

PERIYAR UNIVERSITY
Periyar Palkalai Nagar, Salem-636011

Department of
Clinical Nutrition and Dietetics



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

REGULATIONS AND SYLLABUS
(w.e.f.2016-2017)

PERIYAR UNIVERSITY, SALEM
Department of Clinical Nutrition and Dietetics
M.Sc. Clinical Nutrition and Dietetics Course

1. PREAMBLE

Nutrition is the science and art of applying the principles of food science and human nutrition to attain and maintain human health. Dietetics & food service management is a versatile profession, which requires professionals to use their knowledge, communication and creative skills in attaining and maintaining patient's health. Dieticians and Nutritionists are paramedical healthcare professionals, who with their nutritional, food science and human nutrition knowledge help in achieving and maintaining good health.

2. OBJECTIVES

1. To impart knowledge and develop capacities of the students through state of the art higher education in the area of Medical Nutrition Management
2. To develop students to become health care professionals for services in various fields such as hospitals academics, research, industry, clinical nutrition department, training, extension and community service.
3. To provide practical, field level experience in hospital administration and dietetics
4. To equip students to start their own Diet clinic unit, leading to entrepreneurship.

3. CONDITIONS FOR ADMISSION

A. Eligibility conditions for admission

- B.Sc Home Science/ Clinical Nutrition and Dietetics/ Food Science and Nutrition / Food Service Management and Dietetics /Human Science/ Nutrition and Dietetics/ Foods and Nutrition
- B.Sc Nursing/ Applied Nutrition/Biomedical Sciences/ Biochemistry/ Clinical Biochemistry/ Microbiology/ Biotechnology / Zoology /Plant Science/Life Science and B.A Home Economic
- MBBS -Bachelor of Medical and Bachelor of Surgery/ BHMS-Bachelor of Homeopathic Medicine and Surgery/ BAMS - Bachelor of Ayurveda, Medical and Surgery/ BNYS - Bachelor of Naturopathy and Yoga/ /BSMS- Bachelor of Siddha Medicine & Surgery/ Any Bachelor degree in Medicine
- Bachelor degree in Allied Health Sciences

B. Method of selection

Candidates have to appear for an entrance examination in the respective subjects to be conducted by the respective departments and thereafter an interview. The date, venue, and time of the entrance examination and interview will be notified to the applicants separately as soon as it is fixed.

4. DURATION OF THE COURSE

The duration of the course is for two academic years consisting of four semesters

DEPARTMENT OF CLINICAL NUTRITION AND DIETETICS
M.Sc. CLINICAL NUTRITION AND DIETETICS

SYLLABUS
Choice Based Credit system (CBCS)

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
SEMESTER –I						
16CNDC01	Human Physiology	5	4	25	75	100
16CNDC02	Advanced Nutrition	5	4	25	75	100
16CNDC03	Clinical Nutrition and Dietetics-I	5	4	25	75	100
16CNDA01	Applied Food Science	5	4	25	75	100
16CNDCP01	Human Physiology Practical	3	2	40	60	100
16CNDCP02	Clinical Nutrition and Dietetics Practical-I	3	2	40	60	100
16CNDE01	Elective –I	4	4	25	75	100
	Total	30	24	205	495	700
SEMESTER –II						
16CNDC04	Clinical Nutrition and Dietetics -II	6	4	25	75	100
16CNDC05	Clinical Biochemistry	5	4	25	75	100
16CNDA02	Food Service Management	5	4	25	75	100
16CNDCP03	Clinical Nutrition and Dietetics Practical-II	3	2	40	60	100
16CNDCP04	Clinical Biochemistry Practical	3	2	40	60	100
16CNDE02	Elective –II	4	4	25	75	100
16CNDS01	Supportive -I	4	4	25	75	100
	Total	30	24	205	495	700
SEMESTER –III						
16CNDC06	Research Methods & Statistical applications	5	4	25	75	100
16CNDC07	Nutrition through Life cycle	5	4	25	75	100
16CNDC08	Public Health Nutrition	5	4	25	75	100
16CNDA03	Hospital administration and practices	5	4	25	75	100
16CNDCP05	Research Methods & Statistical applications Practical's	3	2	40	60	100
16CNDCP06	Nutrition through Life cycle practical's	3	2	40	60	100
16CNDS02	Supportive-II	4	4	25	75	100
	Total	30	24	205	495	700
SEMESTER –IV						
16CNDC09	Nutraceuticals and Functional foods	5	4	25	75	100
16CNDCP07	Nutraceutical and Functional foods practical	3	2	40	60	100
16CNDCPR01	Project and Viva-voce	23	12	50	150	200
	Total	30	18	75	225	300
SELF STUDY COURSES / INTERNSHIPS						
16CNDSC01	Hospital Dietary internship training	60 days	4	-	-	-
	Total		94	-	-	-

Total weekly contact hours: 120

Total number of credits: 94

In addition to course work, 8 weeks of dietary internship is mandatory (Additional=4 credits)

Allied courses

1. Applied Food Science
2. Food Service Management
3. Hospital administration and practices

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
16CNDA01	Applied Food Science	5	4	25	75	100
16CNDA02	Food Service Management	5	4	25	75	100
16CNDA03	Hospital administration and practices	5	4	25	75	100

Elective courses

1. Principles of Epidemiology in Nutrition
2. Food Microbiology
3. Nutrition in critical care
4. Nutrition for Sports and Exercise

