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. 2018-2019)

PERIYAR UNIVERSITY, SALEM

PERIYAR UNIVERSITY

DEPARTMENT OF NUTRITION AND DIETETICS

VISION

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

MISSION

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

PROGRAM SPECIFIC OUTCOME (PSO)

The 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, likefood safety and security, health and sanitation, environment, and genderconcerns.

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 andinforming 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 cares 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									
18UPCND1C01	Human Physiology	5	4	1	-	4	25	75	100
18UPCND1C02	Applied Food Science	5	4	1	-	4	25	75	100
18UPCND1C03	Clinical Nutrition and Dietetics-I	6	5	1	-	4	25	75	100
18UPCND1A01	Food Service Management	4	3	1	-	4	25	75	100
18UPCND1CP01	Human Physiology Practical	3	-	-	3	2	40	60	100
18UPCND1CP02	Clinical Nutrition and Dietetics Practical-I	3	-	-	3	2	40	60	100
18UPCND1E01	Elective –I	4	3	1	-	4	25	75	100
18UPCND1SM01	SWAYAM/MOOC online course -I	-	-	-	-	4	-	-	-
	Total	**30**				**28**	**205**	**495**	**700**
SEMESTER –II									
18UPCND1C04	Clinical Nutrition and Dietetics -II	5	4	1	-	4	25	75	100
18UPCND1C05	Clinical Biochemistry	5	4	1	-	4	25	75	100
18UPCND1A02	Nutrition for Sports and Exercise	5	4	1	-	4	25	75	100
18UPCND1CP03	Clinical Nutrition and Dietetics Practical-II	3	-	-	3	2	40	60	100

18UPCND1CP04	Clinical Biochemistry Practical	3	-	-	3	2	40	60	100
18UPCND1E02	Elective –II	4	3	1	-	4	25	75	100
18UPCND1S01	Supportive –I	3	3	-	-	3	25	75	100
18UPCND1I01	Skill Based Medical Nutrition Therapy	2	-	-	2	2	25	50	75
06PHR01	Human Rights (Self-study/ Value Edu)	-	-	-	-	-	-	100	100
	Total	**30**				**25**	**230**	**645**	**875**
SEMESTER –III									
18UPCND1C06	Research Methods & Statistical Applications	6	5	1	-	4	25	75	100
18UPCND1C07	Human Development and Nutrition	6	5	1	-	4	25	75	100
18UPCND1C08	Public Health Nutrition	5	4	1	-	4	25	75	100
18UPCND1A03	Hospital Administration and Practices	4	3	1	-	4	25	75	100
18UPCND1CP05	Research Methods & Statistical applications Practical's	3	-	-	3	2	40	60	100
18UPCND1CP06	Human Development and Nutrition practical's	3	-	-	3	2	40	60	100
18UPCND1S02	Supportive-II	3	3	-	-	3	25	75	100
18UPCND1SM02	SWAYAM/MOOC online course -II	-	-	-	-	4	-	-	-
	Total	**30**				**27**	**205**	**495**	**700**
SEMESTER –IV									
18UPCND1C09	Nutraceuticals and Functional Foods	5	4	1	-	4	25	75	100
18UPCND1CP07	Nutraceuticals and Functional Foods Practical	3	-	-	3	2	40	60	100
18UPCND1CPR01	Project and Viva-voce	22	-	22	-	14	50	150	200
	Total	**30**				**20**	**115**	**285**	**400**
SELF STUDY COURSES / INTERNSHIPS									
18UPCND1SC01	Hospital Dietary Internship Training (Mandatory)	60 days				**4**	-	-	-
	Total					**104**	**755**	**1920**	**2675**

Total weekly contact hours: 120 **Total number of credits:104**

Allied courses

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
18UPCND1A01	Food Service Management	4	4	25	75	100
18UPCND1A02	Nutrition for Sports and Exercise	5	4	25	75	100
18UPCND1A03	Hospital Administration and Practices	4	4	25	75	100

Elective courses

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
18UPCND1E01	Textiles and Clothing In Human Care	4	4	25	75	100
18UPCND1E02	Resource Management and Interior Design	4	4	25	75	100
18UPCND1E03	Home Science Extension Education and Communication	4	4	25	75	100
18UPCND1E04	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
18UPCND1S01	Diet Therapy in Life Style Diseases	3	3	25	75	100
18UPCND1S02	Basic concepts in Dietetics	3	3	25	75	100
18UPCND1S03	Life cycle Nutrition	3	3	25	75	100
18UPCND1S04	Food Safety and Sanitation	3	3	25	75	100

SWAYAM/MOOC online courses (Preferable)

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

6. DETAILS OF THE COURSE

1.	No. of Core papers with practical's	:	16
2.	No. of Allied papers	:	3
3.	No. of Elective papers	:	2
4.	Supportive courses-Non-Major	:	2
5.	SWAYAM /MOOC online courses	:	2
6.	Hospital Dietary Internship Training	:	1
7.	Project and Viva voce	:	1
8.	Skill Oriented Industrial Paper	:	1
9.	Self-Study/ Value Added Course	:	1

7. SCHEME OF EXAMINATIONS

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

Theory Paper
External:75 Marks
I**nternal**: 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 X8 =40 Marks

Procedure followed for Internal Marks:
For Theory Papers

Best one out of two tests	:	5 Marks
Model	:	5 Marks
Seminar	:	5 Marks
Assignment	:	5 Marks
Attendance	:	5 Marks
Total	**:**	**25 Marks**

For Practical's

Practical Internal	
Test Best 1 out of 2	: 20 Marks
Model	: 20 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	**18UPCND1C01- Human Physiology**		
Class	**I M.Sc.**	**Semester**	**I**
Cognitive Level	**K-1, K-2, K-3&K-4**		
Course Objectives	**The Course aims** • To aid the Students to conquerknowledge 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 –** a) Overview - Molecular structure of cell and its components - Chemical nature - 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 - only physiology of sense organs	13
II	**Respiratory System** a) Anatomy, Physiology, mechanism and regulation of respiration b) Role of lungs in the exchange of gases c) Transport of oxygen and Co2 d) Role of haemoglobin and buffer systems e) Cardio-respiratory response to exercise and physiological effects of training. **Digestive system**: a) Structural and functional characteristics of parts of digestive organ b) Accessory organs c) process of digestion and absorption of - Carbohydrates, Protein and Fats d) Pancreas - Role in digestion and absorption and glucose regulation. e) Liver - Structure and Role in digestion and absorption.	17
III	**Endocrinology and Reproduction** a) Anatomy of endocrine glands and Reproductive organs. b) Hormones – - 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.	15
IV	**Cardiovascular system** a) Structure, Function, and electrical conduction, Circulatory system and Pulmonary and systemic circuit.	

