

PERIYAR UNIVERSITY
Periyar Palkalai Nagar, Salem-636011

**Department of
Nutrition and Dietetics**



M.Sc. Clinical Nutrition and Dietetics
[Choice Based Credit System (CBCS)]

REGULATIONS AND SYLLABUS
(w.e.f. 2021-2022)

DEPARTMENT OF NUTRITION AND DIETETICS

PERIYAR UNIVERSITY

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 Post Graduates 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.Sc. 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							✓

DEPARTMENT OF NUTRITION AND DIETETICS
M.Sc. CLINICAL NUTRITION AND DIETETICS
SYLLABUS - Choice Based Credit system (CBCS)

Subject code	Title of the Paper	Weekly contact Hours	L	T	P	Credits	Internal Marks	External Marks	Total Marks
SEMESTER –I									
21UPCND1C01	Human Physiology	5	4	1	-	4	25	75	100
21UPCND1C02	Applied Food Science	5	4	1	-	4	25	75	100
21UPCND1C03	Human Development and Nutrition	5	4	1	-	4	25	75	100
21UPCND1C04	Food Service Management	5	4	1	-	4	25	75	100
21UPCND1CP01	Human Physiology Practical	3	-	-	3	2	40	60	100
21UPCND1CP02	Computer Applications in Human Development and Nutrition practical	3	-	-	3	2	40	60	100
21UPCND1E01	Elective –I	4	3	1	-	4	25	75	100
21UPCND1SM01	SWAYAM/MOOC online course -I	-	-	-	-	4 (Extra)	-	-	-
Total		30				24	205	495	700
SEMESTER –II									
21UPCND1C05	Clinical Nutrition and Dietetics -I	6	5	1	-	4	25	75	100
21UPCND1C06	Clinical Biochemistry	6	5	1	-	4	25	75	100
21UPCND1C07	Nutrition For sports and Exercise	5	4	1	-	4	25	75	100
21UPCND1CP03	Computer Applications in Clinical Nutrition and Dietetics –I Practical	3	-	-	3	2	40	60	100
21UPCND1CP04	Clinical Biochemistry Practical	3	-	-	3	2	40	60	100
21UPCND1E02	Elective –II	4	3	1	-	4	25	75	100
21UPCND1S01	Supportive –I	3	3	-	-	3	25	75	100
06PHR01	Human Rights (Self-study/ Value Edu)	-	-	-	-	-	25	75	100
Total		30				23	230	570	800
SEMESTER –III									
21UPCND1C08	Research Methods & Statistical Applications	5	4	1	-	4	25	75	100
21UPCND1C09	Clinical Nutrition and Dietetics-II	6	5	1	-	4	25	75	100
21UPCND1C10	Public Health Nutrition	5	4	1	-	4	25	75	100
21UPCND1C11	Hospital Administration and Practices	5	4	1	-	4	25	75	100
21UPCND1CP05	Research Methods & Statistical applications Practical	3	-	-	3	2	40	60	100
21UPCND1CP06	Computer Applications in Clinical Nutrition and Dietetics –II Practical	3	-	-	3	2	40	60	100
21UPCND1S02	Supportive-II	3	3	-	-	3	25	75	100

21UPCND1SM02	SWAYAM/MOOC online course -II	-	-	-	-	4 (Extra)	-	-	-
21UPCND1SC01	Skill Based Industrial Courses / Internships Hospital Dietary Internship Training (Mandatory during summer vacation)	60 days				4	-	100	100
Total		30				27	205	595	800
SEMESTER -IV									
21UPCND1C12	Nutraceuticals and Functional Foods	5	4	1	-	4	25	75	100
21UPCND1CP07	Nutraceuticals and Functional Foods Practical	3	-	-	3	2	40	60	100
21UPCND1CPR01	Project and Viva-voce	22	-	22	-	10	50	150	200
21UPCND1V01/ 21UPCND1V02	Value Added Course					1 (Extra)			
Total		30				16	115	285	400
Total						90	730	1970	2700

Total weekly contact hours: 120

Total number of credits: 90

Elective courses

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
21UPCND1E01	Home science education and communication	4	4	25	75	100
21UPCND1E02	Food Microbiology	4	4	25	75	100
21UPCND1E03	Extension Education	4	4	25	75	100
21UPCND1E04	Principles of Epidemiology in Nutrition	4	4	25	75	100

Supportive Papers for other PG courses

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
21UPCND1S01	Diet Therapy in Life Style Diseases	3	3	25	75	100
21UPCND1S02	Basic concepts in Dietetics	3	3	25	75	100
21UPCND1S03	Life cycle Nutrition	3	3	25	75	100
21UPCND1S04	Food Safety and Sanitation	3	3	25	75	100

Value Added Courses

Subject code	Title of the Paper
21UPCND1V01	Bakery and Confectionery
21UPCND1V02	Food Packaging

SWAYAM/MOOC online courses (Preferable)

1. Home Science
2. Communication Technologies in Education
3. Science of Clothing Comfort
4. Principles of Human Resource Management
5. Child Development

6. DETAILS OF THE COURSE

1.	No. of Core papers with practical's	:	19
2.	No. of Elective papers	:	2
3.	Supportive courses-Non-Major	:	2
4.	SWAYAM /MOOC online courses	:	2
5.	Skill based industrial course-Hospital Dietary Internship Training	:	1
6.	Project and Viva voce	:	1
8.	Self-Study /Value edu Course	:	1
9.	Value added course	:	1

7. SCHEME OF EXAMINATIONS

The scheme of examinations for different semesters shall be as follows:

Theory Paper

External: 75 Marks

Internal: 25 Marks

Total : 100 Marks

Time : 3 hours

Pattern of Question Paper:

PART – A -Objective type; answer all questions 20 X 1 = 20 Marks

PART – B -Analytical Questions (3 out of 5) 3X 5 =15 Marks

PART – C -Either or type descriptive questions 5 X 8 =40 Marks

Procedure followed for Internal Marks:

For Theory Papers

Best two out of three tests : 10 Marks

Seminar : 5 Marks

Assignment : 5 Marks

Attendance : 5 Marks

Total : 25 Marks

For Practical's

Practical Internal

Best two out of three tests: 40 Marks

Total : 40 Marks

External : **60 Marks**

For Project and viva voce

Components of evaluation are as follows

Component – I (C1): Periodic Progress and progress reports (25 marks)

Components – II (C2): Results of work and draft report (25 marks)

Components – III (C3): Final evaluation and viva-voce (150 marks). The report evaluation is for 100 marks and the Viva-voce examination is for 50 marks.

Total : 200 Marks

8. PASSING MINIMUM

- There shall be no Passing Minimum for Internal.
- For External Examination, Passing Minimum shall be of 50% (Fifty Percentage) of the maximum marks prescribed for the paper.
- In the aggregate (External + Internal) the passing minimum shall be of 50% for each Paper/Practical/Project and Viva-voce.
- Grading shall be based on overall marks obtained (internal + external).

9. RANKING

Candidates who pass all the examinations prescribed for the course in the first appearance itself alone are eligible for Ranking / Distinction. Provided in the case of candidates who pass all the examinations prescribed for the course with a break in the First Appearance due to the reasons as furnished in the Regulations under “Requirements for Proceeding to subsequent Semester” are only eligible for classification.

**M.Sc. Clinical Nutrition and Dietetics Course
SEMESTER-I**

Course Code & Title	21UPCND1C01- Human Physiology		
Class	I M.Sc.	Semester	I
Cognitive Level	K-1, K-2, K-3 & K-4		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To aid the Students to conquer knowledge about the various physiological conditions related to nutrition. • To master the structure and functions of various systems. • To correlate the normal and diseased conditions. 		

Unit	Content	Number of Hours
I	Physiology of Cell – <ol style="list-style-type: none"> a) Molecular structure of cell and its components Specialised cells of human body Type of cells and their functions b) Different tissues and their characteristics c) Body fluid compartment, membrane potential, Inter cellular communication - Homeostasis d) Special senses – structure and functions 	13
II	Respiratory System <ol style="list-style-type: none"> a) Anatomy, Physiology, mechanism and regulation of respiration b) Role of lungs in the exchange of gases c) Transport of oxygen and Co₂ d) Respiratory abnormalities: Hypoxia, hypercapnia, carbon monoxide poisoning e) Respiratory rate, air volume in lung in different conditions Digestive system: <ol style="list-style-type: none"> a) Structural and functional characteristics of parts of digestive organ b) Accessory organs c) Role of enzymes in digestion d) Structure and functions of liver e) Functions of gastrointestinal secretions 	17
III	Endocrinology and Reproduction <ol style="list-style-type: none"> a) Anatomy of endocrine glands and Reproductive organs. b) Hormones – <ul style="list-style-type: none"> - Mode of action - Functions of hormones of the endocrine glands - Pituitary, Adrenal, Thyroid, Gonadal hormones, Pancreas, Pineal body and Parathyroid Hypo and Hyper functions of the glands. <ol style="list-style-type: none"> c) Structure and functions of male and female reproduction. d) Testes: Structure of testes, functions of testosterone, deficiency of testosterone e) Ovaries: Structure of ovaries, functions of estrogens and progesterone 	15

IV	<p>Cardiovascular system</p> <p>a) Structure, Function, and electrical conduction, Circulatory system and Pulmonary and systemic circuit.</p> <p>b) Blood- Components, Blood coagulation and Enzymes in blood</p> <p>c) Lymphatic system - Functions, Components and disorder of lymphatic system</p> <p>d) Regulation of cardiac output and Blood pressure - Pathophysiology of Hypertension, Techniques to identify cardiovascular disorders –angioplasty and angiogram.</p> <p>Excretory System –</p> <p>- Formation of urine, Characteristics of urine and Normal and abnormal constituents of urine</p> <p>- Acid - base balance.</p>	18
V	<p>Immunity:</p> <p>a) Properties, Natural and acquired Immunity and Feature of immune responses</p> <p>b) Antigen - antibodies - Types, Properties and Antigen - antibody interaction, Auto immune disorder and allergy.</p> <p>c) Role in inflammation and defense.</p> <p>d) Development of Granulocytes and Agranulocytes</p>	12
Total Hours		75

References

Text Books:

- Chatterjee –Human Physiology, Edn.11, 2016, CBS Publishers.
- G K Pal - Textbook of Physiology, Vol 1& 2, Jaypee Brothers Medical Publishers
- Khurana Indu - Medical Physiology, Edn.2, 2015, Elsevier India
- Jain AK - Textbook of Physiology, Edn .7, 2017, Avichal Publishing Company
- Guyton, Textbook of Physiology, 9th Edition, 2016, W.B.Saunders Company Books Pvt. Ltd. Banglore.

Reference Books:

- Ganong, Review of Medical Physiology, 2nd Edition, Lange Medical Publication.
- Sherwood - Human Physiology, Cengage Learning, Inc; 9th edition 2014
- Fox- Human Physiology, McGraw-Hill Education; 14th edition
- Vander - Human Physiology, McGraw-Hill Education; 15 edition, 2018
- Bijlani - Textbook of Physiology, Jaypee Brothers Medical Publishers; fourth edition (2010)
- Best and Taylor - Physiological basis of medical practice, Wolters Kluwer India Pvt. Ltd.; Thirteenth edition (2011)
- Boron – Physiology, Edn.3, 2016, Elsevier
- Berne & Levy - Principles of Physiology, Elsevier - Health Sciences Division; 7th International edition , 2017

Web Resources:

- <http://physiology.forumshealth.com/>
- <https://www.pdfdrive.com/physiology-books.html>

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Outline the vital concepts of physiology and their applications in normal body maintenance.</p> <p>CO2: Discuss the Cellular functions and explain its importance in healthy life.</p> <p>CO3: Describe organ systems and its functions effectively and co-relate the role of food and nutrition in organ functioning.</p> <p>CO4: Explain and analyze the functions of hormones and their implications in disease conditions.</p>
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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	N	N	M	S	M	S	S
CO2	S	S	S	S	N	N	M	S	L	S	M
CO3	S	S	S	S	N	N	M	S	M	S	M
CO4	S	S	S	S	N	N	M	S	S	S	M

*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	10	10	20	20
Understand	10	10	15	15
Apply	20	20	25	25
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1C02- Applied Food Science		
Class	I M.Sc.	Semester	I
Cognitive Level	K-1, K-2, K-3, K-4 & K-5		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To assist the Students to apprehend the composition, classification and function of various food groups. • To analyse the factors affecting cooking and keeping quality of food. • 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. 		