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
16CNDE01	Principles of Epidemiology in Nutrition	4	4	25	75	100
16CNDE02	Food Microbiology	4	4	25	75	100
16CNDE03	Nutrition in critical care	4	4	25	75	100
16CNDE04	Nutrition for Sports and Exercise	4	4	25	75	100

Supportive Papers for other PG courses

1. Diet therapy in life style Diseases
2. Basic concepts in Dietetics
3. Life cycle Nutrition
4. Food safety and Sanitation

Subject code	Title of the Paper	Weekly contact Hours	Credits	Internal Marks	External Marks	Total Marks
16CNDS01	Diet therapy in life style Diseases	4	4	25	75	100
16CNDS02	Basic concepts in Dietetics	4	4	25	75	100
16CNDS03	Life cycle Nutrition	4	4	25	75	100
16CNDS04	Food safety and Sanitation	4	4	25	75	100

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.	Hospital Dietary Internship training	:	1
6.	Human Rights	:	1

7. SCHEME OF EXAMINATIONS

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

Theory Paper External

Theory: 75 Marks [Part A: 25 Marks (5 Questions with internal choice) +
Part B: 50 Marks (5 Questions with internal choice)]

Internal: 25 Marks

Total : 100 Marks

Time : 3 hours

Pattern of Question Paper:

PART – A (200 words): Answer All 5 Questions either or type 5 x 5 = 25 Marks

PART – B (500 words): Answer All 5 Questions either or type 5 x 10 = 50 Marks

Procedure followed for Internal Marks:

For Theory Papers

Best two tests out of 3	: 10 Marks
Seminar	: 5 Marks
Assignment	: 5 Marks
Attendance	: 5 Marks
Total	: 25 Marks

For Practical's

Practical Internal	
Test Best 2 out of 3	: 30 Marks
Record	: 10 Marks
Practical External	: 60 Marks
Total	: 100 Marks

For Project and viva voce

Components of evaluation are as follows

Component – I (C1): Periodic Progress and progress reports (15%)

Components – II (C2): results of work and draft report (15%)

Components – III (C3): final viva-voce and evaluation (70%). The report evaluation is for 40% and the Viva-voce examination is for 30%.

Total : 100 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.

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SEMESTER-I

HUMAN PHYSIOLOGY

Objectives

- To enable the Students to learn about the various physiological conditions related to Nutrition

Units	Topic and Details
I	Physiology of Cell - Overview - Molecular structure of cell and its components - Chemical nature - Type of cells and their functions - Different tissues and their characteristics - Body fluid compartment, membrane potential, Inter cellular communication - Homeostasis - Special senses - only physiology of sense organs
II	Respiratory System: - Anatomy, Physiology, mechanism and regulation of respiration - Role of lungs in the exchange of gases - Transport of oxygen and Co₂ - Role of hemoglobin and buffer systems - Cardio-respiratory response to exercise and physiological effects of training. Digestive system: - Structural and functional characteristics of parts of digestive organ - Accessory organs - process of digestion and absorption of - Carbohydrates, Protein and Fats - Pancreas - Role in digestion and absorption and glucose regulation. - Liver - Structure and Role in digestion and absorption.
III	Endocrinology and Reproduction - Anatomy of endocrine glands and Reproductive organs. - 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.
VI	Cardiovascular system - Structure, Function, and electrical conduction, Circulatory system and Pulmonary and systemic circuit. - 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.
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.

References:

1. Human Physiology. VolI &II -C.C.Chatterjee, Medical Allied agencies
2. Ganong W.F. 1985: Review of Medical Physiology 2nd Edition, Lange Medical Publication.
3. Moan Camcell E.J. Dickinson C.J.... Edwares C.R.N. and Sikora K. (1984): Clinical Physiiology, 5th Edition Publication.
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6. Mc. W.D. Karen F.J. and Katch, V.L. (1996): Exercise Physiology, Energy, performance, 4th Edition, Williams and Wilkons Batimere
7. Jain A.K. Text Book of Physiiology, Vol I and II Avichal Publishing Co. New Delhi.

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SEMESTER-I

ADVANCED NUTRITION

Objectives

- To enable the Students to gather depth knowledge about the physiological and metabolic role of various nutrients and their interactions in human nutrition

Units	Topic and Details
I	Energy: - Energy content of foods. - Measurement of Energy Expenditure - Thermic effect of feeding and physical activity - Methods of measurement of basal metabolism. - Estimating energy requirements of individuals. Body fluids and water balance - Body water compartments, Regulation of water balance and Disorders of water balance
II	Carbohydrates: - Types, Classification, Structure, Properties, Digestion and Transport of carbohydrates. - Chemical composition and physiological effects of dietary fibre, Oligosaccharides and resistant starch. - Glycemic index of foods - Calculation and GI of common foods - Sweeteners- nutritive and nonnutritive Metabolism of Carbohydrates: - Glycogenesis, Glycogenolysis, Glycolysis, Gluconeogenesis, Cori's cycle, Krebs-cycle and Pentosephosphate pathway - Regulation of carbohydrate metabolism.
III	Proteins: - Classification of Proteins and amino acids - Functions, Sources, Digestion, Absorption and Transport of proteins and amino acids. Metabolism of proteins: - Role of muscle, liver and gastro intestinal tract in protein metabolism. - Protein quality, methods of evaluating protein quality. - Protein and amino acid requirements. - Therapeutic applications of specific amino acid. Inborn Errors of Metabolism - Phenylketonuria, Maple Syrup Urine Disease (MSUD) Lipids: - Classification-fats and fatty acids - Functions, Sources, Digestion and Absorption - Transport and storage of fat in the body.