	b) Blood- - Components, RBC, WBC and Platelets, Serum and plasma - Blood coagulation and Blood groups. c) Lymphatic system - Structure and function of heart and blood vessels - Regulation of cardiac output and blood pressure - Heart failure and Hypertension. **Excretory System –** - Formation of urine, Characteristics of urine and Normal and abnormal constituents of urine - Acid - base balance.	18
V	**Immunity:** a) Properties, Natural and acquired Immunity and Feature of immune responses b) Antigen - antibodies - Types, Properties and Antigen - antibody interaction, Auto immune disorder and allergy. c) Role in inflammation and defense.	12
	Total Hours	**75**

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

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**

References
Text Books:

- Chatterjee –Human Physiology, Edn.11, 2016, CBS Publishers.
- G K Pal - Textbook of Physiology, Vol 1& 2, Jaypee Brothers Medical Publishers
- KhuranaIndu - 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 Code & Title	18UPCND1C02-Applied Food Science		
Class	**I M.Sc.**	**Semester**	**I**
Cognitive Level	**K-1, K-2, K-3, K-4& K-5**		
Course Objectives	**The Course aims** • 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	**Cereals** – **Rice & wheat and other Millets** a) Structure and Composition b) Nutritive Value and functionality in food system. **Starch:** a) Structure and Gluten formation b) Gelatinization and Factors affecting gelatinization c) Dextrinization and modified food starches. **Fiber (Non-starch Polysaccharides):** a) Cellulose, Hemicelluloses, Pectin, Gums and Animal polysaccharides b) Health benefits of fiber in human nutrition. **Pluses:** a) Types and Composition, b) Methods of processing & cooking and processed products. **Proteins:** a) Classification and Composition of proteins b) Denaturation, non- enzymatic browning c) Protein concentrates, hydro lysates and texturized vegetable proteins.	18
II	**Fats & Oils:** a) Composition of food fats b) Modification of natural oils – Hydrogenation c) Properties of fats and oils d) Fat substitutes and Trans fatty acids e) Fat deterioration and antioxidants. f) Rancidity- Types, Mechanism and prevention. g) Uses of fat replacers in processed foods. **Fruits and Vegetables**: a) Structure, Composition 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	15

	prevention.	
III	**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. **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.	15
IV	**Flesh foods** a) Types, Composition and structure of muscle b) Ripening of meat and Tenderizing of meat c) Conversion of muscle to meat-physico -chemical changes d) Cooking and processing. **Marine foods (Fish and Seaweeds)** a) Types and Composition b) Criteria for fish and seaweed selection c) Fish and seaweed products **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	15
V	**Sensory evaluation of foods** a) Sensory characteristics of foods - Appearance, Colour and Flavor b) Types of sensory test, sensitivity test and objective evaluation. **Food additives:** a) Definition and Needs for food additives b) Different food additives and food safety c) Unintentional additives **Packaging** a) Importance, functions & types of packaging material.	12
	Total Hours	**75**

Course Outcomes	**On completion of the course, students should be able to** **CO1**: Cite and explain the chemistry, structure and composition underlying the properties of various food components. **CO2:**Ascertain the major chemical reactions that occur during food preparation and storage. **CO3:** Apply food science knowledge to describe functions of ingredients in food. **CO4:** Plan appropriate sensory evaluation tests to answer specific questions regarding food attributes or consumer preferences. **CO5:** Describe techniques that can be used to monitor quality of raw ingredients and final packaged products.

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**

References

Text Books:

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

Reference Books:

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

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

Course Code & Title	18UPCND1C03- Clinical Nutrition & Dietetics-I		
Class	**I M.Sc.**	**Semester**	**I**
Cognitive Level	**K-1, K-2, K-3, K-4& K-5**		
Course Objectives	**The Course aims** • 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 dieticians.		

Unit	Content	Number of Hours
I	**Clinical Nutrition and Dietetics** a) Definition and history of dietetics. b) Dietitian as part of the Medical Team c) Nutritional Screening and care - Nutritional Assessment - Diagnosis - Intervention and evaluation. **Diet, Nutrient and Drug Interaction** 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** a) Normal diet as a basis for therapeutic diets b) Modification of Normal Diet and various nomenclatures of standard hospital diets c) Hospital diet - Scope and importance - Routine hospital diets - Normal / General diets - Liquid diets and formula diets - Soft diets and bland diets	17
II	**Dietary management in critically ill patients** a) Nutritional status assessment of the critically ill patients. b) Recent advances in techniques and feeding substrates. c) Enteral Nutrition support - Site, Different tube sizes, Different types of feeds, Composition and Delivery methods and its complications. d) Parenteral Nutrition - Type of access, Parenteral nutrition solutions/composition - Administration methods, Monitoring & complications. **Dietary management in Febrile condition** a) Classification and etiology of fever/infection, symptoms, diagnostic tests , Metabolic changes during infection and dietary treatment for - Typhoid, Influenza, Malaria, Tuberculosis and HIV & AIDS **Dietary management of cancer** a) Types, Etiology and Signs and symptoms, and diagnosis of	20

	cancers. b) Cancer therapy and its complications - Chemotherapy, Radiation therapy and Surgery. c) Dietary management to cancer patients.	
III	**Dietary management in deficiency diseases** a) Aetiology, Symptom and Diagnostic tests and Dietary treatment for PEM, Vitamin A and Anaemia **Dietary management in Surgery** a) Nutrition in wound healing b) Stage of Convalescence c) Dietary management for pre and post- surgical diets. **Dietary management in Burns** 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. **Dietary management in Trauma** a) Physiological, metabolic and hormonal response to injury b) Dietary management in trauma **Dietary management in Sepsis** a) Definition andDietary management of Sepsis with or without Multiple Organ Dysfunction Syndrome (MODS)	19
IV	**Dietary management in Weight Imbalance** a) Prevalence and Classification b) Components of body weight c) Guidelines for Calculating Desirable body weight. **Dietary management in Obesity** 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 **Dietary management in Underweight** a) Etiologyand dietary management **Dietary management in Eating disorders** a) Definition, Signs and symptoms and Complications/health risks, Diagnostic criteria and nutrition management in Anorexia Nervosa and Bulimia Nervosa.	18
V	**Dietary management in allergy** a) Definition, Symptoms and Diagnostic tests b) Common food allergens and Mechanism of food allergy c) Elimination diets d) Milk allergy in infants and prevention of food allergy. **Dietary Management in Nervous System Disorders** a) Etiology and Clinical features and Dietary management for - Parkinson's disease and Alzheimer's disease **Dietary Management in Bone Health disorders** a) Prevalence, Types and Etiologyand Role ofCalcium, 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**

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Elucidate the importance of interdisciplinary approaches to the management of nutritional problems and the promotion of nutritional health and well -being. **CO2:**Assess the nutritional status of critically ill patients **CO3:**Determine the dietary essentials for recovery and maintenance of various systems. **CO4:** Describe the etiology, symptoms and dietary management of deficiency diseases and febrile conditions. **CO5:** Explain, analyze and diagnose the causes of allergy.