Unit	Content	Number of Hours
I	<p>Cereals – Rice & wheat and other Millets- Finger millet, Foxtail millet, Sorghum, Pearl millet and Little millet a) Structure and Composition b) Nutritive Value and functionality in food system.</p> <p>Starch: a) Structure and Gluten formation b) Gelatinization and Factors affecting gelatinization c) Dextrinization and modified food starches.</p> <p>Fiber (Non-starch Polysaccharides): a) Cellulose, Hemicelluloses, Pectin, Gums and Animal polysaccharides b) Health benefits of fiber in human nutrition.</p> <p>Pluses: a) Types and Composition, b) Methods of processing & cooking and processed products.</p> <p>Proteins: a) Classification and Composition of proteins b) Dissociation, optical activity, solubility, hydration, swelling, foam formation & stabilization, gel formation, emulsifying effect, thickening & binding, amino acids in Maillard reaction, denaturation; Texturized proteins</p>	18
II	<p>Fats & Oils: a) Composition of food fats b) Modification of fats: hydrogenation- cis and trans isomers, interesterification, acetylation, winterization; Hydrolytic rancidity & oxidative rancidity; radiolysis Shortening power of fats, tenderization, emulsification, frying - smoke point, auto oxidation, Properties of fats and oils c) Fat substitutes and Trans fatty acids d) Fat deterioration and antioxidants. e) Uses of fat replacers in processed foods.</p> <p>Fruits and Vegetables: a) Structure, Composition</p>	15

	<p>b) Pectin and Plant acids c) Types of pigments. d) Effect of cooking on colour and texture of vegetables. e) Browning reactions-Enzymatic & non-enzymatic and its prevention.</p>	
III	<p>Milk and Milk Products: a) Composition, Nutritive value, Physical and functional properties. b) Processing of different products like milk powders, ghee, khoa, butter, paneer, cheese, milk products and ice creams.</p> <p>Eggs: a) Quality grading, Structure, composition and changes during storage b) Functional properties of eggs, uses in cookery c) Egg processing d) Low cholesterol egg substitutes in health system.</p>	15
IV	<p>Flesh foods a) Types, Composition and structure of muscle b) Ripening of meat and Tenderizing of meat c) Cooking and processing.</p> <p>Marine foods (Fish and Seaweeds) a) Types and Composition b) Criteria for fish and seaweed selection c) Fish and seaweed products</p> <p>Sugar and Jaggery a) Principles of sugar crystallization, b) Stages of cookery and role in Indian traditional sweet preparations c) Manufacturing of candies and sweets d) Artificial Sweeteners – list, structure, taste profile, permitted list, usage levels and food applications.</p>	15
V	<p>Sensory evaluation of foods a) Sensory characteristics of foods b) Types of sensory test, sensitivity test and objective evaluation.</p> <p>Food additives: a) Definition and Needs for food additives b) Different food additives and food safety c) JECFA and Food Chemical Codex standards for food additives, d) GMP and permissible upper levels of food additives under Indian food laws.</p> <p>Packaging a) Importance, functions & types of packaging material.</p>	12
	Total Hours	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, 8thEdn, 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 thEdn, 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 Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Cite and explain the chemistry, structure and composition underlying the properties of various food components.</p> <p>CO2: Ascertain the major chemical reactions that occur during food preparation and storage.</p> <p>CO3: Apply food science knowledge to describe functions of ingredients in food.</p> <p>CO4: Plan appropriate sensory evaluation tests to answer specific questions regarding food attributes or consumer preferences.</p> <p>CO5: Describe techniques that can be used to monitor quality of raw ingredients and final packaged products.</p>
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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	L	L	M	L	S	S	L	L
CO2	S	S	S	S	M	L	M	S	S	M	L
CO3	S	S	S	S	N	M	M	S	S	S	M
CO4	S	S	S	M	L	S	S	S	S	S	L
CO5	S	S	S	S	M	S	N	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	10	20	20
Understand	15	10	15	15

Apply	10	15	15	15
Analyse	10	10	15	15
Evaluate	10	5	10	10
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1C03 - Human Development and Nutrition		
Class	II M.Sc.	Semester	I
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To know the importance of nutrition during life span and also to enlighten on the RDA and dietary modifications for different age groups. • Develop aptitude to learn the stages of growth and development of different age groups • To familiarize the theories of growth and development of all ages. 		

Unit	Content	Number of Hours
I	<p>Recommended allowances</p> <ol style="list-style-type: none"> RDA for Indians, basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. General concepts about growth and development through different stages of life. <p>Nutrition in Pregnancy</p> <ol style="list-style-type: none"> Physiology of pregnancy Stages of gestation, maternal weight gain Nutritional requirements and dietary guidelines during and prior to pregnancy Nutrition related complications with special focus to Adolescent Pregnancy and general complications of pregnancy HIV/AIDS during pregnancy – Dietary concerns Role of Exercise & Fitness during pregnancy 	15
II	<p>Nutrition during Lactation</p> <ol style="list-style-type: none"> Physiology of Lactation, hormonal control and reflex action Human milk composition Nutritional requirements & dietary guidelines Benefits of Breast Feeding Galactogogues Lactation Management in Normal & Special conditions <p>Nutrition in infancy</p> <ol style="list-style-type: none"> Growth and development and nutrient needs Feeding in early and late infancy and Feeding problems and Weaning foods Common nutrition problems Feeding Preterm and low birth weight infants 	18
III	<p>Preschool and Childhood</p> <ol style="list-style-type: none"> Growth and development –stage, Theories – Maturationist theory, Behaviorist theory, Eriksons psycho analytical theory, Piagets cognitive theory, Vygotsky’s theory. Nutritional requirements Nutrition for special children- Autism Feeding problems Factors to be considered for menu planning and packed lunch 	13
IV	Adolescence	

	<p>a) Growth and development –stages, Theories – Freud’s psychosexual stage theory, Kohlberg’s moral understanding stage theory, and Bronfenbrenner’s ecological theory.</p> <p>b) Physiological and Psychological changes</p> <p>c) Nutritional requirements of adolescents</p> <p>Nutrition situation with special needs in adolescence</p> <p>a) Pregnancy</p> <p>b) Eating disorders</p> <p>Adulthood</p> <p>a) Theories of Adult Development: Levinson, Vaillant & Neugarten</p> <p>b) Physiological and Psychosocial changes</p> <p>c) Common nutritional concerns</p> <p>d) Nutritional requirements and dietary recommendation</p> <p>e) Physical Activity in adulthood</p>	14
V	<p>Elderly</p> <p>a) Theories of Aging –</p> <ul style="list-style-type: none"> - Theory Building in Aging- Historical Development of Theories of Aging, Models and Explanation, Theory Development and Research Design in Aging. - Biological Theories of Aging - Biological Theories of Senescence, Stress Theories of Aging. - Psychological Theories of Aging- Theories of Cognition, Theories of Everyday Competence, Social-Psychological Theories. - Sociological Theories of Aging - Anthropological Theories, Life Course Theories, Social Theories of Aging. <p>b) Nutritional requirements of the Elderly</p> <p>Nutrition needs during illness and chronic conditions</p> <p>a) Sensory loss, Oral health and GI functions</p> <p>b) Neuromuscular and skeletal functions</p> <p>c) Renal and cardiac function</p> <p>d) Immuno-competence</p>	15
	Total Hours	75

References

Text Books:

- Brown, J. E-Nutrition through the Life Cycle, 6edn., 2016, Cengage Learning.
- Mahan L. K. & Stump S.E Krause’s - Food Nutrition and diet Therapy, 11edn, 2003, Saunders.
- B.Srilakshmi - Nutrition Science, 2006, New Age International.

Reference Books:

- Groff, J. L and Gropper, S. S- Advanced Nutrition and Human Metabolism, Belmont CA: Wads worth/Thomson Learning.
- Goodhart, R. S. S. and Shils, M. E - Modern Nutrition in Health and Disease, Philadelphia: Lea and Febiger.
- Jackson, M. S - Adolescent Nutritional Disorders, 1997, The New York Academy of Science.
- Jelliffe D.B- Assessment of Nutrition Status of the Community, 1966, WHO, Geneva.

Web Resources:

- <https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-different-ages>.
- <https://www.nutrition.org.uk/nutritionscience/life.html>
- <http://www.open.edu/openlearncreate/mod/oucontent/view.php>

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Define the nutritional needs of each age group.</p> <p>CO2: Infer the appropriate theories to distinguish the developmental milestones.</p> <p>CO3: Co-relate the physiological and psychological changes adhering to all age groups.</p> <p>CO4: Interpret the nutritional problems pertaining to different ages.</p>
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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	S
CO2	S	S	S	S	M	M	S	S	S	S	S	S
CO3	S	S	S	S	L	L	S	S	S	S	S	S
CO4	S	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	10	10	20	20
Understand	10	10	20	20
Apply	15	15	15	15
Analyse	15	15	20	20
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1C04- Food Service Management		
Class	I M.Sc.	Semester	I
Cognitive Level	K-1, K-2, K-3, K-4 & K-5		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To develop core knowledge in key areas of various Food Service Systems, its development and also in administration. • To gain efficacy in principles of management. • To progress in food production, standardisation and serving techniques. 		
Unit	Content		Number of Hours
I	<p>Food service Institutions and management</p> <ol style="list-style-type: none"> a) History and development b) Definition and importance c) Factors affecting development of Food Service institutions d) Principles, tools and functions of organizations e) Recent trends in food service institutions <p>Various types of food service institutions</p> <ol style="list-style-type: none"> a) Commercial and Non-commercial conventional, commissary, ready prepared and assembly/serve. b) Various approaches in the management of Food service Institutions. - traditional- systems approach-MBO and TQM 		15
II	<p>Food Service Unit Layout and Design</p> <ol style="list-style-type: none"> a) Steps and different types of Planning, b) Various Phases of layout and Various factors influencing layout design c) Pointing work centers d) Work pattern. <p>Equipments</p> <ol style="list-style-type: none"> a) Classification, Selection and Design b) Factors influencing selection of various equipments c) Base materials and finishes in food industries d) Installation and operation e) Care and maintenance of equipments. 		15
III	<p>Food production & service</p> <ol style="list-style-type: none"> a) Type of menu, techniques of menu writing b) Importance, principles of Menu Planning in Food Service institutions c) Procedures and techniques used in Institutional and Commercial Food Production d) Standardization of recipe, food cost, SWOT Analysis. and portion control e) Principles involved in large Scale Cooking and utilization of left over foods in food service institutions. f) Food Service <ul style="list-style-type: none"> - Formal and informal types - Styles of food services - Centralized and decentralized system of service 		15

IV	<p>Material management</p> <p>a) Principles of quantity food purchase</p> <ul style="list-style-type: none"> - Selection, Methods of buying and Receiving - Methods of delivery and accounting of different foods <p>b) Inventory management</p> <ul style="list-style-type: none"> - Assessing requirements and Receiving and release of stocks <p>c) Types of Storage, maintenance of food quality in Storage and store record maintenance</p> <p>d) Marketing and E-Marketing – definition, function, marketing mix, sales promotion, selling techniques and advertisement</p> <p>Personnel management</p> <p>a) Definition, development and policies</p> <p>b) Sources of recruitment, Selection, Induction, training, wages, salaries, incentives, promotion, demotion, transfer, dismissal. Managerial problems of Food Service Unit.</p> <p>c) Labor laws and other legal aspects</p>	15
V	<p>Financial management</p> <p>a) Types of budget, Records for purchase, Receiving, Storage and Production</p> <p>b) Service and income and expenditure record.</p> <p>c) Costing and cost control-</p> <ul style="list-style-type: none"> - Factors affecting cost control - Importance and Components of Costing - Breakeven Analysis - Determining Selling Price of Food - Checklist for Cost Control <p>Hygiene and sanitation in preparation and serving area</p> <p>a) Personal hygiene</p> <p>b) Types and sources of contamination</p> <p>c) Prevention and safety measures</p> <p>d) Methods of controlling infestation.</p> <p>e) Methods of dish washing</p>	15
Total Hours		75

References

Text Books:

- West, B. B. and Wood, L. - Food Service in Institutions, 1979, John Wiley, New York
- Wood, C; Kluge, E, Annssem, P. E- The Anatomy of Food Service Design, 1978, C. B. I. Publishing Co Inc.
- Sethi, M; Malhan, S. - Catering Management; An integrated approach, 1997, New Age International.
- Kotler, P., (2019), Principles Of Marketing, 13th edition, Pearson.

Reference Books:

- Livingston, G.E. -Food Service Systems-Analysis, Design and Implementation, 1979, Academic press
- Powers, T. F. and Powers, T. M. - Food Service Operations Planning and Control, 1984, John Wiley & Sons.
- Buchanan, R. D- The Anatomy of Food Service Design, 1975, CAHNERS Publ. Co. Inc.
- Boella, M. J. - Personnel Management in the Hotel and Catering Industry, 1983, Hutchinson, London.
- T. Ramaswamy - Principles of Management, 2014, Himalaya publishing house.
- Hitchcock, M. J - Food Service Systems Administration, 1980, Prentice Hall.

Web Resources:

- <https://theicn.org/management-and/inventory-tracking-and-managment-guide.pdf>
- <https://www.scribd.com/document/119449120/History-of-Food-Service-Industry>
- cte.sfasu.edu > Hospitality and Tourism > Practicum in Culinary Arts

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Differentiate and contrast the types of foodservice offered in a variety of foodservice settings.</p> <p>CO2: Relate food services technology to design layout and operate industry equipment.</p> <p>CO3: Apply nutritional standards as expected in Food Service Management Fields.</p> <p>CO4: Demonstrate an understanding of human resource management, financial management, and quality control.</p> <p>CO5: Perform essential food production and cost control skills.</p>
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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	M	L	S	S	M	S	S	N	S
CO2	M	M	M	L	S	S	L	S	S	N	S
CO3	M	M	M	L	S	S	S	S	S	N	S
CO4	M	M	M	L	S	S	S	S	S	N	S
CO5	M	M	M	L	S	S	L	S	S	N	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	10	10	20	20
Understand	10	10	15	15
Apply	15	20	15	15
Analyse	10	5	15	15
Evaluate	5	5	10	10
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	18UPCND1CP01- Human Physiology Practical		
Class	I M.Sc.	Semester	I
Cognitive Level	K-1, K-2, K-3, K-4 & K-5		
Course Objectives	The Course aims <ul style="list-style-type: none"> To provide practical experience on physiological concepts. To govern measurement techniques and investigations in blood and urine samples. 		