	d) Nutritional and metabolic effects of dietary fatty acids. e) Effect of diet on serum lipids and lipoproteins
IV	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.
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

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1. Indian Council of Medical Research Nutrient Requirements and Recommended Dietary Allowances for India, A Report of the Expert Group of the Indian Council of Medical Research, New Delhi; ICMR.
2. Matab S. Bamji, N. Prahlada Rao, Vinodini Reddy (1996): Text Book of Human Nutrition, Oxford & IBM Publishing Co. Pvt. Ltd., New Delhi.
3. Swaminathan M. (1991) : Advanced Text Book on Food & Nutrition, Vol. I & II (2nd Edition, Revised), Bangalore printing & Publishing Ltd.
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SEMESTER-I
CLINICAL NUTRITION & DIETETICS-I

Objectives

- To enable the students to understand the principles of diet and nutrient modifications for different diseases.

Units	Topic and Details
I	Clinical Nutrition and Dietetics - Definition and history of dietetics. - Dietitian as part of the Medical Team - Nutritional Screening and care - Nutritional Assessment - Diagnosis - Intervention and evaluation. Diet, Nutrient and Drug Interaction - Effect of drugs on ingestion, Digestion, Absorption and metabolism of nutrients. - Effect of foods, nutrients and nutritional status on drug dosage and efficacy. Diet Modifications - Normal diet as a basis for therapeutic diets - Modification of Normal Diet and various nomenclatures of standard hospital diets - Hospital diet - Scope and importance - Routine hospital diets - Normal / General diets - Liquid diets and formula diets - Soft diets and bland diets
II	Dietary management in critically ill patients - Nutritional status assessment of the critically ill patients. - Recent advances in techniques and feeding substrates. - Enteral Nutrition support - Site, Different tube sizes, Different types of feeds, Composition and Delivery methods and its complications. - Parenteral Nutrition - Type of access, Parenteral nutrition solutions/composition - Administration methods, Monitoring & complications. Dietary management in Febrile condition - 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 - Types, Etiology and Signs and symptoms, and diagnosis of cancers. - Cancer therapy and its complications - Chemotherapy, Radiation therapy and Surgery. - Dietary management to cancer patients.

III	Dietary management in deficiency diseases a) Etiology, 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 and Dietary management of Sepsis with or without Multiple Organ Dysfunction Syndrome (MODS)
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) Nutraceutical and Dietary management Dietary management in Underweight a) Etiology and 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.
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 Etiology and Role of Calcium, Phosphate & Vitamin D in Osteoporosis and Osteomalacia. b) Measurement of Bone Mass Using Bone Mineral Density (BMD) and Peak Bone Mass (PBM).

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SEMESTER-I

APPLIED FOOD SCIENCE

Objectives:

- To enable the students to understand the composition and changes in various food stuffs as a result of processing and cooking

Units	Topic and Details
I	Cereals – Rice & wheat and other Millets - Structure and Composition - Nutritive Value and functionality in food system. Starch: - Structure and Gluten formation - Gelatinization and Factors affecting gelatinization - Dextrinization and modified food starches. Fiber (Non-starch Polysaccharides): - Cellulose, Hemicelluloses, Pectin, Gums and Animal polysaccharides - Health benefits of fiber in human nutrition. Pluses: - Types and Composition, - Methods of processing & cooking and processed products. Proteins: - Classification and Composition of proteins - Denaturation, non- enzymatic browning - Protein concentrates, hydro lysates and texturized vegetable proteins.
II	Fats & Oils: - Composition of food fats - Modification of natural oils – Hydrogenation - Properties of fats and oils - Fat substitutes and Trans fatty acids - Fat deterioration and antioxidants. - Rancidity- Types, Mechanism and prevention. - Uses of fat replacers in processed foods. Fruits and vegetables: - Structure, Composition - Pectins and Plant acids - Types of pigments. - Effect of cooking on colour and texture of vegetables. - Browning reactions-Enzymatic & non-enzymatic and its prevention.
III	Milk and milk products: - Composition, Nutritive value, Physical and functional properties. - 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.
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
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.

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Journals

1. Food Technology Abstracts, Central Food Technological Research Institute Mysore.
2. Food Technology, Journal Of The Institute Of Food Technology, Illinois, USA.
3. Food Digest, CFTRI Mysore.
4. Journal of Agriculture and Food Chemistry.
5. Cereal Science.
6. Indian Food Industry AFSTI, CFTRI, Mysore.
7. Journal of Food Science and Technology CFTRI, Mysore.
8. Indian Food Packer, All Indian Food Preserves Association, Delhi.
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SEMESTER-I

HUMAN PHYSIOLOGY PRACTICAL

Objectives:

- To provide practical experience on physiological concepts and measurement techniques

S.No	Exercises
1	Microscopic examination of various tissues and blood vessels a. Epithelial Tissue b. Connective Tissue c. Muscular tissue
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	Recording height, weight, Body Fat, Body Mass Index and Waist to Hip Ratio
5	Measurement of Bp, Pulse Rate - Before And After Mild, Moderate And Strenuous Exercise or activity
6	Measurement of Blood Pressure and Pulse Rate
7	Determination of Blood Grouping and Rh Factor
8	Determination of White Blood Cell Count
9	Determination of Red Blood Cell Count
10	Estimation of the Hemoglobin Concentration
11	Estimation of the Bleeding Time And Clotting Time
12	Measurement of Erythrocyte Sedimentation Rate (ESR)

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SEMESTER-I

CLINICAL NUTRITION & DIETETICS PRACTICAL-I

Objectives:

- To provide practical laboratory training in the planning and preparation of therapeutic diets

S.No	Exercises
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
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.
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
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
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

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SEMESTER-II

CLINICAL NUTRITION AND DIETETICS –II

Objectives:

- To enable the students to recommend and provide appropriate nutritional care for prevention/and treatment of the various diseases.