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**

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 Code & Title	**18UPCND1A01- Food Service Management**		
Class	**I M.Sc.**	**Semester**	**I**
Cognitive Level	**K-1, K-2, K-3, K-4& K-5**		
Course Objectives	**The Course aims** • 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	**Food service Institutions and management** 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 **Various types of food service institutions** a) Commercial and Non-commercial b) Various institutions catering needs to different types of handicapped personnel **c)** Various approaches in the management of Food service Institutions. - traditional- systems approach-MBO and TQM	13
II	**Food Service Unit Layout and Design** 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. **Equipments** a) Classification, Selection and Design b) Factors influencing selection of various equipments c) Base materials and finishes in food industries	10

	d) Installation and operation e) Care and maintenance of equipments.	
III	**Food production & service** 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 and portion control e) Principles involved in large Scale Cooking and utilization of left over foods in food service institutions. f) Food Service - Formal and informal types - Styles of food services - Centralized and decentralized system of service	12
IV	**Material management** a) Principles of quantity food purchase - Selection, Methods of buying and Receiving - Methods of delivery and accounting of different foods b) Inventory management - Assessing requirements and Receiving and release of stocks c) Types of Storage, maintenance of food quality in Storage and store record maintenance d) Marketing – definition, function, marketing mix, sales promotion, selling techniques and advertisement **Personnel management** a) Definition, development and policies b) Sources of recruitment, Selection, Induction, training, development, promotion, motivation and leadership c) Wages and other welfare benefits for personnel d) Labor laws and other legal aspects	13
V	**Financial management** a) Types of budget, Records for purchase, Receiving, Storage and Production b) Service and income and expenditure record. c) Costing and cost control- - Factors affecting cost control - Importance and Components of Costing - Breakeven Analysis - Determining Selling Price of Food - Checklist for Cost Control **Hygiene and sanitation in preparation and serving area** a) Personal hygiene b) Types and sources of contamination c) Prevention and safety measures d) Methods of controlling infestation. e) Methods of dish washing	12
	Total Hours	**60**

Course Outcomes	On completion of the course, students should be able to
	CO1: Differentiate and contrast the types of foodservice offered in a variety of foodservice settings. **CO2:**Relate food services technology to design layout and operate industry equipment. **CO3:**Apply nutritional standards as expected in Food Service Management Fields. **CO4:** Demonstrate an understanding of human resource management, financial management, and quality control. **CO5:** Perform essential food production and cost control skills.

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**

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.

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 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** • To provide practical experience on physiological concepts. • To governmeasurement 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**

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

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**

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 Code & Title	**18UPCND1CP02- Clinical Nutrition and Dietetics Practical - I**		
Class	**I M.Sc.**	**Semester**	**I**
Cognitive Level	**K-3, K-4, K-5 & K-6**		
Course Objectives	**The Course aims** • To provide practical laboratory training in the planning and preparation of therapeutic diets. • 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 trail 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 cancer 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**

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Assess the nutritional status using various nutritional assessment tools. **CO2:**Develop a ready –reckoner for calculating nutrient content of various foods in normal persons and the ability to modify for given disease conditions. **CO3:**Apply the principles of diet and determine the dietary essentials for recovery from critical illness. **CO4:** Plan menu for the given disease condition and compare and contrast with R.D.A using software.

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**

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

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

Course Code & Title	**18UPCND1C04- Clinical Nutrition and Dietetics -II**		
Class	**I M.Sc.**	**Semester**	**II**
Cognitive Level	**K-1, K-2, K-3, K-4& K-5**		
Course Objectives	**The Course aims** • 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	**Dietary management of Cardio Vascular Diseases** a) Prevalence, Etiology and Risk Factors, b) Clinical diagnostic tests and nutrition management for - Dyslipidemias, Atherosclerosis, Angina Pectoris and Myocardial Infarction (MI) and Congestive Cardiac Failure (CCF) c) Prevention through life style modifications d) Dietary management - Low fat, low cholesterol and medium chain triglyceride diet **Dietary management of Hypertension** a) Definition, Classification and Causes b) Signs & Symptoms and Complications c) Dietary management - Diet related factors influencing hypertension, DASH diet - Lifestyle modification	16

II	**Dietary management of Upper Gastro Intestinal Diseases** a) Etiology, signs & symptoms and complications b) Dietary managementfor - Gastritis, Peptic ulcer, Dyspepsia, Esophagitis and Dumping Syndrome. **Dietary management of Lower Gastro Intestinal Diseases** a) Etiology, signs & symptoms and complications Dietary management for - Flatulence, Diarrhea, Dysentery, Constipation, Celiac disease, Steatorrhea, Tropical sprue, Irritable bowel syndrome, diverticular disease, colon cancer, Ulcerative colitis and Crohn's Disease.	14
III	**Dietary management of Liver disease** a) Types, Etiology, Symptoms and Complications b) Physiology, functions of the liver and liver function tests. c) Metabolic consequences of alcohol consumption d) Dietary management for - Hepatitis, Cirrhosis and Hepatic coma. **Dietary management ofGall Bladder Diseases** a) Physiology and functions of Gall Bladder b) Gall bladder function tests c) Dietary management for - Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis **Dietary management ofPancreatic Disorders** a) Physiology and functions of exocrine Pancreas b) Pancreatic function tests c) Dietary management for - Pancreatitis (Acute and chronic) and Zollinger- Ellison Syndrome	16
IV	**Dietary management ofDiabetes mellitus** 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 **Management of Diabetes** a) Food exchange list, b) Glycaemic index of foods, Carbohydrate counting and Resistant starch c) Sweeteners and sugar substitutes d) Meal planning approaches - With and without Insulin and during sickness. e) Medications - Oral hypoglycaemic drugs and Insulin. f) Lifestyle modification and exercise to manage diabetes mellitus. **Management of Hypoglycaemia** a) Types, symptoms and fasting state hypoglycemia b) Postprandial or reactive hypoglycemia. **c)** Dietary treatment in reactive hypoglycemia.	14
V	**Dietary management ofKidney Diseases** a) Aetiology, clinical signs & symptoms b) Physiology & functions of kidney c) Kidney function tests.	15

	d) Types of kidney diseases - Glomerulonephritis,Nephrotic Syndrome**,** Acute Renal Failure (ARF), Chronic Renal Failure (CRF), End Stage Renal Disease (ESRD)-Dialysis and Kidney Transplant. **Nephrolithiasis/Renal Calculi** a) Aetiology b) Types of stones and nutritional care- acid and alkaline ash diet. **c)** Use of sodium, potassium and phosphorus exchange lists in diet planning of kidney diseases patient.	
	Total Hours	**75**

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

COs Consistency with POs and PSOs

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

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

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests(Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	5	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**

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/PrincipiesofNutrition.pdf
- https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf
- krishikosh.egranth.ac.in