Unit	Content	Number of Hours
1	Microscopic examination of various tissues and blood vessels a. Epithelial Tissue b. Connective Tissue c. Muscular tissue	12
2	Microscopic examination of various tissues and blood vessels a. Nervous Tissue b. Digestive tissue c. Respiratory Tissue	
3	Microscopic examination of various tissues and blood vessels a. Reproductive system b. Excretory system c. Pancreas	
4	Estimation of the Bleeding Time And Clotting Time	10
5	Measurement of B.P, Pulse Rate - Before And After Mild, Moderate And Strenuous Exercise or activity	
6	Measurement of Blood Pressure and Pulse Rate	13
7	Determination of Blood Grouping and Rh Factor	
8	Determination of White Blood Cell Count and Red Blood Cell Count	
9	Estimation of the blood Haemoglobin Concentration	
10	Investigation of the Urine Sediment using microscope	10
11	Detection of Protein in Urine	
12	Detection of Acetone in Urine	
	Total Hours	45

References

Text Books:

- Ghai – A Textbook of Practical Physiology, Jaypee Brothers Medical Publishers
- G.K.Pal - Textbook of Practical Physiology, Jaypee Brothers Medical Publishers

Reference Books:

- Stirling, William – Outlines of Practical Physiology, Blakiston & Co.
- Manual of Practical Physiology-A.K.Jain, Mittal books.

Web Resources:

- www.tnmgrmu.ac.in

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Identify and functionally describe the different tissues and blood vessels.</p> <p>CO2: Utilise core instrumentation and equipment for the measurement of blood pressure.</p> <p>CO3: Review, analyse, assess and interpret independently generated results from blood and urine samples.</p>
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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	N	L	L	N	L	S	M	L	L
CO2	S	S	L	M	S	L	L	S	S	M	M
CO3	S	S	L	M	M	L	L	S	S	M	M

*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	10	10	10
Apply	15	15	10	10
Analyse	15	15	15	15
Evaluate	20	15	15	15
Create	-	-	-	-
Total	60	60	60	60

Course Code & Title	21UPCND1CP02 – Computer Applications in Human Development and Nutrition Practical		
Class	II M.Sc.	Semester	I
Cognitive Level	K-1, K-2, K-3, K-4, K-5 & K-6		
Course Objectives	The Course aims <ul style="list-style-type: none"> To enable the students to develop menu for each age group, which meet nutritional requirements needs. To expertise in dietary modification required for different age group. 		

S.No	Exercises	Number of Hours
1.	Menu planning for Pregnancy	6
2.	Menu planning for Lactation	6
3.	Menu planning for Infants- Supplementary feeding - Preparation of weaning foods	6
4.	Menu planning for Pre-school children	5
5.	Menu planning for School going children- meals and packed lunch	6
6.	Menu planning for Adolescence	5
7.	Menu planning for Adult with different working category- sedentary, moderate and heavy worker	6
8.	Menu planning for Elderly people	5
	Total Hours	45

References

Text Books:

- Brown, J. E-Nutrition through the Life Cycle, 6edn., 2016, Cengage Learning.
- Mahan L. K. & Stump S.E Krause's - Food Nutrition and diet Therapy, 11edn, 2003, Saunders.
- B.Srilakshmi - Nutrition Science, 2006, New Age International.

Reference Books:

- Groff, J. L and Gropper, S. S- Advanced Nutrition and Human Metabolism, Belmont CA: Wads worth/Thomson Learning.
- Goodhart, R. S. S. and Shils, M. E - Modern Nutrition in Health and Disease, Philadelphia: Lea and Febiger.
- Jackson, M. S - Adolescent Nutritional Disorders, 1997, The New York Academy of Science.
- Jellife D.B- Assessment of Nutrition Status of the Community, 1966, WHO, Geneva.

Web Resources:

- <https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-different-ages>.
- <https://www.nutrition.org.uk/nutritionscience/life.html>
- <http://www.open.edu/openlearncreate/mod/oucontent/view.php>

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Define the nutritional needs of each age group.</p> <p>CO2: Infer the appropriate principles in diet planning for developmental milestones.</p> <p>CO3: Co-relate the physiological and psychological needs while designing menu.</p> <p>CO4: Interpret and discuss the nutritional values of developed menu with RDA using software.</p>
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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	S
CO2	S	S	S	S	M	M	S	S	S	S	S	S
CO3	S	S	S	S	L	L	S	S	S	S	S	S
CO4	S	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	5	5
Understand	5	5	5	5
Apply	5	10	10	10
Analyse	15	10	10	10
Evaluate	15	15	15	15
Create	15	15	15	15
Total	60	60	60	60

**M.Sc. Clinical Nutrition and Dietetics Course
SEMESTER-II**

Course Code & Title	21UPCND1C05- Clinical Nutrition & Dietetics-I		
Class	I M.Sc.	Semester	II
Cognitive Level	K-1, K-2, K-3, K-4 & K-5		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To facilitate the students to realize the principles of diet. • To expertise in the dietary modifications for different diseases. • To develop the proficiency of becoming successful clinical dietitians. 		

Unit	Content	Number of Hours
I	Clinical Nutrition and Dietetics <ol style="list-style-type: none"> a) Definition and history of dietetics. b) Dietitian as part of the Medical Team c) Nutritional Screening and care <ul style="list-style-type: none"> - Nutritional Assessment - Diagnosis - Intervention and evaluation. Diet, Nutrient and Drug Interaction <ol style="list-style-type: none"> a) Effect of drugs on ingestion, Digestion, Absorption and metabolism of nutrients. b) Effect of foods, nutrients and nutritional status on drug dosage and efficacy. Diet Modifications <ol style="list-style-type: none"> a) Normal diet as a basis for therapeutic diets b) Routine Hospital Diet c) Feeding methods <ul style="list-style-type: none"> - Enteral Nutrition -Site, Different tube sizes, Different types of feeds, Composition and Delivery methods and its complications. - Parenteral Nutrition- Type of access, Parenteral nutrition solutions/composition, Administration methods, Monitoring & complications. 	17
II	Dietary management in deficiency diseases <ol style="list-style-type: none"> a) Aetiology, Symptom and Diagnostic tests and Dietary treatment for PEM, Vitamin A and Anaemia Dietary management in febrile condition <ol style="list-style-type: none"> a) Classification and etiology of fever/infection, symptoms, diagnostic tests , Metabolic changes during infection and dietary treatment for <ul style="list-style-type: none"> - Typhoid, Influenza, Malaria, Tuberculosis and HIV & AIDS Diet for weakened immune system- Neutropenic diet, COVID, Dengue Dietary management in allergy <ol style="list-style-type: none"> a) Definition, Symptoms and Diagnostic tests 	20

	<ul style="list-style-type: none"> b) Common food allergens and Mechanism of food allergy c) Elimination diets d) Milk allergy in infants and prevention of food allergy. 	
III	<p>Dietary management in Surgery</p> <ul style="list-style-type: none"> a) Nutrition in wound healing b) Stage of Convalescence c) Dietary management for pre and post- surgical diets. <p>Dietary management in Burns</p> <ul style="list-style-type: none"> a) Classification and Complications b) Metabolic changes in protein and electrolytes c) Dietary management & mode of nutrition support for burns and wound management of burns. <p>Dietary management in Trauma</p> <ul style="list-style-type: none"> a) Physiological, metabolic and hormonal response to injury b) Dietary management in trauma <p>Dietary management in Sepsis</p> <ul style="list-style-type: none"> a) Definition and Dietary management of Sepsis with or without Multiple Organ Dysfunction Syndrome (MODS) 	19
IV	<p>Dietary management in Weight Imbalance</p> <ul style="list-style-type: none"> a) Prevalence and Classification b) Components of body weight c) Guidelines for Calculating Desirable body weight. <p>Dietary management in Obesity</p> <ul style="list-style-type: none"> a) Etiology, Classification and Energy balance b) Physiology of the obese state & Clinical manifestations c) Risk factors, Complications and Lifestyle modifications d) Nutraceuticals and Dietary management <p>Dietary management in Underweight</p> <ul style="list-style-type: none"> a) Etiology and dietary management 	18
V	<p>Dietary Management in Gout</p> <ul style="list-style-type: none"> a) Etiopathology, Role of proteins and purines, clinical features and complications, Management of gout <p>Dietary Management in Bone Health disorders</p> <ul style="list-style-type: none"> a) Prevalence, Types and Etiology and Role of Calcium, Phosphate & Vitamin D in Osteoporosis and Osteomalacia. b) Measurement of Bone Mass Using Bone Mineral Density (BMD) and Peak Bone Mass (PBM). 	16
	Total Hours	90

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, 8thEdn, 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 LivingStone.

- 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 Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Elucidate the importance of interdisciplinary approaches to the management of nutritional problems and the promotion of nutritional health and well-being.</p> <p>CO2: Assess the nutritional status of critically ill patients</p> <p>CO3: Determine the dietary essentials for recovery and maintenance of various systems.</p> <p>CO4: Describe the etiology, symptoms and dietary management of deficiency diseases and febrile conditions.</p> <p>CO5: Explain, analyze and diagnose the causes of allergy.</p>
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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	S	M	S	S	S	S
CO2	S	S	S	S	L	S	M	S	S	S	S
CO3	S	S	S	S	L	S	M	S	S	S	S
CO4	S	S	S	S	L	S	M	S	S	S	S
CO5	S	S	S	S	L	S	M	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	10	5	20	20
Understand	10	15	20	20
Apply	20	15	15	15
Analyse	5	10	10	10
Evaluate	5	5	10	10
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1C06- Clinical Biochemistry		
Class	I M.Sc.	Semester	II
Cognitive Level	K-1, K-2, K-3, K-4, K-5		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To enable the students to understand the various mechanism adopted by the human body for the regulation of metabolic cycles. • To learn the interrelationship between various metabolic pathways. • To skill the sources, functions and deficiency conditions of macro and micro nutrients. 		

Unit	Content	Number of Hours
I	<p>Body fluids, Hormones, Enzymes and Bioenergetics</p> <p>Components of blood</p> <ol style="list-style-type: none"> Composition and function of blood Plasma and blood corpuscles Structure and function of haemoglobin, abnormal haemoglobins. Mechanism of blood clotting - intrinsic and extrinsic pathway Blood groups <p>Water and electrolyte</p> <ol style="list-style-type: none"> Regulation of water and electrolyte balance Hydrogen ion homeostasis and acid-base balance. <p>Hormones and Enzymes</p> <ol style="list-style-type: none"> Mechanism of hormone action and its regulation. Hormones of Pancreas, Pituitary, Adrenal, Thyroid and Sex hormones. Enzymes in differential diagnosis of diseases and their clinical significance. <p>Bioenergetics</p> <ol style="list-style-type: none"> Electron transport chain, Oxidative Phosphorylation and synthesis of ATP. 	18
II	<p>Carbohydrates</p> <ol style="list-style-type: none"> Occurrence, Classification and Structure, Physic-chemical properties, Isomerism and biological importance of carbohydrates. Monosaccharide and related compounds, disaccharides and Polysaccharides. <p>Metabolism of carbohydrates</p> <ol style="list-style-type: none"> Glycogenesis and Glycogenolysis Glycolysis and Gluconeogenesis Cori's cycle, Pyruvate Dehydrogenase complex Krebs-cycle and Pentose phosphate pathway Regulation of carbohydrate metabolism. Sugar derivatives of biomedical importance and Inter conversion of Hexoses. Galactosemia and Glycogen storage diseases. 	17

III	<p>Proteins</p> <ul style="list-style-type: none"> a) Classification, structure and properties of amino acids and proteins b) Assessment of protein quality <p>Metabolism of Proteins</p> <ul style="list-style-type: none"> a) General reactions of protein metabolism b) Amino acids – Types, Therapeutic application of specific amino acids c) Inborn errors of protein metabolism –PKU, MSUD d) Metabolism of amino acids <ul style="list-style-type: none"> - Decarboxylation, Transamination, Deamination, Glycine, Tyrosine, Tryptophan, Methionine and urea cycle. e) Pathology and differential diagnosis of gout, treatment of gout f) Nucleic acids- Biosynthesis and degradation of purines and pyrimidine's and their regulation. 	19
IV	<p>Lipids</p> <ul style="list-style-type: none"> a) Structure and Biological importance and distribution of fats and fatty acids. b) Chemical properties and characterization of fats. <p>Metabolism of Lipids</p> <ul style="list-style-type: none"> a) Biosynthesis of saturated and unsaturated fatty acids b) β-Oxidation of fatty acid c) Biosynthesis of glycerides, phospholipids and cholesterol. d) Regulation of lipid metabolism and ketone bodies. e) Disorders of lipid metabolism, lipoproteins and their significance. f) Fat absorption, transport, storage and metabolism, Investigation and principles of treatment of hyperlipidemias 	18
V	<p>Vitamins</p> <ul style="list-style-type: none"> a) Historical Background, Structure, Metabolism, Absorption and Transport Food Sources, Interactions with other Nutrients therapeutic Effects, Toxicity And Deficiency of following vitamins <ul style="list-style-type: none"> - Fat soluble Vitamins: A, D, E, & K - Water Soluble vitamins: Thiamine, riboflavin, niacin, ascorbic acid, folic acid, biotin, pyridoxine, pantothenic acid, cyanocobalamin, choline and inositol <p>Macro minerals</p> <ul style="list-style-type: none"> a) Sources, Recommended Dietary Allowances, Requirements, Function, Metabolism and Bio-availability, Deficiency and toxicity of phosphorus, calcium, magnesium, sodium, potassium and chloride. <p>Micro minerals</p> <ul style="list-style-type: none"> a) Sources, Recommended Dietary Allowances, Requirements and Function, Metabolism, bio-availability, deficiency and toxicity of Iron, copper, iodine, fluoride, zinc and manganese. 	18
Total Hours		90

References**Text Books:**

- AmbikaShanmugam- Fundamentals of Biochemistry for Medical Students, 8th edition, 2016, Wolters Kluwer India Pvt. Ltd
- Lehinger et al. – Principles of Biochemistry, 7th ed. 2017 WH Freeman.
- Satyanarayana.U –Essentials of Biochemistry, 2ndedn, 2008, Books And Allied (p) Ltd
- Devlin: Textbook of Biochemistry with clinical correlation, 7thEdn, 2010, John Wiley and Sons Publishers.