Units	Topic and Details
I	Dietary management of Cardio Vascular Diseases - Prevalence, Etiology and Risk Factors, - Clinical diagnostic tests and nutrition management for - Dyslipidemias, Atherosclerosis, Angina Pectoris and Myocardial Infarction (MI) and Congestive Cardiac Failure (CCF) - Prevention through life style modifications - Dietary management - Low fat, low cholesterol and medium chain triglyceride diet Dietary management of Hypertension - Definition, Classification and Causes - Signs & Symptoms and Complications - Dietary management - Diet related factors influencing hypertension, DASH diet - Lifestyle modification
II	Dietary management of Upper Gastro Intestinal Diseases - Etiology, signs & symptoms and complications - Dietary management for - Gastritis, Peptic ulcer, Dyspepsia, Esophagitis and Dumping Syndrome. Dietary management of Lower Gastro Intestinal Diseases - 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.
III	Dietary management of Liver disease - Types, Etiology, Symptoms and Complications - Physiology, functions of the liver and liver function tests. - Metabolic consequences of alcohol consumption - Dietary management for - Hepatitis, Cirrhosis and Hepatic coma. Dietary management of Gall Bladder Diseases - Physiology and functions of Gall Bladder - Gall bladder function tests - Dietary management for - Cholecystitis, Cholelithiasis, Acute Cholangitis and Cholestasis Dietary management of Pancreatic Disorders - Physiology and functions of exocrine Pancreas

	b) Pancreatic function tests c) dietary management for - Pancreatitis (Acute and chronic) and Zollinger- Ellison Syndrome
IV	Dietary management of Diabetes mellitus a) Prevalence, Types, Etiology and Signs and Symptoms b) Factors affecting normal blood glucose levels c) Impaired glucose homeostasis d) Diagnostic test for diabetes e) Complications of diabetes - macro-vascular and micro-vascular Management of Diabetes a) Food exchange list, b) Glycemic index of foods, Carbohydrate counting and Resistant starch c) Sweeteners and sugar substitutes d) Meal planning approaches - With and without Insulin and during sickness. e) Medications - Oral hypoglycemic drugs and Insulin. f) Lifestyle modification and exercise to manage diabetes mellitus. Management of Hypoglycemia a) Types, symptoms and fasting state hypoglycemia b) Postprandial or reactive hypoglycemia. c) Dietary treatment in reactive hypoglycemia.
V	Dietary management of Kidney Diseases a) Etiology, clinical signs & symptoms b) Physiology & functions of kidney c) Kidney function tests. 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) Etiology 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.

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SEMESTER-II

CLINICAL BIOCHEMISTRY

Objectives

- To enable the students to understand the various mechanism adopted by the human body for the regulation of metabolic cycles and to learn the interrelationship between various metabolic pathways

Units	Topic and Details
I	Components of blood - Composition and function of blood - Plasma and blood corpuscles - Structure and function of haemoglobin, abnormal haemoglobins. - Blood coagulation – mechanism and regulation. - Blood groups Water and electrolyte - Regulation of water and electrolyte balance - Role of hormones and kidneys in their maintenance. - Hydrogen ion homeostasis and acid-base balance.
II	Carbohydrates - Occurrence, Classification and Structure, Physic-chemical properties and biological importance of carbohydrates. - Monosaccharide and related compounds, disaccharides and Polysaccharides. Metabolism of carbohydrates - Aerobic and anaerobic degradation - Glycogenesis and Glycogenolysis - Glycolysis and Gluconeogenesis - Cori's cycle, Pyruvate Dehydrogenase complex - Krebs-cycle and Pentosephosphate pathway - Regulation of carbohydrate metabolism. - Sugar derivatives of biomedical importance and Inter conversion of Hexoses.
III	Proteins - Classification, structure and properties of amino acids, - Classification, properties and structure of proteins -Primary, secondary, tertiary and quaternary structure. Metabolism of Proteins - General reactions of protein metabolism - Essential amino acids. - Inborn errors of protein metabolism. - Metabolism of amino acids - Decarboxylation, Transamination, Deamination, Glycine, Tyrosine, Tryptophan, Methionine and urea cycle. - Nucleic acids- Biosynthesis and degradation of purines and pyrimidines and their regulation.