Course Code & Title	18UPCND1C05- Clinical Biochemistry		
Class	**I M.Sc.**	**Semester**	**II**
Cognitive Level	**K-1, K-2,K-3,K-4 & K-5**		
Course Objectives	**The Course aims** • 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	**Body fluids, Hormones, Enzymes and Bioenergetics** **Components of blood** a) Composition and function of blood b) Plasma and blood corpuscles c) Structure and function of haemoglobin, abnormal haemoglobins. d) Blood coagulation – mechanism and regulation. e) Blood groups **Water and electrolyte** a) Regulation of water and electrolyte balance b) Hydrogen ion homeostasis and acid-base balance. **Hormonesand Enzymes** a) Mechanism of hormone action and its regulation. b) Hormones of Pancreas, Pituitary, Adrenal, Thyroid and Sex hormones. c) Enzymes in differential diagnosis of diseases and their clinical significance. **Bioenergetics** a) Electron transport chain, Oxidative Phosphorylation and synthesis of ATP.	16
II	**Carbohydrates** a) Occurrence, Classification and Structure, Physic-chemical properties and biological importance of carbohydrates. b) Monosaccharide and related compounds, disaccharides and Polysaccharides. **Metabolism of carbohydrates** a) Aerobic and anaerobic degradation b) Glycogenesis and Glycogenolysis c) Glycolysis and Gluconeogenesis d) Cori's cycle, Pyruvate Dehydrogenase complex e) Krebs-cycle and Pentose phosphate pathway f) Regulation of carbohydrate metabolism. g) Sugar derivatives of biomedical importance and Inter conversion of Hexoses.	14

III	**Proteins** a) Classification, structure and properties of amino acids, b) Classification, properties and structure of proteins -Primary, seconsportsdary, tertiary and quaternary structure. c) Assessment of protein quality **Metabolism of Proteins** 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 - Decarboxylation, Transamination, Deamination, Glycine, Tyrosine, Tryptophan, Methionine and urea cycle. e) Nucleic acids- Biosynthesis and degradation of purines and pyrimidine's and their regulation.	15
IV	**Lipids** a) Structure and Biological importance and distribution of fats and fatty acids. b) Chemical properties and characterization of fats. **Metabolism of Lipids** 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) Role of free radicals and antioxidants in health and disease	14
V	**Vitamins** a) Historical Background, Structure, Metabolism, Absorption and Transport Food Sources, Interactions with other Nutrients therapeutic Effects, Toxicity And Deficiency of following vitamins - 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 **Macro minerals** a) Sources, Recommended Dietary Allowances, Requirements, Function, Metabolism and Bio-availability, Deficiency and toxicity of phosphorus, calcium, magnesium, sodium, potassium and chloride. **Micro minerals** a) Sources, Recommended Dietary Allowances, Requirements and Function, Metabolism, bio-availability, deficiency and toxicity of Iron, copper, iodine, fluoride, zinc and manganese.	16
	Total Hours	**75**

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

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
CO2	S	S	S	M	L	L	M	M	L	S	L
CO3	S	S	S	S	L	L	M	S	L	S	L
CO4	S	S	S	S	L	L	S	S	M	M	L
CO5	S	S	S	S	L	M	S	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	15	25	25
Apply	15	10	10	10
Analyse	10	10	10	10
Evaluate	5	5	10	10
Create	-	-	-	-
Total	**50**	**50**	**75**	**75**

References

Text Books:

- AmbikaShanmugam- Fundamentals of Biochemistry for Medical Students, .; Eighth edition, 2016, Wolters Kluwer India Pvt. Ltd
- Lehingeretal. – Principles of Biochemistry, 7th ed. 2017 WH Freeman.
- Satyanarayana.U –Essentials of Biochemistry, 2nd edn, 2008, Books And Allied (p) Ltd

Reference Books:

- Devin. T.M- Text book of Biochemistry with Clinical Correlations, 1997, 4th Ed., Wiley Liss Inc.
- Voet and Prat- Fundamentals of Biochemistry , 8 thEdn, 2004, John Wiley & Sons
- Conn, stumpt. 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

Course Code & Title	18UPCND1A02- Nutrition for Sports and Exercise		
Class	**I M.Sc.**	**Semester**	**II**
Cognitive Level	**K-1, K-2, K-3& K-4**		
Course Objectives	**The Course aims** • 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 sportspersons. • To acquaint with different types of ergogenic aids.		

Unit	Content	Number of Hours
I	**Introduction** a. Nutritional considerations for sports / exercising person as compare to normal active person. b. Energy substrate for activities of different intensity and duration, aerobic and anaerobic activities. c. Fluid balance in sports and exercise, importance, symptoms and prevention of dehydration, Sports drink	14
II	**Macro Nutrients** a. Carbohydrate as an energy source for sport and exercise. b. Carbohydrate stores, c. Fuel for aerobic and anaerobic metabolism d. Glycogen re-synthesis and CHO Loading e. CHO composition for pre exercise, during and recovery period**.** f. Diets for persons with - High energy requirements, Stress, Fracture and Injury	16
III	**Protein and amino acid requirements** a. Factors affecting Protein turnover b. Protein requirement and metabolism during endurance exercise c. Resistance exercise and recovery process. d. Protein supplement.	15
IV	**Role of Fat as an energy source for sports and exercise** a) Fat stores, b) Regulation of fat metabolism c) Factors affecting fat oxidation (intensity, duration , training status, CHO feeding) d) Effect of fasting and fat ingestion	15
V	**Important micronutrients for exercise** a. B complex vitamin and specific minerals. b. Exercise induced oxidative stress and role of antioxidants c. Chronic dieting and eating disorder. - Female athletic triad and Sports anemia d. Dietary supplements and different nutragenic / ergogenic aids (commercial supplements, Sports drinks, sports bars etc.)	15
	Total Hours	**75**

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

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**

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_2013http:// themedicalbiochemistrypage.org

Course Code & Title	18UPCND1CP03 -Clinical Nutrition and Dietetics Practical-II		
Class	**I M.Sc.**	**Semester**	**II**
Cognitive Level	**K-3, K-4, K-5&K-6**		
Course Objectives	**The Course aims** • To provide practical laboratory training in the planning and preparation of diets for different disease conditions. • Expertise in various feeding formulas and techniques.		

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.	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**

Course Outcomes	On completion of the course, students should be able to
	CO1: Develop a ready –reckoner for calculating nutrient content of various foods in normal persons and the ability to modify for given disease conditions. **CO2:** Apply the principles of diet and determine the dietary essentials for recovery from critical illness. **CO3:** Plan and prepare menu for the given disease condition. **CO4:** Compare and contrast the derived nutritive values with R.D.A using software.

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**

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 Code & Title	18UPCND1CP04 -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** • To provide practical laboratory training in the estimation of various nutritional 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**

Course Outcomes	**On completion of the course, students should be able to** **CO1:**Compare and contrast the values of estimation with normal and diseased conditions. **CO2:** Apply the principles to estimate various parameters in blood. **CO3:** Apply the principles to estimate various parameters in urine.