Reference Books:

- Devin. T.M- Text book of Biochemistry with Clinical Correlations, 1997, 4th Ed., WileyLiss Inc.
- Voet and Prat- Fundamentals of Biochemistry , 8 thEdn, 2004, John Wiley & Sons
- Conn, stumpf. et .al. Outlines of Biochemistry, 2001, 5th Ed John Wiley and Sons.
- Murray et. al. – Harpers Illustrated Biochemistry, 2000, 25thEdn, Macmillan Worth Publishers.

Web Resources:

- www.virutal library biochemistry
- [http:// themedicalbiochemistrypage.org](http://themedicalbiochemistrypage.org)

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Summarize the basic concepts of biochemistry.</p> <p>CO2: Explain the metabolism of macro and micro nutrients.</p> <p>CO3: Describe the mechanism of body fluids and bioenergetics.</p> <p>CO4: Determine the inborn errors of metabolism.</p> <p>CO5: Discuss the bioavailability, excess and deficiency conditions of all nutrients.</p>
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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	M	L	M	M	M	M	M	M	M
CO2	S	S	S	M	L	L	M	M	L	S	L	L
CO3	S	S	S	S	L	L	M	S	L	S	L	L
CO4	S	S	S	S	L	L	S	S	M	M	L	L
CO5	S	S	S	S	L	M	S	S	S	S	M	M

*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	10	10	20	20
Understand	10	15	25	25
Apply	15	10	10	10
Analyse	10	10	10	10
Evaluate	5	5	10	10
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1C07- Nutrition for Sports and Exercise		
Class	I M.Sc.	Semester	II
Cognitive Level	K-1, K-2, K-3 & K-4		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To enable the students to understand the special nutritional requirements for physical activities related to sports and exercise • To apply the nutritional knowledge on sports to improve the performance of sports persons. • To acquaint with different types of ergogenic aids. 		

Unit	Content	Number of Hours
I	<p>Introduction</p> <p>a. Nutritional intake concerns for athletes in sport and exercise;.</p> <p>b. Types of exercise (aerobic and anaerobic) and limiting factors, Exercise intensity and duration</p> <p>c. Fluid balance in sports and exercise, importance, symptoms and prevention of dehydration, Sports drink</p>	14
II	<p>Macro Nutrients</p> <p>a. Carbohydrate as an energy source for sport and exercise.</p> <p>b. Carbohydrate stores,</p> <p>c. Fuel utilisation during rest and exercise.</p> <p>d. CHO Loading- ATP-PC Changes and lactate changes</p> <p>e. CHO composition for pre exercise, during and recovery period.</p> <p>f. Diets for persons with</p> <p>- High energy requirements, Stress, Fracture and Injury</p>	16
III	<p>Protein and amino acid requirements</p> <p>a. Protein turnover during endurance versus resistance training;</p> <p>b. Protein requirement and metabolism during endurance exercise</p> <p>c. Significance of protein in Resistance exercise and recovery process.</p> <p>d. Protein supplement.</p>	15
IV	<p>Role of Fat as an energy source for sports and exercise</p> <p>a) Fat stores,</p> <p>b) Regulation of fat metabolism</p> <p>c) Factors affecting fat oxidation (intensity, duration , training status, CHO feeding)</p> <p>d) Amount of fat recommended for varying level of training, fitness or recreational sports.</p>	15
V	<p>Important micronutrients for exercise</p> <p>a. B complex vitamin and specific minerals.</p> <p>b. Antioxidant effects to reduce exercise induced oxidative stress;- Antioxidant requirements for exercise.</p> <p>c. Female athletic triad and Sports anemia-Assessment for fat; Dietary guidelines and suggestions for fat. Eating disorder.</p> <p>d. Ergogenic Supplements</p> <p>d. Doping control and Supplement testing</p>	15
	Total Hours	75

References**Text Books:**

- Srilakshmi et al. - Exercise Physiology, Fitness and Sports Nutrition, 2016, New Age International Private Limited
- Dan Benardot – Advanced Sports Nutrition, 2011, 2 edition Human Kinetics, Inc.
- Suzanne Girard Eberle – Endurance Sports Nutrition, 2013, 3rd edn. Human Kinetics, Inc.

Reference Books:

- Nancy Clarke’s- Sports Nutrition Guidebook, 2015, 3rd edn. Human Kinetics, Inc.
- Anita Bean – A Complete Guide to Sports Nutrition, 8 edition , 2017, Bloomsbury Sport
- Louise Burke – Clinical Sports Nutrition, 2018, 5th edn. Human Kinetics, Inc.

Web Resources:

- <http://www.aco.org.nz/pdf/nutrition-for-sports>
- https://www.researchgate.net/publication/258630492_Sports_Nutrition_Book_2013
- <http://themedicalbiochemistrypage.org>

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Apply the art and science of sports nutrition for the wellness of sports personnel.</p> <p>CO2: Relate the role and importance of macro and micro nutrients in body maintenance of sports enthusiasts.</p> <p>CO3: Describe the dietary supplements for different sports activities.</p> <p>CO4: Discuss the role of nutrition in physical performance, recovery and adaptations to exercise.</p>
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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	M	L	M	M	S	M	M	M
CO2	S	S	S	M	L	M	M	M	L	S	M
CO3	S	S	S	S	L	M	M	S	L	S	M
CO4	S	S	S	S	L	M	S	S	M	M	M

*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	15	15	20	20
Understand	15	10	25	25
Apply	10	15	15	15
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1CP03- Computer Applications in Clinical Nutrition and Dietetics-I Practical		
Class	I M.Sc.	Semester	II
Cognitive Level	K-3, K-4, K-5 & K-6		
Course Objectives	The Course aims <ul style="list-style-type: none"> To provide training in the planning and preparation of therapeutic diets using software. Expertise in various feeding formulas and techniques. 		

Unit	Content	Number of Hours
1.	Development of a Ready – Reckoner for calculating nutrient content of various foods, portion size and volume, conversion of cooked to raw equivalent of various foods	10
2.	Diet Therapy: Routine hospital diet, Regular diet, Light diet, Soft diet, Full liquid diet, Bland diet, Formula diets available in markets. Write suitable recipes for the above modified diets	
3.	Preparation and laboratory trial of formulas for enteral feeding- Home based and commercial supplement feeds.	10
4.	Diet in fevers and infections – Typhoid, Malaria and Tuberculosis	
5.	Planning and preparation of diet for HIV with and without comorbidities	
6.	Diet in deficiency diseases - Anaemia, vitamin A and PEM	11
7.	Planning and preparation of diet for the gout patient based on the treatment and other conditions	
8.	Preparing nutrient dense -high calorie and high protein recipes and Preparing high fiber low calorie recipes for Pre & post Bariatric Surgery patients	11
9.	Diet therapy for post burn condition	
10.	Planning diet for Obesity and underweight individuals.	
11.	Learning how to use different nutrition assessment tools -MNA, MUST etc	3
	Total Hours	45

References

Text Books:

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

Web Resources:

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

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Assess the nutritional status using various nutritional assessment tools.</p> <p>CO2: Develop a ready –reckoner for calculating nutrient content of various foods in normal persons and the ability to modify for given disease conditions.</p> <p>CO3: Apply the principles of diet and determine the dietary essentials for recovery from critical illness.</p> <p>CO4: Plan menu for the given disease condition and compare and contrast with R.D.A using software.</p>
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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	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	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	-	-	-	-
Understand	-	-	-	-
Apply	15	10	10	10
Analyse	15	15	10	10
Evaluate	15	15	15	15
Create	15	20	25	25
Total	60	60	60	60

Course Code & Title	21UPCND1CP04 -Clinical Biochemistry Practical		
Class	I M.Sc.	Semester	II
Cognitive Level	K-1, K-2, K-3, K-4 & K-5		
Course Objectives	The Course aims <ul style="list-style-type: none"> To provide practical laboratory training in the estimation of various clinical parameters in blood and urine. Acquire skills in using laboratory instruments. 		

Unit	Content	Number of Hours
1.	Estimation of Blood Glucose	9
2.	Estimation of Total Protein	
3.	Estimation of Cholesterol in Blood	9
4.	Determination of Serum Creatinine	
5.	Estimation of Serum Iron	9
6.	Estimation of Serum Urea	
7.	Estimation of Calcium in Urine	9
8.	Estimation of Urea in Urine	
9.	Estimation of Creatinine in Urine	9
10.	Estimation of Uric Acid	
	Total Hours	45

<p>References</p> <p>Text Books:</p> <ul style="list-style-type: none"> Varley, H. Gownakah and Hell-Practical clinical biochemistry, 1980, CBC Publishers, NewDelhi. Plummer, D.T - An Introduction to Practical Biochemistry, McGraw- Hill (UK) King, E.J. and Wootton, I.D.P - Micro-Analysis in Medical Biochemistry, J. & A. Churchill. <p>Reference Books:</p> <ul style="list-style-type: none"> Raghuramulu, N. Nair, K, M, Kalyanasundaram-Manual of laboratory techniques, Second Edition 2003, ICMR. Jayaraman. J - Laboratory manual in Bio Chemistry,2011, New Age International Private Limited

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Compare and contrast the values of estimation with normal and diseased conditions.</p> <p>CO2: Apply the principles to estimate various parameters in blood.</p> <p>CO3: Apply the principles to estimate various parameters in urine.</p>
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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	M	S	S	S	S	S
CO2	S	S	S	S	S	L	S	M	M	L	L
CO3	S	S	S	S	S	L	S	M	M	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	15	10	10	10
Understand	15	10	15	15
Apply	10	15	10	10
Analyse	10	15	10	10
Evaluate	10	10	15	15
Create	-	-	-	-
Total	60	60	60	60

Course Code & Title	21UPCND1SC01- Hospital Dietary Internship		
Class	I M.Sc.	Semester	II (Summer Vacation)
Cognitive Level	K-3, K-4, K-5 & K-6		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To create opportunities to explore the interests of students in clinical nutrition and dietetics. • To develop professional skills and competencies as clinical dietitians. • To apply what is learnt theoretically to actual practice. • To infer with career development by providing real work experiences. 		

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Identify the different disease conditions.</p> <p>CO2: Interpret the relevance of food and nutrition for the disease.</p> <p>CO3: Devise an individualized diet plan for patients.</p> <p>CO4: Compare and contrast the derived nutritive values with R.D.A using software.</p> <p>CO5: Persuade the patients with appropriate diet counselling techniques.</p>
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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	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	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**

**M.Sc. Clinical Nutrition and Dietetics Course
SEMESTER-III**

Course Code & Title	21UPCND1C08 - Research Methods & Statistical Applications		
Class	II M.Sc.	Semester	III
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	The Course aims <ul style="list-style-type: none">• To provide sound knowledge on the fundamental principles and techniques of methodology concerning research in nutrition and dietetics.• To familiarize the type of research tools and techniques applicable to a research problem.• To acquaint with the statistical methods for testing of hypothesis.		