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
V	Vitamins a) Structure and Biochemical properties of water soluble and fat soluble vitamins and their coenzyme activity. Hormones a) Mechanism of hormone action and its regulation b) Hormones of Pancreas, Pituitary, Adrenal, Thyroid and Sex hormones. Bioenergetics a) Electron transport chain, Oxidative Phosphorylation and synthesis of ATP Enzymes: a) Enzymes in differential diagnosis of diseases and their clinical significance

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FOOD SERVICE MANAGEMENT

Objective

- To enable the students to develop a knowledge base in key areas of various Food Service Systems, its development and also in administration

Units	Topic and Details
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
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 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
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
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

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CLINICAL NUTRITION AND DIETETICS PRACTICAL-II

Objectives:

- To provide practical laboratory training in the planning and preparation of therapeutic diets

S.No	Exercises
1	Planning and preparation of diet for Cardio vascular disease patients – Atherosclerosis, Acute myocardial Infarction, Hypertension and Hypercholesterolemia
2	Planning and preparation of diets for the following conditions- Gastro Intestinal Disorders-Peptic Ulcer, Constipation, Diarrhea, Lactose intolerance, Celiac Disease, IBS and IBD
3	Planning and preparation of diets for the liver and pancreatic disorders - Hepatitis, cirrhosis, hepatic encephalopathy, gall stones and pancreatitis.
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.
5	Planning and preparation of diet for renal disorders- Glomerulonephritis, Nephrosis, acute renal failure, chronic renal failure, dialysis and renal calculi

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CLINICAL BIOCHEMISTRY PRACTICAL

Objectives:

- To provide practical laboratory training in the estimation of various nutritional parameters in blood and urine

S.No	Exercises
1.	Estimation of blood glucose
2.	Estimation of total protein
3.	Estimation of cholesterol in blood
4.	Determination of Serum creatinine
5.	Estimation of serum iron
6.	Estimation of serum urea
7.	Estimation of calcium in urine
8.	Estimation of urea in urine
9.	Estimation of creatinine in urine
10.	Estimation of Uric Acid

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RESEARCH METHODS & STATISTICAL APPLICATIONS

Objectives:

- To enable the students to understand the type of research tools and techniques applicable to a research problem

Units	Topic and Details
I	Research Methodology - Meaning, Objectives and Significance of research. - Types of research and Research approaches and scientific methods. - Research process and criteria of good research. Research process - Selection and formulation of research problem - Specifying objectives - Formulating hypothesis and Deciding variables - Limitations and delimitations of the problem.
II	Research design: - Purposes of research design - Fundamental, Applied and action, Exploratory and descriptive, Experimental, Ex-post facto - Longitudinal and cross sectional and co-relational. Data collection instrument - Observation, Questionnaire, Interview, Scaling method, Case study and Home visits. - Reliability and validity of measuring instruments.
III	Sampling design - Population and sample - Steps in sampling design - Criteria for selecting a sampling procedure - Different types of sampling techniques - Probability sampling, Random sampling, Purposive sampling, Stratified sampling and Non-probability sampling. - Advantages and disadvantages of sampling. - Power analysis and sample size calculation in experimental design.
IV	Research Tools - Scales of data measurements - Characteristics of good tool-Validity, usability and reliability. - Types of tools and their uses - Questionnaire, Rating scale and Attitude scale - Interview-Structured and unstructured and - Observation-Participant and non participant - Concept of data - Types and analysis of Qualitative and Quantitative data

V	Statistical Testing of Hypothesis Parametric Tests a) Sampling Distribution of Means - Large Samples, Confidence Intervals and Levels of Significance, Small Samples and Degree of Freedom b) Application of Parametric Tests - Application of Z-Test, Two-Tailed and One-Tailed Tests, - Application of T-Test, Application of F-Test and Factor Analysis Non-Parametric Tests a) Application of Chi-Square Tests and Spearman's Rank correlation
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NUTRITION THROUGH LIFE CYCLE

Objectives

- To enable the students to know the importance of nutrition during life span and also to enlighten on the dietary modifications

Units	Topic and Details
I	Recommended allowances - RDA for Indians, basis for requirement, computation of allowance based on energy expenditure, components of energy expenditure. - General concepts about growth and development through different stages of life. Nutrition in Pregnancy - Reproductive Physiology - Stages of gestation, maternal weight gain - Physiology of pregnancy, nutritional requirements and dietary guidelines during and prior to pregnancy - Nutrition related complications with special focus to Adolescent Pregnancy and general complications of pregnancy - HIV/AIDS during pregnancy – Dietary concerns - Role of Exercise & Fitness during pregnancy
II	Nutrition during Lactation - Physiology of Lactation, hormonal control and reflex action - Human milk composition - Nutritional requirements & dietary guidelines - Benefits of Breast Feeding - Galactogouges - Lactation Management in Normal & Special conditions Nutrition in infancy - Infant feeding and nutrient needs - Feeding in early and late infancy and Feeding problems and Weaning foods - Common nutrition problems - Feeding Preterm and low birth weight infants
III	Nutrition in Preschool and Childhood - Growth and development and Nutritional requirements - Nutrition for children with special health care needs - Feeding problems - Factors to be considered for menu planning and packed lunch - Nutritional concerns and prevention of nutrition related disorders - Obesity – underweight - Deficiency condition - Allergies
IV	Nutrition in adolescence Growth and development

	b) Physiological and Psychological changes c) Nutritional requirements of adolescents Nutrition situation with special needs in adolescence a) Pregnancy b) Eating disorders c) Obesity – underweight d) Deficiency conditions Nutrition in the adult years a) Physiological and Psychosocial changes b) Common nutritional concerns c) Nutritional requirements and dietary recommendation d) Physical Activity in adulthood
V	Nutrition in Aging/Elderly a) Theories of Aging, Physiological and Psychosocial changes b) The Aging Process c) Nutritional requirements of the Elderly d) Nutrition care 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

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PUBLIC HEALTH NUTRITION

Objectives

- To enable the students to understand the malnutrition problems and gain knowledge on the national effort in combating community nutrition problems in India.