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**

References

Text Books:

- Varley, H. Gownakah and Hell-Practical clinical biochemistry, 1980, CBC Publishers, New Delhi.
- 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.

Reference Books:

- 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 Code & Title	**18UPCND1I01- Skill Based Medical Nutrition Therapy**		
Class	**I M.Sc.**	**Semester**	**II**
Cognitive Level	**K-3, K-4, K-5 & K-6**		
Course Objectives	**The Course aims** • To provide clinical approach to assess the nutritional status of patients using case studies. • Hands on training to frame nutritional guidelinesand interventions for the diagnosed disease conditions.		

Unit	Content	Number of Hours
1.	Case study evaluation and nutritional intervention for 1. Infections and Fever 2. Nutrition deficiency diseases 3. HIV with and without comorbidities 4. Different types of cancer 5. Pre & Post bariatric surgery 6. Post burns 7. Obesity 8. Underweight	30
	Total Hours	**30**

Course Outcomes	**On completion of the course, students should be able to** **CO1:** Develop a ready –reckoner for calculating nutrient content of various foods in normal persons and the ability to modify for given disease conditions. **CO2:**Determine the morbidity of the patients by assessing case sheets. **CO3:** Apply the principles of diet and determine the dietary essentials for recovery from critical illness. **CO4:**Plan menu for the given disease condition and compare and contrast with R.D.A using software.

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

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

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.

Web Resources:

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

Course Code & Title	**18UPCND1SC01- Hospital Dietary Internship**		
Class	**I M.Sc.**	**Semester**	**II**
Cognitive Level	**K-3, K-4, K-5&K-6**		
Course Objectives	**The Course aims** • To create opportunities to explore theinterests of studentsin clinical nutrition and dietetics. • To develop professional skills and competencies as clinical dieticians. • To apply what islearnt theoretically to actual practice. • To infer with career development by providing real work experiences.		

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

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	**18UPCND1C06 -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** • 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** a) Meaning, Objectives and Significance in Research b) Types of Research, Research Approaches and Scientific Methods c) Research Process and Criteria of good research d) Research Process and Problems encountered by researchers in India **Research Problem** a) Definition, Selection of a Problem, Techniques b) Formulating hypothesis and deciding variables c) Limitations and delimitations of a problem	18
II	**Research Design** a) Meaning, Need, Features b) Forms of research- Basic, Applied, Evaluation, Action c) Types of Research design – Action Research Design, Case Study Design, Causal Design, Cohort Design, Cross-Sectional Design, Descriptive Design,Experimental Design, Exploratory Design, Historical Design, Longitudinal Design, Meta-Analysis Design, Observational Design.	18
III	**Sampling Design** a) Population and sample	

	b) Steps in sampling design c) Probability sampling techniques –Definition, types, merits and demerits d) Non-Probability Sampling techniques - Definition, types, merits and demerits	18
IV	**Research Tools and Techniques** a) Types of data –Qualitative and Quantitative - Primary and secondary b) Research tools – Definition and purpose c) Types of tools and their uses - Questionnaires – open ended, close ended, mail - Interviews- structured and unstructured, telephone - Observation Techniques- Participant and Non-participant - Rating scales and Attitude scales	18
V	**Statistical Testing of Hypothesis** a) Define – Hypothesis, Hypothesis Statement, Hypothesis Testing, Null Hypothesis. b) Parametric Tests –Definition,Merits and Demerits, Types and its Applications - Student's T test (Independent, Paired, One tailed and two tailed), ANOVA, Z-test. c) Non-Parametric Tests – Definition,Merits and Demerits, Types and its Applications- Chi- square, Spearman's Rank Co-relation, Kruskal Wallis or H test. d) Difference between parametric and Non-Parametric tests.	18
	Total Hours	**90**

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

COs Consistency with POs and PSOs

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

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

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests (Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	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**

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 Code & Title	**18UPCND1C07 -Human Development and Nutrition**		
Class	**II M.Sc.**	**Semester**	**III**
Cognitive Level	**K-1, K-2, K-3, &K-4**		
Course Objectives	**The Course aims** • 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	**Recommended allowances** a) RDA for Indians, basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. b) General concepts about growth and development through different stages of life. **Nutrition in Pregnancy** a) Reproductive Physiology b) Stages of gestation, maternal weight gain c) Physiology of pregnancy, nutritional requirements and dietary guidelines during and prior to pregnancy d) Nutrition related complications with special focus to Adolescent Pregnancy and general complications of pregnancy e) HIV/AIDS during pregnancy – Dietary concerns f) Role of Exercise & Fitness during pregnancy	18
II	**Nutrition during Lactation** a) Physiology of Lactation, hormonal control and reflex action b) Human milk composition c) Nutritional requirements & dietary guidelines	18

	d) Benefits of Breast Feeding e) Galactogogues f) Lactation Management in Normal & Special conditions **Nutrition in infancy** a) Infant feeding and nutrient needs b) Feeding in early and late infancy and Feeding problems and Weaning foods c) Common nutrition problems d) Feeding Preterm and low birth weight infants	
III	**Preschool and Childhood** a) Growth and development –stage, Theories – Maturationist theory, Behaviorist theory, Eriksons psycho analyatical theory, Piagets cognitive theory, Vygotsky's theory. b) Nutritional requirements c) Nutrition for children with special health care needs d) Feeding problems e) Factors to be considered for menu planning and packed lunch f) Nutritional concerns and prevention of nutrition related disorders - Obesity , underweight, Deficiency condition and Allergies	18
IV	**Adolescence** a) Growth and development –stages, Theories – Freud's psychosexual stage theory, Kohlberg's moral understanding stage theory, and Bronfenbrenner'secological theory. b) Physiological and Psychological changes c) Nutritional requirements of adolescents **Nutrition situation with special needs in adolescence** a) Pregnancy b) Eating disorders **Adulthood** a) Theories of Adult Development: Levinson, Vaillant&Neugarten b) Physiological and Psychosocial changes c) Common nutritional concerns d) Nutritional requirements and dietary recommendation e) Physical Activity in adulthood	18
V	**Elderly** a) Theories of Aging – - 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. b) Physiology of Aging **c)** Nutritional requirements of the Elderly **Nutrition needs during illness and chronic conditions** a) Sensory loss, Oral health and GI functions b) Neuromuscular and skeletal functions c) Renal and cardiac function d) Immuno-competence	18
	Total Hours	**90**

Course Outcomes	On completion of the course, students should be able to **CO1:**Define the nutritional needs of each age group. **CO2:** Infer the appropriate theories to distinguish the developmental milestones. **CO3:** Co-relate the physiological and psychological changes adhering to all age groups. **CO4:** Interpret the nutritional problems pertaining to different ages.