Unit	Content	Number of Hours
I	Research Methodology <ol style="list-style-type: none"> a) Meaning, Objectives and Significance in Research b) Types of Research c) Scientific Methods- Meaning, Basis of scientific method, Requisites, the components of scientific approach. d) Research Process and Criteria of good research e) Problems encountered by researchers in India Research Problem <ol style="list-style-type: none"> a) Meaning, Selection of a Problem, Techniques b) Limitations and delimitations of a research problem c) Ethics in research 	15
II	Research Design <ol style="list-style-type: none"> a) Meaning, Need, Features, Concepts b) Forms of research- Basic, Applied or Action, Evaluation, c) Types of Research design – Case Study Design, Causal Design, Cohort Design, Cross-Sectional Design, Descriptive Design, Experimental Design, Exploratory Design, Historical Design, Meta-Analysis Design, Observational Design. d) Major steps in preparing a research design, Evaluation and Factors affecting research design 	15
III	Sampling Design <ol style="list-style-type: none"> a) Terms and concepts used in sampling and sample design b) Steps in sampling design c) Criteria of selecting a sampling procedure d) Characteristics of a good sample design e) Types of sampling design <ol style="list-style-type: none"> i) Probability sampling techniques –Definition, types, merits and demerits ii) Non-Probability Sampling techniques - Definition, types, merits and demerits 	15
IV	Research Tools and Techniques <ol style="list-style-type: none"> a) Research tools – Meaning and purpose b) Methods of data collection-primary and secondary c) Types of tools and their uses <ol style="list-style-type: none"> i) Primary - Questionnaires, Schedule, Interviews, Observation ii) Secondary d) Processing of data- Editing, Coding and Tabulation e) Measurement scale and Important Scaling techniques f) Report writing–Introduction, Steps, Layout, Types, Mechanics and Precautions 	15
V	Statistical Testing of Hypothesis <ol style="list-style-type: none"> a) Meaning- Hypothesis, Hypothesis Statement, Hypothesis Testing, Null Hypothesis. b) Types of Hypothesis Testing- 	15

	<p>i) Parametric Tests or Standard Tests of Hypothesis– Definition, Merits and Demerits, Types and its Applications - Student’s T test (Independent, Paired, One tailed and two tailed), ANOVA, Z-test.</p> <p>ii) Non-Parametric or Distribution Free Tests – Definition, Merits and Demerits, Types and its Applications- Chi-square, Spearman’s Rank Co-relation, Kruskal Wallis or H test.</p> <p>c) Difference between parametric and non-parametric tests.</p>	
	Total Hours	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.
- Ranjitkumar- Research Methodology, 4th Ed. Edition, 2014, Sage Publishing.

Web Resources:

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

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Define a research problem and draft a research design for solving.</p> <p>CO2: Apply the appropriate sampling techniques for projects.</p> <p>CO3: Plan and design tools for data collection.</p> <p>CO4: Interpret the results by performing statistical analysis.</p>
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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	10	10	20	20
Understand	10	5	20	20
Apply	15	20	20	20
Analyse	15	15	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1C09- Clinical Nutrition and Dietetics -II		
Class	I M.Sc.	Semester	III
Cognitive Level	K-1, K-2, K-3, K-4 & K-5		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To apprehend the etiology, symptoms and complications of diseases. • To enable the students to recommend and provide appropriate nutritional care for prevention and treatment of the various diseases. • To gain efficacy in principles of diet therapy for metabolic and degenerative diseases. 		

Unit	Content	Number of Hours
I	<p>Dietary management of Cardio Vascular Diseases</p> <ul style="list-style-type: none"> a) Prevalence, Etiology and Risk Factors b) Clinical diagnostic tests and dietary management for <ul style="list-style-type: none"> - Dyslipidemias, Atherosclerosis, Angina Pectoris and Myocardial Infarction (MI) and Congestive Cardiac Failure (CCF) c) Prevention through life style modifications <p>Dietary management of Hypertension</p> <ul style="list-style-type: none"> a) Definition, Classification and Causes b) Signs & Symptoms and Complications c) Dietary management <ul style="list-style-type: none"> - Diet related factors influencing hypertension, DASH diet - Lifestyle modification 	18
II	<p>Dietary management of Upper Gastro Intestinal Diseases</p> <ul style="list-style-type: none"> a) Etiology, signs & symptoms and complications b) Dietary management for <ul style="list-style-type: none"> - Gastritis, Peptic ulcer, Dyspepsia, Esophagitis and Dumping Syndrome. <p>Dietary management of Lower Gastro Intestinal Diseases</p> <ul style="list-style-type: none"> a) Etiology, signs & symptoms and complications Dietary management for <ul style="list-style-type: none"> - Flatulence, Diarrhea, Dysentery, Constipation, Celiac disease, Steatorrhea, Tropical sprue, Irritable bowel syndrome, diverticular disease, colon cancer, Ulcerative colitis and Crohn's Disease. 	18
III	<p>Dietary management of Liver disease</p> <ul style="list-style-type: none"> a) Types, Etiology, Symptoms and Complications b) Functions of the liver and liver function tests c) Metabolic consequences of alcohol consumption d) Dietary management for <ul style="list-style-type: none"> - Hepatitis, Cirrhosis and Hepatic coma. <p>Dietary management of Gall Bladder Diseases</p> <ul style="list-style-type: none"> a) Functions of Gall Bladder b) Gall bladder function tests c) Dietary management for <ul style="list-style-type: none"> - Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis <p>Dietary management of Pancreatic Disorders</p> <ul style="list-style-type: none"> a) Functions of exocrine Pancreas b) Pancreatic function tests c) Dietary management for <ul style="list-style-type: none"> - Pancreatitis (Acute and chronic) and Zollinger- Ellison Syndrome 	18
IV	<p>Dietary management of Diabetes mellitus</p> <ul style="list-style-type: none"> a) Prevalence, Types, Aetiology and Signs and Symptoms b) Factors affecting normal blood glucose levels c) Impaired glucose homeostasis d) Diagnostic test for diabetes e) Complications of diabetes - macro-vascular and micro-vascular <p>Management of Diabetes</p> <ul style="list-style-type: none"> a) Food exchange list, 	18

	<p>b) Glycaemic index of foods, Carbohydrate counting and Resistant starch</p> <p>c) Sweeteners and sugar substitutes</p> <p>d) Meal planning approaches</p> <p>- With and without Insulin and during sickness.</p> <p>e) Medications</p> <p>- Oral hypoglycaemic drugs and Insulin.</p> <p>f) Lifestyle modification and exercise to manage diabetes mellitus.</p> <p>Management of Hypoglycaemia</p> <p>a) Types, symptoms and fasting state hypoglycemia</p> <p>b) Postprandial or reactive hypoglycemia.</p> <p>c) Dietary treatment in reactive hypoglycemia.</p> <p>Dietary management of cancer</p> <p>a) Types, Etiology and Signs and symptoms, and diagnosis of cancers.</p> <p>b) Cancer therapy and its complications</p> <p>- Chemotherapy, Radiation therapy and Surgery.</p> <p>c) Dietary management to cancer patients.</p>	
V	<p>Dietary management of Kidney Diseases</p> <p>a) Aetiology, clinical signs & symptoms</p> <p>b) Functions of kidney</p> <p>c) Kidney function tests.</p> <p>d) Types of kidney diseases</p> <p>- Glomerulonephritis, Nephrotic Syndrome, Acute Renal Failure (ARF), Chronic Renal Failure (CRF), End Stage Renal Disease (ESRD)-Dialysis and Kidney Transplant.</p> <p>Nephrolithiasis/Renal Calculi</p> <p>a) Aetiology</p> <p>b) Types of stones and nutritional care- acid and alkaline ash diet.</p> <p>c) Use of sodium, potassium and phosphorus exchange lists in diet planning of kidney diseases patient.</p>	18
	Total Hours	90

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, 8thEdn, 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, 17th 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 Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Elucidate the aetiology, signs and symptoms of diseases.</p> <p>CO2: Explain the different diseases affecting the organs.</p> <p>CO3: Describe the diagnostic test.</p> <p>CO4: Deliver nutritional management for metabolic and degenerative disease conditions.</p> <p>CO5: Determine the dietary essentials for recovery and maintenance of various diseases.</p>
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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	10	20	20
Understand	10	5	20	20
Apply	15	15	15	15
Analyse	10	10	10	10
Evaluate	10	10	10	10
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1C10- Public Health Nutrition		
Class	II M.Sc.	Semester	III
Cognitive Level	K-1, K-2, K-3, K-4 & K-5		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> To understand the malnutrition problems. To gain knowledge on the nation's effort in combating community nutrition problems. To educate the community on the importance of nutrition. 		

Unit	Content	Number of Hours
I	Concept of Public Health Nutrition	

	<p>a) Relationship between health and nutrition, Productivity and development</p> <p>b) Role of public nutritionist in the health care delivery system.</p> <p>Population Dynamics</p> <p>a) Demographic processes and Demographic cycle</p> <p>b) World population trend</p> <p>- Birth rates, Death rates, Growth rates and Demographic trends in India</p> <p>c) Age pyramid, sex ratio and Human Development Index</p>	12
II	<p>Assessment of Nutritional Status</p> <p>a) Methods of Nutritional assessment, Nutritional anthropometry and Growth standards,</p> <p>b) Biochemical and radiological assessment</p> <p>c) Clinical assessment and Diet Survey</p> <p>Nutrition monitoring</p> <p>a) Agencies engaged in nutrition monitoring</p> <p>b) Objectives, Components of nutrition monitoring and key indicators.</p> <p>Nutritional surveillance</p> <p>a) Need for nutritional surveillance</p> <p>b) Key indicators and uses of nutritional surveillance programme</p>	15
III	<p>National nutritional policy and intervention programme –</p> <p>a) Aim, objectives, guidelines and thrust areas.</p> <p>b) PDS - Public distribution system, implementation of state and central governments, PDS commodities.</p> <p>Nutrition intervention Programmes</p> <p>a) Objectives</p> <p>b) Operation of feeding programmes</p> <p>- ICDS, Anganwadi and TINP</p> <p>- National organizations - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD and Pradhan Mantri Gramodaya Yojana (PMGY)</p> <p>- International organizations - FAO, WHO, UNICEF UNESCO, World Bank.</p>	18
IV	<p>Strategies to combat public nutrition problems</p> <p>a) Common Nutritional disorders - PEM</p> <p>b) Mineral Deficiency diseases- Iron, Iodine, Zinc</p> <p>c) Mineral toxicity disorder- Fluorosis</p> <p>d) Vitamin deficiency diseases- Folic acid, Vitamin B12, Vitamin A, Beriberi, Ariboflavinosis, Pellagra, scurvy, Rickets and Osteomalacia</p>	16
V	<p>Nutrition Education</p> <p>a) Need, Scope, Importance and Theories of nutrition education</p> <p>b) Purpose, Advantages and constraints of Nutrition Education.</p> <p>c) Behaviour change communication</p> <p>Nutrition education communication</p> <p>a) Programme, formulation, Implementation and evaluation.</p> <p>b) Primary Health Care (PHC) and its role in preventing communicable diseases</p>	14
	Total Hours	75

References

Text Books:

- Suryatapas – 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, 2ndEdn, John Wiley & Sons.
- Jelliffe 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/healthyliving/healthy-diet>

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Assess the nutritional status of individuals.</p> <p>CO2: Relate health, nutrition and population dynamics of a community.</p> <p>CO3: Compile the nutritional interventions provided by the government.</p> <p>CO4: Describe the public nutritional problems and appraise strategies to combat.</p>
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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	S
CO2	S	S	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S	S	S
CO4	S	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	15	10	20	20
Understand	15	15	20	20
Apply	10	15	15	15
Analyse	5	5	10	10
Evaluate	5	5	10	10
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1C11- Hospital Administration and Practices		
Class	II M.Sc.	Semester	III
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To understand the hospital administration practices. • To comprehend patient data maintaining practices followed in hospitals. • To acquaint with biomedical waste management. 		

Unit	Content	Number of Hours
I	Hospital Administration <ol style="list-style-type: none"> a. Role of Medical Superintendent b. Hospital Administrator c. Resident Medical Officer d. Night Duty Executive e. Public and guest relation f. Importance in patient care, information regarding patients g. Code of press relations, medical information h. Patient information booklets, attendants' management. 	15
II	Quality Management in Hospital <ol style="list-style-type: none"> a) Definition, Concept of Total Quality Management, importance of TQM, Principle of Total Quality management, basic elements of TQM b) Critical Factors Influencing TQM, Total Quality Management Practices in Healthcare, Measuring the Quality in Healthcare Service, Relationship between Hospitals and Medical Staff 	15
III	Biomedical Waste Management <ol style="list-style-type: none"> a) Meaning – Categories of Biomedical wastes b) Disposal of biomedical waste products c) Incineration and its importance d) Standards for Waste Autoclaving e) Micro Waving and Deep Burial – Segregation – Packaging – Transportation – Storage. 	15
IV	Health Records <ol style="list-style-type: none"> a) The World of Informatics b) The Future of healthcare technology c) Functions of the health record <ul style="list-style-type: none"> – Changing functions of the patients record – privacy, confidentiality and Law – Advantages and Disadvantages of the paper record d) Optically scanned records e) The Electronic Health Record (EHR) <ul style="list-style-type: none"> – Advantages and disadvantages of the EHR – Bedside or point-of-care systems – Human factors and the EHR – Roadblocks and challenges to EHR implementation 	15
V	Telemedicine <ol style="list-style-type: none"> a) Telehealth <ul style="list-style-type: none"> - Historical perspectives and Types of Technology - Clinical initiatives and Administrative initiatives - Advantages and Barriers of Telehealth - Future trends and Summary - The Future of informatics; b) Globalization of Information in Telehealth. <ul style="list-style-type: none"> Technology in Electronic communication <ul style="list-style-type: none"> - Knowledge management - Genomics - Advances in public health - Speech recognition - Wireless computing and Security - Informatics Education and Barriers to Information Technology implementation 	15

	Total Hours	75
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References

Text Books:

- Sakharka B M –Principles of Hospital Administration and Planning, 2010, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
- Kelkar S.A- Hospital Information Systems, 2010, Prentice Hall India Learning Private Limited.
- D.C. Joshi and Mamta Joshi - Hospital Administration, 2011, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

Reference Books:

- Syed Amin Tabish - Hospital and Health Services Administration Principles and Practice, 2001, Oxford Publishers, New Delhi.
- Sharma - Holistic approach to Hospital Waste Management, 2006, AIIMS, New Delhi.
- Arun Kumar - Encyclopaedia of Hospital Administration and Development, 2000, Anmol Publications, New Delhi.