Units	Topic and Details
I	Concept of Public Health Nutrition - Relationship between health and nutrition - Role of public nutritionist in the health care delivery system. Population Dynamics - Demography and Demographic cycle - World population trend - Birth rates, Death rates, Growth rates and Demographic trends in India - Age pyramid, sex ratio and Human Development Index
II	Assessment of Nutritional Status - Methods of Nutritional assessment, Nutritional anthropometry and Growth standards, - Dietary and clinical assessment - Biochemical and radiological assessment Nutrition monitoring - Objectives and Agencies engaged in nutrition monitoring Nutritional surveillance - Need for nutritional surveillance - Key indicators of nutritional surveillance programme
III	National nutritional policy and intervention programme – - Aim, objectives, guidelines and thrust areas. - PDS - Public distribution system and Agricultural planning - New strategies Nutrition intervention Programmes - Objectives - Operation of feeding programmes - ICDS, Anganwadi and TINP - National organizations - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD and Pradhan Mantri Gramodaya Yojana (PMGY) - International organizations - FAO, WHO, UNICEF UNESCO, World Bank.
IV	Strategies to combat public nutrition problems - Protein energy malnutrition (PEM) - Vitamin a deficiency - Iron deficiency anemia (IDA) - Iodine deficiency disorder (IDD) - Zinc deficiency - 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

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HOSPITAL ADMINISTRATION AND PRACTICES

Objectives

- To enable the students to understand the hospital administration practices and patient data maintaining practices in hospitals.

Units	Topic and Details
I	Hospital Administration b. Role of Medical Superintendent c. Hospital Administrator d. Resident Medical Officer e. Night Duty Executive f. Public and guest relation g. Importance in patient care, information regarding patients h. Code of press relations, medical information i. Patient information booklets, attendants' management.
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
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.
IV	Health Records a) The World of Informatics b) The Future of healthcare technology c) Functions of the health record – 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-of-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
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RESEARCH METHODS & STATISTICAL APPLICATIONS PRACTICAL'S

Objectives

- To enable the students to understand the applications of statistical techniques for analysis and interpretation and to use selective software for qualitative and quantitative data analysis.

S.No	Exercises
1.	Introduction to Statistics - Definition, conceptual understanding of statistical measures, popular concepts and misuse of statistics Data Management - Planning for data analysis – coding of responses, preparation of code book - Coding of data - Use of statistical programs - MS Excel, SPSS
2.	Data Analysis - Descriptive statistics-Frequencies and Crosstabs - Large and Small Sample tests and interpretation - Z-test for single proportions and difference between proportions - Large sample test for single mean and difference between means - Small sample tests- 't'-test, independent 't' test, paired 't'-test, 'F' Test(ANOVA)
3.	Chi square test and its interpretation - General features, goodness of fit - Independence of Attributes Correlation and Regression and its interpretation - Basic concepts - Linear regression and correlation coefficient, Regression and prediction - Rank correlation, Product-moment method
4.	Presentation of Data - Graphical presentation of data- histogram, frequency polygon, stem and leaf plot, box and whiskers plot - Graphs for nominal and ordinal data- pie diagram, bar graphs of different types, graphs for relation between two variables, line diagram. - Use of illustrations

5.	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 Students to design a research study on a topic- a) Specify type of research, sample selection, protocol/operationalization, tools and tests for statistical analysis
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NUTRITION THROUGH LIFE CYCLE PRACTICAL'S

Objectives

- To enable the students to develop menu for each age group which meeting nutritional requirements needs
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S.No	Exercises
1.	Menu planning for Pregnancy and Lactation
2.	Menu planning for Infants- Supplementary feeding - Preparation of weaning foods
3.	Menu planning for Pre-school and School going children- meals and packed lunch
4.	Menu planning for Adolescence
5.	Menu planning for Adult with different working category (- sedentary, moderate and heavy worker)
6.	Menu planning for Elderly people
7.	Menu planning for sports persons

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NUTRACEUTICALS AND FUNCTIONAL FOODS

Objectives

- To enable the students to learn the principle compounds available in various food groups in treating various diseases.

Units	Topic and Details
I	Introduction to nutraceuticals - Definitions, - Synonymous terms. - Nutraceuticals - The link between nutrition and medicine - A brief review of historical and teleological aspects - Basis of claims for a compound as a nutraceutical and classifying nutraceuticals.
II	Properties, structure and functions of various Nutraceuticals - Pigments, - Structural lipids - Flavor and odor compounds, - Alkaloids, Terpenoids, Glycosides, Polyphenols, Isoprenoid derivatives and Natural antioxidants
III	Functional components and health effects of - Soya, Olive oil, Tea, Common beans, <i>Capsicum annum</i>, Mustards, Ginseng, Garlic, Grape, Citrus fruits, Fish oils, Sea foods - Sports drink - Infant formula as functional foods. - Bioavailability and safety issues of functional foods.
IV	Concept and the role of nutraceuticals/functional foods - Nutraceuticals for - Cardiovascular diseases, Cancer, Diabetes, Cholesterol management, Obesity, Immune enhancement and Endurance performance - Mood disorders - Compounds and their mechanisms of action - Dosage levels and Contraindications if any etc.
V	General idea about role of Probiotics and Prebiotics as nutraceuticals. - Dietary supplements- - GMPS and shelf life of dietary supplements. - Role of changing food preferences and globalization on selection of nutraceutical products - Nutrigenomics - An introduction and its relation to nutraceuticals