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

***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**

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, Belmount 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 Code & Title	18UPCND1C08-Public Health Nutrition		
Class	**II M.Sc.**	**Semester**	**III**
Cognitive Level	**K-1, K-2, K-3, K-4 &K-5**		
Course Objectives	**The Course aims** • 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** a) Relationship between health and nutrition b) Role of public nutritionist in the health care delivery system. **Population Dynamics** a) Demography and Demographic cycle b) World population trend - Birth rates, Death rates, Growth rates and Demographic trends in India c) Age pyramid, sex ratio and Human Development Index	12
II	**Assessment of Nutritional Status** a) Methods of Nutritional assessment, Nutritional anthropometry and Growth standards, b) Dietary and clinical assessment c) Biochemical and radiological assessment **Nutrition monitoring** a) Objectives and Agencies engaged in nutrition monitoring **Nutritional surveillance** a) Need for nutritional surveillance b) Key indicators of nutritional surveillance programme	15
III	**National nutritional policy and intervention programme –** a) Aim, objectives, guidelines and thrust areas. b) PDS - Public distribution system and Agricultural planning - New strategies **Nutrition intervention Programmes** a) Objectives b) Operation of feeding programmes - ICDS, Anganwadi and TINP - **National organizations** - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD and Pradhan MantriGramodayaYojana (PMGY) - **International organizations** - FAO, WHO, UNICEF UNESCO, World Bank.	18
IV	**Strategies to combat public nutrition problems** a) Protein Energy Malnutrition (PEM) b) Vitamin A Deficiency c) Iron Deficiency Anaemia (IDA) d) Iodine deficiency disorder (IDD) S e) Zinc deficiency	16

	f) Beriberi and Pellagra g) Folic acid and B12 deficiency h) Scurvy i) Rickets and Osteomalacia j) Fluorosis k) Lathyrism.	
V	**Nutrition Education** a) Need, Scope, Importance and Theories of nutrition education b) Process of nutrition education. **Nutrition education communication** a) Programme, formulation, Implementation and evaluation. b) Primary Health Care (PHC) and its role in preventing communicable diseases	14
	Total Hours	**75**

Course Outcomes	**On completion of the course, students should be able to** **CO1:**Assess the nutritional status of individuals. **CO2:**Relate health, nutrition and population dynamics of a community. **CO3:** Compile the nutritional interventions provided by the government. **CO4:**Describe the public nutritional problems and appraise strategies to combat.

COs Consistency with POs and PSOs

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

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

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests (Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	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**

References

Text Books:

- Suryatapadas –Textbook of Community Nutrition,2016, Academic Publishers
- Prabha Bisht- Community Nutrition in India, 2017, Star Publications.

- B.Srilakshmi - Nutrition Science, 2006, New Age International.
- Swaminathan.M- Advanced Textbook on Food & Nutrition Vol 1& 2, Bappco.

Reference Books:

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

Web Resources:

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

Course Code & Title	**18UPCND1A03- Hospital Administration and Practices**		
Class	**II M.Sc.**	**Semester**	**III**
Cognitive Level	**K-1, K-2, K-3, &K-4**		
Course Objectives	**The Course aims** • 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** 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.	12
II	**Quality Management in Hospital** 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	14
III	**Biomedical Waste Management** 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.	10
IV	**Health Records** a) The World of Informatics b) The Future of healthcare technology c) Functions of the health record	12

	– 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) – Advantages and disadvantages of the EHR – Bedside or point-or-care systems – Human factors and the EHR – Roadblocks and challenges to EHR implementation	
V	**Telemedicine** a) Telehealth - 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. Technology in Electronic communication - Knowledge management - Genomics - Advances in public health - Speech recognition - Wireless computing and Security - Informatics Education and Barriers to Information Technology implementation	12
	Total Hours	**60**

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

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**

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 Code & Title	**18UPCND1CP05 - 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** • To enable the students to understand the applications of statistical techniques for analysis and interpretation of nutrition research. • To use selective SPSS software for qualitative and quantitative data analysis.		

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	6

	b) Crosstabs	
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**

Course Outcomes	**On completion of the course, students should be able to** **CO1:**Interpret the results of small and large samples using parametric and non-parametric tests. **CO2:** Apply the appropriate methods of data presentation. **CO3:** Conceive knowledge on coding and tabulation of datas. **CO4:** Develop a research report.

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**

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.
- 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 Code & Title	**18UPCND1CP06 - Human Development and Nutrition 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** • 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 and Lactation	7
2.	Menu planning for Infants- Supplementary feeding - Preparation of weaning foods	6
3.	Menu planning for Pre-school and School going children- meals and packed lunch	6
4.	Menu planning for Adolescence	6
5.	Menu planning for Adult with different working category- sedentary, moderate and heavy worker	6
6.	Menu planning for Elderly people	7

7.	Menu planning for sports persons	7
	Total Hours	**45**

Course Outcomes	**On completion of the course, students should be able to** **CO1:**Define the nutritional needs of each age group. **CO2:** Infer the appropriate principles in diet planning for developmental milestones. **CO3:** Co-relate the physiological and psychological needs while designing menu. **CO4:** Interpret and discuss the nutritional values of developed menu with RDA using software.

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

***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**

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, Belmount 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

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

Course Code & Title	**18UPCND1C09- 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** • 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) Definitions, b) Synonymous terms. 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 and classifying nutraceuticals.	14
II	**Properties, structure and functions of various Nutraceuticals** a) Pigments, b) Structural lipids c) Flavor and odor compounds, d) Alkaloids, Terpenoids, Glycosides, Polyphenols, Isoprenoid derivatives and Natural antioxidants	14
III	**Functional components and health effects of** a) Soya, Olive oil, Tea, Common beans, *Capsicum annum*, Mustards, Ginseng, Garlic, Grape, Citrus fruits, Fish oils, Sea foods b) Sports drink c) Infant formula as functional foods. d) Bioavailability and safety issues of functional foods.	16

IV	**Concept and the role of nutraceuticals/functional foods** a) Nutraceuticals for - Cardiovascular diseases, Cancer, Diabetes, Cholesterol management, Obesity, Immune enhancement and Endurance performance b) Mood disorders - Compounds and their mechanisms of action - Dosage levels and Contraindications if any etc.	16
V	**General idea about role of Probiotics and Prebiotics as nutraceuticals.** 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	15
	Total Hours	**75**

Course Outcomes	**On completion of the course, students should be able to** **CO1:**Compile the updates on link between nutrition and medicine. **CO2:** Assess the properties and functions of nutraceuticals. **CO3:** Classify the nutraceuticals and comprehend their role in health promotion. **CO4:** Describe the dietary supplements. **CO5:** Determine the role of globalisation in food choices.

COs Consistency with POs and PSOs

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

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

Assessment Pattern

Bloom's Category	**Continuous Assessment Tests (Marks)**			**Terminal Examination (Marks)**
	I	**II**	**III**	
Remember	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**

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 DehkerInc, New York.
- Guo M. - Functional Foods – Principles and technology, 2009, Wood head publishing company, UK.