Web Resources:

- <https://www.telehealth.net>
- <http://www.internetmedicine.com/telemedicine>

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Compile the duties and responsibilities of administrators in hospitals.</p> <p>CO2: Assess the total quality management.</p> <p>CO3: Classify the bio medical waste and explain disposal methods.</p> <p>CO4: Describe the types and uses of health records.</p> <p>CO5: Determine the role of technology in patient care.</p>
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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	L	S	M	M	M	M
CO2	S	S	L	L	M	L	S	M	M	M	M
CO3	S	S	M	M	M	S	S	N	N	N	N
CO4	S	S	L	L	L	L	S	L	L	L	L
CO5	M	M	M	M	S	L	S	L	L	N	M

*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	15	15	20	20
Understand	15	10	20	20
Apply	10	15	20	20
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-

Total	50	50	75	75
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Course Code & Title	21UPCND1CP05 - Research Methods & Statistical Applications Practical		
Class	II M.Sc.	Semester	III
Cognitive Level	K-1, K-2, K-3, K-4, K-5 & K-6		
Course Objectives	The Course aims <ul style="list-style-type: none"> To enable the students to understand the applications of statistical techniques for analysis and interpretation of nutrition research. 		

	<ul style="list-style-type: none"> To use selective SPSS software for qualitative and quantitative data analysis.
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Unit	Content	Number of Hours
1.	Introduction to Statistics a) Definition and misuse of statistics	5
2.	Data Management a) Coding of data	5
3.	Descriptive statistics a) Frequencies b) Crosstabs	6
4.	Large and Small Sample tests and interpretation a) Z-test for single proportions b) Z-test for Two proportions c) Small Sample “t” test d) Independent “t” test e) Paired “t” test f) F -test (ANOVA)	6
5.	Chi square test and its interpretation a) General features, goodness of fit b) Independence of Attributes	6
6.	Correlation and Regression and its interpretation a) Linear regression and correlation coefficient b) Product-moment method	6
7.	Presentation of Data a) Graphs - bar graphs of different types, pie diagram, histogram and line diagram.	5
8.	The Research Report a) Basic components of a research report- prefatory material, introduction and Review of Related Literature, Methodology, Results, Discussion, Conclusion, Summary, Abstract, Bibliography and Appendices	6
	Total Hours	45

References

Text Books:

- Julie Pallant, **SPSS Survival Manual, 2016, Open University Press.**
- KaruthanChinna&Choo Wan Yuen, *Statistical Analysis Using SPSS, 3rdEdn, Pearson*
- 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.
- Ranjtkumar- Research Methodology, 4th Ed. Edition, 2014, Sage Publishing.

Web Resources:

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

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Interpret the results of small and large samples using parametric and non-parametric tests.</p> <p>CO2: Apply the appropriate methods of data presentation.</p> <p>CO3: Conceive knowledge on coding and tabulation of datas.</p> <p>CO4: Develop a research report.</p>
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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	5	10	10	10
Analyse	15	10	10	10
Evaluate	15	15	15	15
Create	15	15	15	15
Total	60	60	60	60

Course Code & Title	21UPCND1CP06 - Computer Applications in Clinical Nutrition and Dietetics-II Practical		
Class	II M.Sc.	Semester	III
Cognitive Level	K-3, K-4, K-5&K-6		

Course Objectives	The Course aims <ul style="list-style-type: none"> To provide training in the planning and preparation of diets for different disease conditions using computers. Expertise in various feeding formulas and techniques.
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Unit	Content	Number of Hours
1	Planning and preparation of diet for Cardio vascular disease patients – Atherosclerosis, Acute myocardial Infarction, Hypertension and Hypercholesterolemia	8
2	Planning and preparation of diets for the following conditions- Gastro Intestinal Disorders-Peptic Ulcer, Constipation, Diarrhoea, Lactose intolerance, Celiac Disease, IBS and IBD	10
3	Planning and preparation of diets for the liver and pancreatic disorders - Hepatitis, cirrhosis, hepatic encephalopathy, gall stones and pancreatitis.	9
4	Planning and preparation of diets for the individuals with Diabetes mellitus - Type I diabetes, Type II diabetes and gestational diabetes. Prepare few sweets using artificial sweeteners. Planning and preparation of diets for cancer patients.	8
5	Planning and preparation of diet for renal disorders- Glomerulonephritis, Nephrosis, acute renal failure, chronic renal failure, dialysis and renal calculi	10
	Total Hours	45

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, 8thEdn, 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, 17thEdn, 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 Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Develop a ready –reckoner for calculating nutrient content of various foods in normal persons and the ability to modify for given disease conditions.</p> <p>CO2: Apply the principles of diet and determine the dietary essentials for recovery from critical illness.</p> <p>CO3: Plan and prepare menu for the given disease condition.</p> <p>CO4: Compare and contrast the derived nutritive values with R.D.A using software.</p>
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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	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	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	-	-	-	-
Understand	-	-	-	-
Apply	15	10	10	10
Analyse	15	15	10	10
Evaluate	15	15	15	15
Create	15	20	25	25
Total	60	60	60	60

**M.Sc. Clinical Nutrition and Dietetics Course
SEMESTER-IV**

Course Code & Title	21UPCND1C12- Nutraceuticals and Functional Foods		
Class	II M.Sc.	Semester	IV

Cognitive Level	K-1, K-2, K-3, K-4 & K-5
Course Objectives	The Course aims <ul style="list-style-type: none"> • To learn the principle compounds available in various food groups in aiding good health. • To gain insights into the functional foods which are in nature to prevent and treat diseases. • To vision the impact of globalization on health and food products.

Units	Topic and Details	Number of Hours
I	Introduction to nutraceuticals a) Introduction to Functional Foods and Nutraceuticals: Definition, History and Classification b) Perceived Effects of Functional Foods c) Nutraceuticals - The link between nutrition and medicine d) A brief review of historical and teleological aspects e) Basis of claims for a compound as a nutraceutical	14
II	Properties, structure and functions of various Nutraceuticals a) Pigments b) Functional lipids c) Flavor and odor compounds - Alkaloids, Terpenoids, Glycosides, Polyphenols and Natural antioxidants d) Probiotics: Taxonomy and Important Features of Probiotic Microorganisms e) Health Effects of Probiotic Microorganisms f) Prebiotics: Non Digestible Carbohydrates/ Oligosaccharides, Dietary Fiber, Resistant Starch, Gums	14
III	Functional components and health effects of a) Soya, Olive oil, Tea, Common beans, Capsicum annum, Mustards, Ginseng, Garlic, Grapes, Citrus fruits, Fish oils, Sea foods, Mushroom b) Sports drink c) Infant formula as functional foods. d) Bioavailability and safety issues of functional foods. e) Applications of herbs to functional foods.	16
IV	Concept and the role of nutraceuticals/functional foods in health a) Nutraceuticals for - Cardiovascular diseases, Cancer, Diabetes, Cholesterol management, Obesity, Age related macular degeneration, Immune enhancement and Endurance performance b) Mood disorders - Compounds and their mechanisms of action c) Adverse effects and toxicity of nutraceuticals	16
V	Recent advancements in nutraceuticals and functional foods a) Dietary supplements- GMPS and shelf life of dietary supplements. b) Role of changing food preferences and globalization on selection of nutraceutical products c) Nutrigenomics - An introduction and its relation to nutraceuticals d) Recent advancements and techniques in the formulation and processing of functional foods	15
	Total Hours	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 Dekker 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 Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Compile the updates on link between nutrition and medicine.</p> <p>CO2: Assess the properties and functions of nutraceuticals.</p> <p>CO3: Classify the nutraceuticals and comprehend their role in health promotion.</p> <p>CO4: Describe the dietary supplements.</p> <p>CO5: Determine the role of globalisation in food choices.</p>
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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	S
CO2	S	S	S	S	M	M	S	S	S	S	S	S
CO3	S	S	S	S	L	L	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	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	10	15	15	15
Understand	15	10	15	15
Apply	15	15	15	15
Analyse	5	5	15	15
Evaluate	5	5	10	10
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1CP07 - Nutraceuticals and Functional Foods Practical		
Class	II M.Sc.	Semester	IV

Cognitive Level	K-1, K-2, K-3, K-4, K-5 & K-6
Course Objectives	The Course aims <ul style="list-style-type: none"> To enable the students to develop functional food products which meet consumer needs nutritionally and commercially viable. To prepare and evaluate the different variations of sports drink.

Unit	Content	Number of Hours
1.	Identification of various nutraceuticals and functional foods available in the market	4
2.	Preparation and evaluation of dietary fibre rich functional foods	4
3.	Preparation and evaluation of lycopene rich juices	4
4.	Preparation and evaluation of probiotic foods	5
5.	Preparation and evaluation of prebiotic foods	5
6.	Preparation and evaluation of hypo, hyper and isotonic sports drinks	5
7.	Preparation and evaluation of natural antioxidant rich foods	4
8.	Preparation and evaluation of soy protein rich foods	5
9.	Preparation and evaluation of calcium rich foods	5
10.	Preparation and evaluation of herbal foods	4
	Total Hours	45

Reference Books:

- Jeffery Horst, Methods of Analysis for Functional Foods and Nutraceuticals, 2002, CRS Press.
- AOAC International. Official methods of analysis of AOAC International
- Linden G. -Analytical Techniques for Foods and Agricultural Products.
- Ranganna. S.- Handbook of Analysis and Quality Control for Fruit and Vegetable Products

Course Outcomes	On completion of the course, students should be able to CO1: Identify and analyse the various nutraceuticals and functional foods available in the market CO2: Develop and evaluate functional foods products. CO3: Comprehend the formulations of sports drink. CO4: Describe the role of nutraceuticals in herbs.
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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
Total Hours									330		

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

Assessment Pattern

Bloom's Category	Terminal Examination (Marks)
Remember	10
Understand	10
Apply	20
Analyse	30
Evaluate	30
Create	100
Total	200

ELECTIVE COURSES

Course Code & Title	21UPCND1E01- Home Science Education and Communication		
Class	I M.Sc.	Semester	I / II

Cognitive Level	K-1, K-2, K-3, K-4 & K-5
Course Objectives	The Course aims <ul style="list-style-type: none"> • To enable students gain knowledge on fibre and yarn. • To familiarise with fabric construction. • To enable students gain knowledge on branches of home science. • To apprehend on skills of communication

Units	Topic and Details	Number of Hours
I	Fibre <ol style="list-style-type: none"> a) Types Natural –cotton, flax/Linen, Jute, Ramie, Hemp Manmade – cellulosic, manmade synthesized fibre, mineral and elastomeric b) Properties –Physical and Chemical Yarn <ol style="list-style-type: none"> a) Definition, Classification –simple and complex b) Yarn twist c) Testing and Identification of yarn Fabric construction <ol style="list-style-type: none"> a) Definition, Types –woven, non-woven, knitted b) Merits and demerits 	14
II	Laundrying and Laundrying Agents <ol style="list-style-type: none"> a) Laundrying – Types, Principles, methods and process b) Laundrying agents -Stiffening agents, Bleaching agents, Fabric Softeners c) Dry cleaning –Procedure, advantages and disadvantages Environment Protection <ol style="list-style-type: none"> a) Environment protection –Importance b) Environmental impacts of textile industries - Effluent treatment of water- Importance of ecofriendly processing c) Application of enzyme in textile wet processing industry. 	11
III	Concepts of home management and steps <ol style="list-style-type: none"> a) Meaning and Importance of home management, Basis for home management –values, goals and standards b) Qualities of good home maker, Home management process- planning, controlling, evaluating Decision making <ol style="list-style-type: none"> a) Definition, Characteristics and steps in decision making b) Types of decision Work simplification <ol style="list-style-type: none"> a) Definition, Symbols, techniques b) Mundels class of change c) Time management process d) Energy management –types of fatigue, measures to relieve fatigue 	11
IV	Interior Design <ol style="list-style-type: none"> a) Interior design -Definition and types b) Colour - Definition, Classification, Prang Colour Chart, Colour Harmonies and Use of Colour in Different Rooms. c) Principles of design - Harmony, Balance, Proportion, Rhythm and Emphasis 	12

	<p>d) Elements of design - Line, Direction, Shape, Colour, Texture and Value</p> <p>Flower arrangement</p> <p>a) Principles of Flower Arrangement – Design, Scale, Balance, Harmony, Rhythm, Color</p> <p>b) Patterns and Styles –Symmetrical and Asymmetrical, Traditional, Oriental, Modern, Dried flower arrangement.</p> <p>c) Guidelines , Aids and Accessories and Care of flowers</p>	
V	<p>Developmental and Educational communication</p> <p>a) Communication- Definition, Objectives, Process, skills</p> <p>b) Types – Interpersonal, focused and Unfocused, Group, Mass, Verbal Models</p> <p>c) Barriers- Physical, psychological, Linguistic, cultural and Mechanical.</p> <p>d) Purpose/ functions of communication Essentials of good communication, Seven C’s of Communication.</p> <p>e) Class room communication in home science studies</p> <p>f) Strategies for developmental communications</p>	12
	Total Hours	60

References

Text Books:

- Branson, Joan C & Lennox, Margaret-Hotel, hostel and hospital housekeeping, 1973 Edward Arnold, London.
- DeepaliRastogi and Sheetal Chopra -Textile Science, 2017, Orient Blackswan Private Limited.
- SeemaSekhri - Textbook of Fabric science, second edition, 2016,Prentice hall India learning private Ltd
- Seetharaman. P, and Pannu.P-Interior Design and Decoration,2009, Cbs Publishers
- Chaudhari, S.N -Interior Design, Pointer Publishers
- Dahama.O.P and Bhatnagar .O.P - Education and Communication for Development, 1988, Oxford and IBH Publishing,New Delhi
- Dubey V.K. and Bishnoi Indira - Extension Education and communications, 2009, New Age International Pvt. Ltd. Publishers, New Delhi.