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SEMESTER-IV

NUTRACEUTICAL AND FUNCTIONAL FOODS PRACTICAL

Objectives

- To enable the students to develop functional food products which meeting consumer needs nutritionally and commercially viable

S.No	Exercises
1.	Identification of various nutraceuticals and functional foods available in the market
2.	Preparation and evaluation of dietary fibre rich functional foods
3.	Preparation and evaluation of lycopene rich juices
4.	Preparation and evaluation of probiotic foods
5.	Preparation and evaluation of prebiotic foods
6.	Preparation and evaluation of hypo, hyper and isotonic sports drinks
7.	Preparation and evaluation of natural antioxidant rich foods
8.	Preparation and evaluation of soy protein rich foods
9.	Preparation and evaluation of calcium rich foods
10.	Preparation and evaluation of anthocyanins rich foods

Core Project I**Paper Code 16CND CPR01**

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SEMESTER-IV

PROJECT WORK and *viva voce*

Topic of dissertation may be chosen from any broad area of Clinical nutrition and dietetics. It may be started during the starting of the 3rd semester and shall be completed by the end of the 4th semester. The Dissertation to be submitted should include

1. Abstract
2. Introduction
3. Objectives of the study
4. Materials and Methods employed
5. Results and Discussion
6. Summary and Conclusions and
7. Bibliography

Self Study Course I**Paper Code 16CNDSC01**

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SEMESTER-II

INTERNSHIP

1. Internship in RD board Recognized Hospitals in India
2. The total internship period is 2months. This is a continuous internship in Super specialty or Multispecialty hospitals.
3. Students are expected to document minimum 20 cases during the period of internship.
4. The student has to submit a Research Project at the conclusion of the internship.
5. Report on internship will be evaluated as per regulations.

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PRINCIPLE OF EPIDEMIOLOGY IN NUTRITION

Objectives

- To enable the students to understand the principles of epidemiology and its importance in community and also to design and evaluate nutritional programme

Units	Topic and Details
I	Introduction to Epidemiology a) Epidemiology: concept and definitions, aims. b) Basic measurements in epidemiology c) Tools of measurement – Rates, Ratios and proportions.
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
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
IV	Immunity a. Types of immunity-Active and passive b. Immunizing agents- Vaccines, immunoglobulin and antisera c. Hazards of immunization d. Immunization schedules e. Disinfection-types, and recommended procedures
V	Genetics and Health a) Introduction and cytologic facts b) Classification of genetic disorders a. Chromosomal disorders, Mendelian diseases and Erythroblastosis foetalis c) Preventive and social measures

References:

- Anisa Basheer (1995): Environmental Epidemiology, Rawat Publications, Jaipur.
- Beghin I. Cap, M. and Dujardan, B. (1988), A guide to nutritional status assessment, WHO, Geneva.
- Parks K., Park: Text Book of Preventive and Social Medicine, Eighteenth Edition, M/S Banarasidas, Bhanot Publishers, 1167, Prem Nagar, Jabalpur, 482001.

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FOOD MICROBIOLOGY

Objectives

- To enable the students to learn the methods used for quality assessment of food and also to know about various pathogenic microbes responsible for illness.

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

References:

1. Frazierw. C. and Westhoff D. C. Food Microbiology, 4th ed., 1988 New York.
2. Pelezar, M. (1988) Microbiolgy V ed., McGraw Hill, N. Y.
3. James, M. Jay. Modern Food Microbiology 4th ed., CBS Publishers, New Delhi.
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NUTRITION IN CRITICAL CARE

Objectives

- To enable the students to learn the methods used for quality assessment of food and also to know about various pathogenic microbes responsible for illness.

Units	Topic and Details
I	Nutritional screening a) Nutritional screening and nutritional status assessment of the critically ill. b) Nutritional support systems and other life – saving measures for the critically ill.
II	Nutritional support system a) Enteral and parenteral nutrition support and Role of immuno enhancers b) Conditionally essential nutrients c) Immune suppressants d) Special diets in critical care e) Complications of Nutritional Support System including refeeding syndrome and rehabilitation diets and Diet related ethical issues in the terminally ill.
III	Enteral Nutrition a) Various sites for Enteral nutrition b) In brief, discussion on ryles tube and its care c) Types of feeds, advantages and disadvantage of home-based feeds, Commercial formula feeds. d) Incorporation of easily digestible foods. e) Requirements of nutrients according to problems eg. Renal, respiratory etc.
IV	Total Parental Nutrition a) The importance of TPN b) Long term effect of its use c) Site of TPN and its care d) Composition
V	Patho-physiology a) Patho-physiological b) Clinical and metabolic aspects c) Understanding of the special nutritional requirements d) Nutritional goals and monitoring the therapy in critical illnesses like - CV complications, Stroke, Surgery, Dialysis, Respiratory failure, Multi organ failure, Cancer, Hepatic failure, GI tract- surgery and its complications, Neurosurgery, Stress, Trauma, Sepsis, Burns and Ketoacidosis

References:

1. Zaloga, G.P. (1994): Nutrition in Critical Care, Times Mirror/Mosby.
2. Shils, M.E., Olson, J.A., Shike, M. and Ross, A.C. (Ed) (1999): Modern Nutrition in Health and Disease. 9th Edition, Williams and Wilkins.
3. Shikora, S.A. and Blackburn, G.L. (Ed) (1999). Nutritional Support – Theory and

- Therapeutics, Chapman and Hall, ITP (International Thomson Publishing).
4. Mahan, L.K. and Escott – Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Ed. W.B. Saunders Ltd.
 5. Phillips, G.D. and Lodgers C.L. (1986). Parenteral and Enteral Nutrition. A Practical Guide. Churchill Livingstone.
 6. Kinney, J.M. and Borum, P. R. (editors) (1989) Perspectives in Clinical Nutrition. Urban and Schwarzenberg.