Web Resources:

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

Course Code & Title	**18UPCND1CP07 - 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** • 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**

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:** Ccomprehend the formulations of sports drink. **CO4:** Describe the role of nutraceuticals in herbs.

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

***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**

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 Code & Title	18UPCND1CPR01- Project and Viva-voce		
Class	**II M.Sc.**	**Semester**	**IV**
Cognitive Level	**K-1,K-2,K-3,K-4 &K-6**		
Course Objectives	**The Course aims** • To synthesise knowledge from all disciplines of learning. • To creativelyapply the concepts of nutrition and dietetics in practice. • To enhance the skills of independent thinking and learning. • To develop aptitude to solve hitches during applications. • To create innovative solutions to existing nutrition problems in community.		

Course Outcomes	**On completion of the course, students should be able to** **CO1:**State a nutritional problem prevalent in local community settings and draft a research design for solving. **CO2:** Determine the etiological factors. **CO3:** Plan and design tools for data collection. **CO4:**Apply the appropriate nutritional concepts to research techniques. **CO5:**Conceive solutions to the defined problems.

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
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	18UPCND1E01-Textiles and Clothing in Human Care		
Class	**I M.Sc.**	**Semester**	**I / II**
Cognitive Level	**K-1, K-2, K-3, K-4 &K-5**		
Course Objectives	**The Course aims** • To enable students gain knowledge on fibre and yarn. • To familiarise with fabric construction. • To apprehend on care and maintenance of fabrics..		

Units	Topic and Details	Number of Hours
I	**Fibre** a) Types Natural –cotton, flax/Linen, Jute, Ramie, Hemp Manmade – cellulosic, manmade synthesized fibre, mineral and elastomeric b) Processing and manufacture of fibres c) Properties –Physical and Chemical d) Fiber identifications –visual inspection, burning test, microscope test, soluble test e) Applications of fibers	14
II	**Yarn** a) Definition b) Classification –simple and complex c) Testing and Identification of yarn d) Yarn twist e) Uses of yarn in various fabrics	11
III	**Fabric construction** a) Definition b) Types –woven, non-woven, knitted c) Construction techniques d) Merits and demerits	11
IV	**Stain removal and its techniques** a) Solvents - Oxidizing solvents, Reducing solvents, Lacquer solvents, Inert solvents, Detergents, Acids, Alkalis b) Application of solvents c) Types of stains and removal- Dye stains, Protein stains, combination stains, Dairy product stains, fruit stains, mud stains, coffee stains.	12
V	**Laundering and Laundering Agents** a) Laundering – Types, Principles, methods and process b) Laundering agents -Stiffening agents, Bleaching agents, Fabric Softeners c) Dry cleaning –Procedure, advantages and disadvantages	12
	Total Hours	**60**

Course Outcomes	**On completion of the course, students should be able to** **CO1:**Classify the fibres and explain its properties. **CO2:** Assess the types and properties of yarns. **CO3:** Compile the fabric construction techniques. **CO4:** Describe the process and agents in stain removal. **CO5:** Determine the laundering procedures for various fabrics.

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**

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

Reference Books:

- Bev Ashford - Fibers to fabrics, 2016,AuthorHouseUK.
- Premony Ghosh- Fibre science and Technology,2003, McGraw Hill Education
- PremlataMullick-Text book of home science, 2000, Kalyani Publisher.

Web Resources:

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

Course Code & Title	18UPCND1E02-Resource Management and Interior Design		
Class	**I M.Sc.**	**Semester**	**I / II**
Cognitive Level	**K-1, K-2, K-3, &K-4**		
Course Objectives	**The Course aims** • To enable students gain knowledge on resource management. • To familiarise with beautification of homes. • To apprehend on work simplification.		

Units	Topic and Details	Number of Hours
I	**Concepts of home management and steps** a) Definition of home management b) Importance of management c) Qualities of good home maker d) Basis for home management –values, goals and standards e) Home management process- planning, controlling, evaluating	12
II	**Decision making** a) Definition b) Characteristics of decision making c) Steps in decision makings d) Type of decision e) Home Management and Decision Making	11
III	**Work simplification** a) Definition b) Symbols, techniques c) Mundels class of change d) Time management-tools in time management e) Time management process Energy management –types of fatigue, measures to relieve fatigue	13
IV	**Interior Design** 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 d) Elements of design - Line, Direction, Shape, Colour, Texture and Value	12
V	**Flower arrangement** a) Principles of Flower Arrangement – Design, Scale, Balance, Harmony, Rhythm, Color b) Patterns and Styles –Symmetrical and Asymmetrical, Traditional, Oriental, Modern, Dried flower arrangement. c) Types- Floral Bouquets, Floral Wreaths, Floral Baskets, Table Centerpiece. d) Basic Designs – Line, Mass, Line - Mass e) Guidelines , Aids and Accessories and Care of flowers	12
	Total Hours	**60**

Course Outcomes	**On completion of the course, students should be able to** **CO1:**Describe the process of home management. **CO2:** Assess the methods of work simplification. **CO3:** Apply the principles and elements of design in all art forms. **CO4:**Infer the significance and types of flower arrangement in interiors.

COs Consistency with POs and PSOs

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

Text Books:

- Seetharaman. P, and Pannu.P-Interior Design and Decoration,2009, Cbs Publishers
- Chaudhari, S.N -Interior Design, Pointer Publishers

Reference Books:

- Sudhir Andrews -Hotel Housekeeping Training Manual, 2009, Tata McGraw-Hill Education.
- PremlataMullick-Text book of home science, 2000, Kalyani Publishers.
- Holtzschue, L - Understanding Colour - An introduction for Designers, 4thedn, 2011, Wiley.

Web Resources:

- http://ahmed kasu interior design book
- http://ecoursesonline.iasri.res.in/mod/page/view.php?id=28568

Course Code & Title	18UPCND1E03- Home Science Extension Education and Communication		
Class	I M.Sc.	Semester	I / II
Cognitive Level	K-1, K-2, K-3, &K-4		
Course Objectives	The Course aims • 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	**Home Science Extension Education** a) Extension Education - Meaning, Scope, Objectives b) Philosophy and Principles of Extension c) Difference between Formal, Informal and Non-Formal. d) Extension Education Methods: 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	**Management and Administration of Formal, Informal and Non-Formal Methods** 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
III	**Theories and Principles of Guidance and Counselling** 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. e) School and educational Psychologist- Roles and Responsibilities.	11
IV	**Developmental and Educational communication** a) Communication- Definition, Objectives, Process, skills b) Types – Interpersonal, focused and Unfocused, Group, Mass, Verbal Models c) Barriers- Physical, psychological, Linguistic, cultural and Mechanical.	12

	d) Purpose/ functions of communication e) Essentials of good communication, Seven C's of Communication.	
V	**Methods and Materials of communication** **a)** Traditional methods –methods and materials of communication, preparation, use, advantages and disadvantages. **b)** Modern methods - methods and materials of communication, preparation, use, advantages and disadvantages. **c)** Strategies for developmental communications - **d)** Class room communication in home science studies **e)** Communication for publicity and public relations **f)** Change and challenges in communication in contemporary society	12
	Total Hours	**60**

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.