Reference Books:

- Bev Ashford - Fibers to fabrics, 2016,AuthorHouse,UK.
- Premony Ghosh- Fibre science and Technology,2003, McGraw Hill Education
- PremlataMullick-Text book of home science, 2000, Kalyani Publisher.
- Sudhir Andrews -Hotel Housekeeping Training Manual, 2009, Tata McGraw-Hill Education.
- Premlata Mullick-Text book of home science, 2000, Kalyani Publishers.
- Holtzschue, L - Understanding Colour - An introduction for Designers, 4th edn, 2011, Wiley.

Web Resources:

- <http://textilelearner.blogspot.com/2011/10/textile-ebooks-free-download-html>
- <https://www.textilemates.com>

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Classify and explain the properties of the fibres, yarns and fabrics.</p> <p>CO2: Determine the laundering procedures for various fabrics and its impact on environment.</p> <p>CO3: Compile the concepts of home management, decision making and work simplification.</p> <p>CO4: Apply the principles and elements of design, flower arrangement in all art forms.</p> <p>CO5: Apply the techniques of communication in different spheres.</p>
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COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	L	L	L	L	M	M	M	L	L	L	L
CO2	L	L	L	L	M	M	M	L	L	L	L
CO3	L	L	L	L	M	M	M	L	L	L	L
CO4	L	L	L	L	M	M	M	L	L	L	L
CO5	L	L	L	L	M	M	M	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	20	20	15	15
Understand	10	10	15	15
Apply	10	10	15	15
Analyse	5	5	15	15
Evaluate	5	5	10	10
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1E02- Food Microbiology
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Class	I M.Sc.	Semester	I / II
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To enable the students to learn the methods used for quality assessment of food. • To know about various pathogenic microbes responsible for illness. 		

Units	Topic and Details	Number of Hours
I	a. Food Microbiology – Basic Concept b. History of Food Microbiology, Role of Microbiology in Biotechnology , Role of Microorganisms in Fermented Food and Food Safety and Importance of Safe Food c. Factors Affecting Food Safety, Microorganisms in Foods and Recent Concerns of Food Safety	12
II	a. Microbiology of Air, Water and Soil b. Food spoilage and contamination in different kinds of foods and their prevention- Cereal and cereal products, pulses and legumes, Vegetables and fruits, Meat and meat products, Eggs and poultry, Milk and milk products.	14
III	a. Food Borne Diseases b. Food Borne Intoxications, Food Borne Infections, Food Borne Toxic Infections c. Mycotoxins and Food Borne Diseases due to Naturally Occurring Toxicants d. Reporting and Investigations of Food Borne Diseases	12
IV	a. Food Adulteration, Food Commonly Adulterated, Common Adulterants b. Harmful effects of Adulterants and Methods for Detection of some Adulterants	10
V	a. HACCP-An Effective Food Safety Assurance System b. Need for HACCP, Benefits of HACCP, Principles of HACCP c. Guidelines for Application of HACCP Principles, The HACCP Status in India d. HACCP Case Studies	
Total Hours		60

References

1. Frazier W. C. and Westhoff D. C. Food Microbiology, 4th ed., 1988 New York.
2. Pelezar, M. (1988) Microbiolqgy V ed., McGraw Hill, N. Y.
3. James, M. Jay. Modern Food Microbiology 4th ed., CBS Publishers, New Delhi.
4. Frobisher M. et. al. (1974) Fundamentals of Microbiology -9th ed., W. Savenders Co.
5. Baanwart, G.J.(1987) Basic Food Microbiology CBS Publishers, New Delhi

Course Outcomes	On completion of the course, students should be able to CO1: Explain the concepts of food microbiology and food safety. CO2: Determine the causes of food spoilage in different food groups. CO3: Discuss the concepts of food borne diseases. CO4: Elaborate on Food adulteration and adulterants. CO5: Apply the techniques of HACCP.
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COs Consistency with POs and PSOs

CO/PO/PSO	PO							PSO			
	1	2	3	4	5	6	7	1	2	3	4
CO1	L	L	L	L	M	M	M	L	L	L	L
CO2	L	L	L	L	M	M	M	L	L	L	L
CO3	L	L	L	L	M	M	M	L	L	L	L
CO4	L	L	L	L	M	M	M	L	L	L	L
CO5	L	L	L	L	M	M	M	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	20	20	15	15
Understand	10	10	20	20
Apply	10	10	15	15
Analyse	10	10	25	25
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1E03- Extension Education		
Class	I M.Sc.	Semester	I / II
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To familiarise the concepts of extension and communication. • To acquaint different methods of extension education. • To apprehend on skills of communication. 		

Units	Topic and Details	Number of Hours
I	Extension Education <ol style="list-style-type: none"> a) Extension Education - Meaning, Scope, Objectives b) Philosophy and Principles of Extension c) Difference between Formal, Informal and Non-Formal. d) Extension Education Methods: <ol style="list-style-type: none"> i) Individual Methods (Farm and Home Visit, Office Call, Personal Letters, Result Demonstration), ii) Group Methods (Method Demonstration, Lecture Method, Field Trips, Group Discussion), iii) Mass Methods: (TV/Radio Recordings, Circular Letters, News Articles, Campaign). iv) Digital Methods of Extension – E-learning, Smart Board, Intra and Internet e) Extension Education Process. f) Qualities and Role of an Extension Worker 	14
II	National Extension System <ol style="list-style-type: none"> a) Integrated functioning of teaching, research and education in ICAR extension system, Agriculture universities, KVK, Trainer's Training centres. b) Extension systems of Ministry of Rural Development, Department of Science and Technology, Department of Industries and Department of Women and Child Development, Ministry of Forest and Environment, Development work by NGO's, Government-NGO collaboration. 	11
III	Management and Administration of Formal, Informal and Non-Formal Methods <ol style="list-style-type: none"> a) Management- Planning, Organizing, Staffing, Co-ordinating and controlling b) Administration – Definition, Principles, elements c) Constitutional Provisions and Educational Administration d) National Policy on Education. e) Monitoring and Supervision- Functions and Modern Trends, Kothari commission 	11
IV	Theories and Principles of Guidance and Counselling <ol style="list-style-type: none"> a) Educational Guidance –Definition, Types – Individual Educational Guidance and Group Educational Guidance b) Functions of Educational Guidance c) Counselling – Definition, Principles, Theories d) Extension Principles in guidance and counselling. School and educational Psychologist- Roles and Responsibilities. 	12

V	Approaches of Communication in Extension a) Traditional Approach – Folk media and use for communication and extension b) Modern Approach – Participatory, Analytical, Dialogue, Persuasive and Educational games. Use of modern approach for communication and extension c) Modified Approach – Combination of traditional and modern approaches for communication and extension	12
	Total Hours	60

References

Text Books:

- Dahama.O.P and Bhatnagar .O.P - Education and Communication for Development, 1988, Oxford and IBH Publishing,New Delhi
- Dr. (Lt.) Sandhya Rani Mohanty -Home Science Extension Education and Rural Development, 2017, Anchor Academic Publishing
- Dubey V.K. and Bishnoi Indira - Extension Education and communications, 2009, New Age International Pvt. Ltd. Publishers, New Delhi.

Reference Books:

- S.V. Supe - An Introduction to Extension,2005, Oxford and IBH Publishing
- Reddy A. A- Extension Education, 1987, Sree Lakshmi Press.
- Khan, P.M. and Somani, L.L.-Fundamentals of Extension Education, 2009, Agrotech Publishing Academy.

Web Resources:

- http://shodhganga.inflibnet.ac.in/bitstream/10603/101775/9/09_chapter%201.pdf

Course Outcomes	On completion of the course, students should be able to CO1: Compare and contrast the extension education methods. CO2: Evaluate the methods of guidance and counselling. CO3: Apply the techniques of communication in different spheres. CO4: Apply the effective counselling methodologies for patient treatment.
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COs Consistency with POs and PSOs

CO/PO/PSO	PO						PSO				
	1	2	3	4	5	6	7	1	2	3	4
CO1	L	L	L	L	M	M	M	L	L	L	L
CO2	L	L	L	L	M	M	M	L	L	L	L
CO3	L	L	L	L	M	M	M	L	L	L	L
CO4	L	L	L	L	L	L	L	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	15	15	20	20
Understand	15	15	25	25
Apply	10	10	15	15
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1E04- Principles of Epidemiology in Nutrition		
Class	I M.Sc.	Semester	I / II
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To recognize the principles of epidemiology. • To identify the role of nutritional epidemiology in community and public health. • To design and evaluate studies / nutritional programme. 		

Units	Topic and Details	Number of Hours
I	Introduction to Epidemiology <ol style="list-style-type: none"> a) Epidemiology: concept and definitions, aims. b) Basic measurements in epidemiology c) Tools of measurement – Rates, Ratios and proportions. 	11
II	Types of epidemiology <ol style="list-style-type: none"> a) Descriptive Epidemiology-Defining the population, describing the diseases, measurement of diseases and comparing with known indices. b) Analytical Epidemiology – Observational studies cohort, case control and cross sectional analytic study 	12
III	Epidemiological methods <ol style="list-style-type: none"> a) Experimental epidemiology – Randomized controlled. b) Design and planning of nutritional epidemiology studies. c) Evaluation of epidemiological studies. d) Uses of epidemiology 	13
IV	Immunity <ol style="list-style-type: none"> a. Types of immunity-Active and passive b. Immunizing agents- Vaccines, immunoglobulin and antisera c. Hazards of immunization d. Immunization schedules e. Disinfection-types, and recommended procedures 	12
V	Genetics and Health <ol style="list-style-type: none"> a) Introduction and cytologic facts b) Classification of genetic disorders <ol style="list-style-type: none"> a. Chromosomal disorders, Mendelian diseases and Erythroblastosis foetalis c) Preventive and social measures 	12
	Total Hours	60

References

Text Books:

- Park. A - Park's Text Book of Preventive and Social Medicine, Twenty Third edition, 2015, Bhanot Publishers.
- Bamji M.S, Prahlad Rao N, Reddy V -Textbook of Human Nutrition, 3 edn, 2010, Oxford and IBH Publishing.

Reference Books:

- Anisa Basheer - Environmental Epidemiology, 1995, Rawat Publications, Jaipur
- Beghin I. Cap, M. and Dujardan, B. - A guide to nutritional status assessment, 1988, WHO, Geneva.

Web Resources:

- https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/env_occupational_health_students/Epidemiology

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Describe the concepts, principles and role of epidemiology in public health.</p> <p>CO2: Apply the epidemiological methods to assess the nutritional status of a community.</p> <p>CO3: Associate the importance of immunization in disease prevention.</p> <p>CO4: Ascertain the role of genes in health.</p>
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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	M	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	M	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	20	15	20	20
Understand	20	15	25	25
Apply	5	10	15	15
Analyse	5	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

SUPPORTIVE COURSES

Course Code & Title	21UPCND1S01- Diet Therapy in Life Style Diseases		
Class	I /II M.Sc.	Semester	II/ III
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To enable the students to know the effect of the various life style diseases on nutritional status of individuals. • To enhance the knowledge on dietary requirements for different disease conditions. • To overview the types of diets provided to patients. 		

Units	Topic and Details	Number of Hours
I	Introduction to diet therapy <ol style="list-style-type: none"> a) Routine hospital diets- clear fluid, full fluid, soft diet, regular diet b) Nutrition support service c) Malnutrition in hospitalized patients d) Pre and post- operative diets e) Role of nutraceuticals in dietary management of diseases. 	10
II	Diet in Cardiovascular Diseases <ol style="list-style-type: none"> a) Prevalence, Clinical effects b) Risk factors, Role of fat in the development of atherosclerosis c) Dietary management of atherosclerosis d) Hyper tension e) Physical activity and Heart diseases f) Dietary management for Hyper tension 	10
III	Diet in Diabetes Mellitus <ol style="list-style-type: none"> a) Prevalence, clinical symptoms blood glucose levels, types of insulin, aetiology. b) Diagnosis, treatment and complications c) Dietary management 	9
IV	Diet in Cancer <ol style="list-style-type: none"> a) Risk factors and Symptoms b) Nutritional problems of cancer therapy c) Nutritional requirements and Dietary management 	8
	<ol style="list-style-type: none"> d) Role of functional foods in the prevention of cancer e) Physical activity and cancer 	
V	Diet in diseases of Kidney <ol style="list-style-type: none"> a) Functions b) Symptoms and Principles of dietary management –Acute renal failure, Chronic renal failure, Urinary calculi c) Fluid and electrolyte balance 	8
	Total Hours	45

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, 8thEdn, 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 LivingStone.
- 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.
- Burtis, J, Davis, J and Martin, S, (2010), Applied Nutrition and Diet Therapy, WB Saunders Co, Philadelphia
- 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.egrnth.ac.in

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Apply the principles of diet and determine the dietary essentials for recovery from critical illness.</p> <p>CO2: Plan and prepare menu for the given disease condition.</p> <p>CO3: Identify and describe the etiology, symptoms and complications for any life style disease.</p> <p>CO4: Differentiate feeding techniques.</p>
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Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	20	15	20	20
Understand	20	15	25	25
Apply	5	10	15	15
Analyse	5	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1S02- Basic Concepts in Dietetics		
Class	I /II M.Sc.	Semester	II/ III
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To enable the students to learn about the concepts in nutrition science. • To recognize the significance of dieticians in hospitals. • To sensitise on food allergies. 		

