the vital concepts of diabetes mellitus. **CO2:** Explain the dietary management of diabetes. **CO3:** Describe the role of diet in hypoglycemia. **CO4:** Understanding the long term complications of uncontrolled diabetes. **CO5:** Determine the treatment and management of diabetes mellitus.

COs Consistency with POs and PSOs

CO/PO/PSO	**PO**							**PSO**			
	1	2	3	4	5	6	7	1	2	3	4
CO1	S	S	S	S	L	M	M	S	S	S	S
CO2	S	S	S	S	L	L	M	S	S	S	S
CO3	S	S	S	S	S	L	M	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	L	S	S	S	S	S

***S- Strong Correlation, M- Medium Correlation, L- Low correlation, N- No correlation**

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests(Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	5	5	15	15
Understand	5	5	15	15
Apply	10	10	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	10	10	10	10
Total	**50**	**50**	**75**	**75**

References

Text Books:

- Antia F.P. And Philip Abraham-Clinical Nutrition and Dietetics, 2001, Oxford Publishing Company.
- Swaminathan S- Advanced Textbook On Food & Nutrition, 2015, Bappco
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- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001,W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics ¸ 3 edition 2009,Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick : Normal And Therapeutic Nutrition,17 th Edn, Macmillan Publishing Company.
- Shills and Young- Modern Nutrition In Health And Disease,2012, Lippincott Williams and Wilkins.
- Bennion M.: Clinical Nutrition, John Wiley & Sons.
- Whitney, E. N. and C. B. Cataldo, Understanding Normal and Clinical Nutrition, 1983, West Pub.
- Williams S. R. Essentials of Nutrition and Diet Therapy**,** 4th edn, 1986, Mosby College Pub. S. Louis.

Web Resources:

- www.anme.com.mx/libros/PrinciplesofNutrition.pdf
- *https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf*
- *krishikosh.egranth.ac.in*