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**

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 Code & Title	**18UPCND1E04- 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** • 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** a) Epidemiology: concept and definitions, aims. b) Basic measurements in epidemiology c) Tools of measurement – Rates, Ratios and proportions.	11
II	**Types of epidemiology** 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** 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** a. Types of immunity-Active and passive b. Immunizing agents- Vaccines, immunoglobulin and antisera c. Hazards of immunization	12

	d. Immunization schedules e. Disinfection-types, and recommended procedures	
V	**Genetics and Health** a) Introduction and cytologic facts b) Classification of genetic disorders a. Cromosomal disorders, Mendelian diseases and Erythroblastosisfoetalis c) Preventive and social measures	12
	Total Hours	**60**

Course Outcomes	**On completion of the course, students should be able to** **CO1:**Describe the concepts, principles and role of epidemiology in public health. **CO2:**Apply the epidemiological methods to assess the nutritional status of a community. **CO3:** Associate the importance of immunization in disease prevention. **CO4:** Ascertain the role of genes in health**.**

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**

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:

- AnisaBasheer - 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

SUPPORTIVE COURSES

Course Code & Title	**18UPCND1S01- Diet Therapy in Life Style Diseases**		
Class	**I /II M.Sc.**	**Semester**	**I / III**
Cognitive Level	**K-1, K-2, K-3, &K-4**		
Course Objectives	**The Course aims** • 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** 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) Immuno nutrition	10
II	**Diet in Cardiovascular Diseases** a) Prevalence, Clinical effects b) Risk factors, Role of fat in the development of atherosclerosis c) Dietary management d) Hyper tension e) Physical activity and Heart diseases **f)** Fat substitutes	10
III	**Diet in Diabetes Mellitus** a) Prevalence, types, aetiology and symptoms b) Diagnosis, treatment and complications c) Dietary management	9
IV	**Diet in Cancer** a) Risk factors and Symptoms b) Nutritional problems of cancer therapy c) Nutritional requirements and Dietary management	8

	d) Role of food in the prevention of cancer e) Physical activity and cancer	
V	**Diet in diseases of Kidney** a) Functions b) Symptoms and Principles of dietary management –Acute renal failure, Chronic renal failure, Urinary calculi	8
	Total Hours	**45**

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

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**

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 Code & Title	**18UPCND1S02- Basic Concepts in Dietetics**		
Class	**I /II M.Sc.**	**Semester**	**I / III**
Cognitive Level	**K-1, K-2, K-3, &K-4**		
Course Objectives	**The Course aims** • 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) The dietician in India e) Indian dietetic association f) Technology in diet counselling	9
II	**Nutritional anaemia** a) Prevalence and causes b) Types – Iron Deficiency, Megaloblastic, differentiating **c)** Prevention	8
III	**Diet in infections and fever** a) Host deference mechanism b) Causes, Types c) General dietary considerations a. Typhoid, Influenza, Malaria, Tuberculosis and AIDS	9
IV	**Diet in obesity and Underweight** **a) Obesity** i. Aetiology and theories ii. Assessment, types, treatment iii. Complications, Weight management guidelines, eating disorders **b) Underweight** Aetiology, Nutritional and food requirements	10
V	**Food Sensitivity** a) Types of reactions, food involved in sensitivity b) Symptoms c) Diagnosis	9

	d) Treatment	
	Total Hours	**45**

Course Outcomes	**On completion of the course, students should be able to**
	CO1: Apply the principles of diet and determine the dietary essentials for recovery from infectious diseases. **CO2:** Illustrate the role of dietician. **CO3:**Identify and describe the etiology, symptoms and complications for common nutritional problems. **CO4:** Interpret food sensitivity.

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**

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.

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- Mahan L.K., Sylvia Escott-Stump - Krause's Food Nutrition and Diet Therapy 10th Edition, 2001,W.B. Saunders Company London.
- Passmore P. And M.A. East Wood - Human Nutrition and Dietetics, Churchill Living Stone.
- Raheena M. Begum - A Text Book of Foods Nutrition and Dietetics ¸ 3 edition 2009,Sterling Publishers Pvt. Ltd
- Robinson Ch., M.B. Lawlea, W.L., Chenoweth, And A.E., Carwick : Normal And Therapeutic Nutrition,17 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/PrincipiesofNutrition.pdf
- https://2012books.lardbucket.org/pdfs/an-introduction-to-nutrition.pdf

- krishikosh.egranth.ac.in

Course Code & Title	18UPCND1S03- Life Cycle Nutrition		
Class	**I /II M.Sc.**	**Semester**	**I / III**
Cognitive Level	**K-1, K-2, K-3, &K-4**		
Course Objectives	**The Course aims** • 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** 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** 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** 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** 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** a) Adult – nutritional requirements, food requirements	8

	b) Old age – nutritional requirements, food requirements, nutritional related problems of old age, degenerative.	
	Total Hours	**45**

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

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**

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, Belmount 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 Code & Title	18UPCND1S04- Food Safety and Sanitation		
Class	**I /II M.Sc.**	**Semester**	**I / III**
Cognitive Level	**K-1, K-2, K-3, &K-4**		
Course Objectives	**The Course aims** • 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	**Food Safety And Sanitation Management** a) Introduction to food safety b) Changing trends in food consumption and choices c) The food flow d) A new approach to an old problem e) Facility planning and design f) The role of government in food safety g) The role of the food industry in food safety h) Food protection manager certification **i)** Recent initiatives in food safety	9
II	**Factors that affect food borne illness** a) Time and temperature abuse- measure food temperatures, calibration of thermometer, measuring food temperature b) Preventing temperature abuse c) Methods to maintain temperature of food d) Importance of good personal hygiene e) Cross contamination f) Other sources of contamination **g)** Work area sanitation	9
III	**Cleaning and sanitizing operations** a) Principles of cleaning and sanitizing b) Removal of food particles c) Application of cleaning agents d) Methods of cleaning e) Commonly used cleaners and detergents f) Frequency of cleaning g) Sanitizing principles h) Types of sanitizing- heat and chemical sanitizing i) Factors affecting sanitizing j) Chemicals used for sanitizing- chlorine, iodine, quaternary ammonium compounds. k) Equipments and supplies used for cleaning- mechanical dishwashing, manual dishwashing, cleaning fixed equipments.	9
IV	**Environmental sanitation and maintenance** a) Condition of the establishment- proper water supply and sewage disposal systems b) Condition of building- infrastructure, facilities, maintenance and	9

	sanitation 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** 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**

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.

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**

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