Units	Topic and Details	Number of Hours
I	The Dietician a) Classification b) Code of ethics c) Responsibility d) Diet counselling and Nutrition education e) Indian dietetic association – Objectives, chapters, eligibility requirements for R.D.Examinations. f) Technology in diet counselling	9
II	Nutritional anaemia a) Prevalence and Aetiology b) Types – Iron Deficiency, Megaloblastic, differentiating c) Prevention d) Nutritional requirements	8
III	Diet in infections and fever a) Metabolic changes in fever b) Causes, Types c) General dietary considerations d) Typhoid, Influenza, Malaria, Tuberculosis and AIDS- signs and symptoms, and dietary management.	9
IV	Diet in obesity and Underweight a) Obesity i. Aetiology ii. Theories on obesity iii. Assessment, types, treatment iii. Complications, Weight management guidelines, eating disorder iv. Juvenile onset obesity v. Dietary management b) Underweight Aetiology, Nutritional and food requirements	10
V	Food Sensitivity a) Types of reactions, b) Food intolerance and causes c) Symptoms d) Diagnosis e) Treatment	9
	Total Hours	45

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, 8thEdn, 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, 17thEdn, Macmillan Publishing Company.
- Skills 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 Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Apply the principles of diet and determine the dietary essentials for recovery from infectious diseases.</p> <p>CO2: Illustrate the role of dietician.</p> <p>CO3: Identify and describe the etiology, symptoms and complications for common nutritional problems.</p> <p>CO4: Interpret food sensitivity.</p>
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Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	15	15	20	20
Understand	15	15	25	25
Apply	10	10	15	15
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1S03- Life Cycle Nutrition		
Class	I /II M.Sc.	Semester	II / III
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	The Course aims <ul style="list-style-type: none"> • To familiarize the concept of balanced diet. • To discern the importance of nutrition during life span and dietary modifications for different age groups. • Develop aptitude to learn the nutritional problems of different age groups. 		

Units	Topic and Details	Number of Hours
I	Introduction to foods <ol style="list-style-type: none"> a) Functions of food b) Food groups c) Food in relation to health d) Explanation of terms e) Planning balanced diets f) Food guide Vegan diets	10
II	Nutritional and food requirements of expectant mother and lactating mother <ol style="list-style-type: none"> a) Expectant mother- preconception nutrition, nutritional requirements, food requirements, general problems b) Lactating women – nutritional requirements, food requirements 	9
III	Nutritional and food requirements for infants and preschool children <ol style="list-style-type: none"> a) Growth and development during infancy b) Nutritional requirements for infants c) Food requirements for infants d) Low birth weight, preterm baby e) Weaning f) Nutritional requirements for pre-schoolers g) Food requirements, nutrition related problems of pre-schooler 	9
IV	Nutritional and food requirements for school children and adolescents <ol style="list-style-type: none"> a) School children – nutritional requirements, food requirements, packed lunch, school lunch programmes b) Adolescents – nutritional requirements, food requirements, nutritional problems 	9
V	Nutritional and food requirements of adults and during old age <ol style="list-style-type: none"> a) Adult – nutritional requirements, food requirements b) Old age – nutritional requirements, food requirements, nutritional related problems of old age, degenerative. 	8
	Total Hours	45

References**Text Books:**

- Brown, J. E-Nutrition through the Life Cycle, 6edn., 2016, Cengage Learning.
- Mahan L. K. & Stump S.E Krause's - Food Nutrition and diet Therapy, 11edn, 2003, Saunders.
- B.Srilakshmi - Nutrition Science, 2006, New Age International.

Reference Books:

- Groff, J. L and Gropper, S. S- Advanced Nutrition and Human Metabolism, Belmont CA: Wads worth/Thomson Learning.
- Goodhart, R. S. S. and Shils, M. E - Modern Nutrition in Health and Disease, Philadelphia: Lea and Febiger.
- Jackson, M. S - Adolescent Nutritional Disorders, 1997, The New York Academy of Science.
- Jelliffe D.B- Assessment of Nutrition Status of the Community, 1966, WHO, Geneva.

Web Resources:

- <https://www.universalclass.com/articles/health/nutrition/nutritional-needs-for-different-ages>.
- <https://www.nutrition.org.uk/nutritionscience/life.html>
- <http://www.open.edu/openlearncreate/mod/oucontent/view.php>

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Define the nutritional needs of each age group.</p> <p>CO2: Infer and apply the appropriate concepts of balanced diet.</p> <p>CO3: Interpret the nutritional problems pertaining to different ages.</p>
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Assessment Pattern

Bloom's Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	20	15	20	20
Understand	20	15	25	25
Apply	5	10	15	15
Analyse	5	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

Course Code & Title	21UPCND1S04- Food Safety and Sanitation		
Class	I /II M.Sc.	Semester	II / III
Cognitive Level	K-1, K-2, K-3, & K-4		
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To enable students understand how food safety and sanitation practices prevent food borne illness in food establishments. • To emphasise the role of governmental and non-governmental organizations in governing food safety and sanitation. • To familiarize on management of critical situations. 		

Units	Topic and Details	Number of Hours
I	<p>Food Safety And Sanitation Management</p> <ol style="list-style-type: none"> Introduction to food safety Changing trends in food consumption and choices The food flow A new approach to an old problem Facility planning and design The role of government in food safety The role of the food industry in food safety Food protection manager certification Recent initiatives in food safety 	9
II	<p>Factors that affect food borne illness</p> <ol style="list-style-type: none"> Time and temperature abuse- measure food temperatures, calibration of thermometer, measuring food temperature Preventing temperature abuse Methods to maintain temperature of food Importance of good personal hygiene Cross contamination Other sources of contamination Work area sanitation 	9
III	<p>Cleaning and sanitizing operations</p> <ol style="list-style-type: none"> Principles of cleaning and sanitizing Removal of food particles Application of cleaning agents Methods of cleaning Commonly used cleaners and detergents Frequency of cleaning Sanitizing principles Types of sanitizing- heat and chemical sanitizing Factors affecting sanitizing Chemicals used for sanitizing- chlorine, iodine, quaternary ammonium compounds. Equipments and supplies used for cleaning- mechanical dishwashing, manual dishwashing, cleaning fixed equipments. 	9
IV	<p>Environmental sanitation and maintenance</p> <ol style="list-style-type: none"> Condition of the establishment- proper water supply and sewage disposal systems Condition of building- infrastructure, facilities, maintenance and sanitation 	9

	<ul style="list-style-type: none"> c) Plumbing hazards in food establishments- cross connection, back flow: methods and devices to prevent back flow, grease traps d) Garbage and refuse sanitation- inside and outside storage e) Pest control- pests, signs of infestation and Integrated Pest Management (IPM) 	
V	Accident prevention and crisis management <ul style="list-style-type: none"> a) Safety in food establishments b) Common types of injuries c) Self-inspection safety checks d) Facilities for emergency e) Crisis management- bioterrorism, water supply emergency procedures f) Foodborne illness incident or outbreak 	9
Total Hours		45

References

Text Books:

- Longree.K and Armbruster-Quality Food Sanitation, 1996, Wiley Interscience, New York, NY.
- Adams, M.R and M.O. Moss - Food Microbiology, 2000, Royal Society of Chemistry, London, England.
- **Reference Books:**
- McSwane, D., Rue, N., Linton, R- Essentials of Food Safety and Sanitation, 3rdedn, 2003, Prentice Hall, Upper Saddle River, NJ.
- Anna.K.Joshua – Food Microbiology,2018, New Age International Private Limited
- Bennett, G, W., J. W. Owens, and R. M. Corrigan - Truman’s Scientific Guide to Pest Control Operations, 1997, Advanstar Communications, Cleveland, OH.

Web Resources:

- <http://www.foodsafe.ca>
- http://www.bclaws.ca/civix/document/id/complete/statreg/08028_01

Course Outcomes	On completion of the course, students should be able to CO1: Describe the importance of food safety and sanitation. CO2: Relate the factors that cause food borne illness. CO3: Ascertain accident prevention and managing crisis.
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Assessment Pattern

Bloom’s Category	Continuous Assessment Tests (Marks)			Terminal Examination (Marks)
	I	II	III	
Remember	15	15	20	20
Understand	15	15	25	25
Apply	10	10	15	15
Analyse	10	10	15	15
Evaluate	-	-	-	-
Create	-	-	-	-
Total	50	50	75	75

VALUE ADDED COURSES

Course Code & Title	21UPCNDIV01- Bakery and Confectionery
Course Objectives	<p>The Course aims</p> <ul style="list-style-type: none"> • To enable students understand concepts of baking and confectionery. • To become familiar with the principles, role of various food components involved in baking and confectionery.

Units	Topic and Details	Number of Hours
I	<p>Introduction to Bakery Definition, principle and classification of baked products. Major / minor equipments required to start a small bakery Unit</p>	6
II	<p>Ingredients in Baking Role of flour (gluten), fat and egg in baking Leavening agents – definition, types (physical, biological and chemical) and role in baking. Sugar-Sources. Types and role in baking. Role of minor ingredients – Milk, water, salt, fruit and nuts.</p>	6
III	<p>Preparation of Bakery Foods Bread: Types, methods, faults, bread diseases and improvers. Cake : Ingredients, types, methods and faults. Biscuits and cookies: Ingredients, types, methods.</p>	6
IV	<p>Decoration of Baked Foods Introduction, types and techniques of icing – basic and royal , frosting and filling</p>	6
V	<p>Confectionery Making of Toffee, Chocolates, Hard Boiled Candies (clear, hard, pulled, grained, filled), Soft candies (basic fondant, modified fondant like toffee, fudge, marshmallows, gums, jellies, chocolates), Bars - Role of major components, factors affecting quality of the product.</p>	6
Total Hours		30

References

Text Books

- Dubey, S.C. (2002), Basic Baking IV Edition, The Society of Indian Bakers, New Delhi.
- Bakers Handbook on Practical Baking (1998) Compiled and Published by US Wheat Associates, New Delhi.
- NIR Board, The Complete Technology Book on Bakery Products, National Institute of Industrial Research, New Delhi

Reference Books

- Fellows, J.P. (1998), Food Processing Technology – Principles and Practice, Ellis Horwood Limited, London.
- Avantina Sharma, (2006), Text Book of Food Science and Technology, International Book Distributing Co., Chaman Studio Building, Charbagh, Lucknow, UP.

Course Outcomes	<p>On completion of the course, students should be able to</p> <p>CO1: Describe the concepts of bakery and confectionery.</p> <p>CO2: Relate the role of ingredients to product outcome.</p> <p>CO3: Ascertain the types of confectionery and factors affecting the quality of products.</p>
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Course Code & Title	21UPCND1V02- Food Packaging
Course Objectives	<p>The Course aims</p> <ol style="list-style-type: none"> 1. To enable students understand about various packaging materials and importance of packaging 2. To become familiar with testing and evaluation of packing media, packaging laws and regulations 3. To familiarize on environment friendly packaging material

Units	Topic and Details	Number of Hours
I	Packaging Concepts, definition, significance, classification. Development, unit/Retail. Fresh and processed, general characteristics and food preservation.	6
II	Primary Packaging Media: Properties and applications. Paper boards, metals, plastics, wood and plywood, glass.. Labels, caps and closures, waxes, adhesives, inks and lacquers, cushioning materials.	6
III	Packaging Systems and Methods General classification, packaging types - Vacuum packaging, gas flush Packaging, CAP and MAP, aseptic and retort packing bag-in-box.	6
IV	Storage, Handling and Distribution of Food Packages Palletisation and containerization. Marketing - barcoding and marketing.	6
V	Packaging Laws and Regulations FDA, FPO, Packaging commodity rules, Weight and Measures Act.	6
	Total Hours	30

<p>References</p> <ul style="list-style-type: none"> • Bhatia, S.C., Canning and Preservations of Fruits and Vegetables – New Delhi, Inc. • Darry, R. Blackie. T. Principles of Applications of MAP – Academic Professions. • Hotchikess, Food and Packaging Interaction- American Chemical Society. • Multon, J.K. Food packaging Technology, (Vol.1 and 2) VCH – Publishers, Inc. New York. • Robertson, G.L., Food Packaging – Marcell, Dekker, Inc, New York. • Sacharow & Griffini, Food Packing, AVI Publications.

Course Outcomes	On completion of the course, students should be able to CO1: Describe the various packaging materials and importance of packaging. CO2: Discuss laws and regulations related to packaging. CO3: Ascertain the role of packaging on environment.
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