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NUTRITION FOR SPORTS AND EXERCISE

Objectives

1. To enable the students to understand the special nutritional requirements for physical activities related to sports and exercise and also apply the knowledge to improve the performance of sportspersons

Units	Topic and Details
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
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
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.
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
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 nutrigenic / ergogenic aids (commercial supplements, Sports drinks, sports bars etc.)

References

1. Bucci, L., 1993 Nutrients as Ergogenic Aids for Sports and Exercise. Boca Raton, FL.: CRC Press.
2. Advances in Sport and Exercise Science: Nutrition and Sport, Edited by Don MacLaren. , ChPublished by Churchill Livingstone, Elsevier. 2007
3. Sports Medicine: The school age athlete by Bruce Reider. 1996. Published by W.B. Saunders.
4. Nutrition for Serious Athletes. Dan Banardot. 2000; Human Kinetics.
5. Energy-Yielding Macronutrients and Energy Metabolism in Sports Nutrition. Edited by Judy A Driskell, Ira Wolinsky, CRC Press 2000.

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DIET THERAPY IN LIFE STYLE DISEASES

Objectives

- To enable the students to know the effect of the various diseases on nutritional status and dietary requirements

Units	Topic and Details
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
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
III	Diet in Diabetes Mellitus a) Prevalence, types, etiology and symptoms b) Diagnosis, treatment and complications c) Dietary management
VI	Diet in Cancer a) Risk factors and Symptoms b) Nutritional problems of cancer therapy c) Nutritional requirements and Dietary management 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

References

- Antia P. Clinical Dietetics and Nutrition, 2nd edition, Oxford University press.
- Garrow J.S, James W. P.T, Ralph A, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingstone, London.
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BASIC CONCEPTS IN DIETETICS

Objectives

- To enable the students to learn about the background in the science of nutrition and concepts of diet in health promotion

Units	Topic and Details
I	The dietitian a) Classification b) Code of ethics c) Responsibility d) The dietitian in India e) Indian dietetic association f) Technology in diet counseling
II	Nutritional anaemia a) Prevalence and causes b) Types – Iron Deficiency, Megaloblastic, differentiating c) Prevention
III	Diet in infections and fever a) Host defence mechanism b) Causes, Types c) General dietary considerations a. Typhoid, Influenza, Malaria, Tuberculosis and AIDS
VI	Diet in obesity and Underweight a) Obesity i. Etiology and theories ii. Assessment, types, treatment iii. Complications, Weight management guidelines, eating disorders b) Underweight - Aetiology, Nutritional and food requirements
V	Food Sensitivity a) Types of reactions, food involved in sensitivity b) Symptoms c) Diagnosis d) Treatment

References

- Antia, F.P (1973): Clinical dietetics and Nutrition, Second Edition, Oxford University Press, Delhi.
- Joshi, S.A (1992): Nutrition and Dietetics, TATA McGraw Hill publications, New Delhi Mahan, L.K. Arlin, M.T (1992) Krause's Food, Nutrition and Diet Therapy, 8th Ed. W.B. Saunders Company, London
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Supportive paper III

Paper code 16CND S03

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LIFE CYCLE NUTRITION

Objectives

- To impart the knowledge of diet and health and to promote wellness in the developing community

Units	Topic and Details
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
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
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 preschoolers g) Food requirements, nutrition related problems of preschooler
VI	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
V	Nutritional and food requirements of adults and during old age a) Adult – nutritional requirements, food requirements b) Old age – nutritional requirements, food requirements, nutritional related problems of old age, degenerative.

References

1. Garrow J.S., James W.P.T. and Ralph A (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingstone.
2. Antia F.P and Abraham Philip (1998), Clinical Nutrition and Dietetics, 4th edition, Oxford Publishers.
3. Robinson C.H., Rawler M.R., Chenoweth W.L., Garwich A.E (1986) Normal and Therapeutic Nutrition, 17th edition, Mac Millan Publishing Co, New York.
4. Swaminathan M.(1974) Advanced Text Book On Food and Nutrition ,Volume II
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6. Bamji M., Prahlad N., Vinodhini R (1998), Text Book of Human Nutrition. Oxford and IBH Publ. Co., New Delhi.
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FOOD SAFETY AND SANITATION

Objectives

- To enable students understand how food safety and sanitation practices prevent food borne illness in food establishments

Units	Topic and Details
I	Food Safety And Sanitation Management - Introduction to food safety - Changing trends in food consumption and choices - The food flow - A new approach to an old problem - Facility planning and design - The role of government in food safety - The role of the food industry in food safety - Food protection manager certification - Recent initiatives in food safety
II	Factors that affect food borne illness - Time and temperature abuse- measure food temperatures, calibration of thermometer, measuring food temperature - Preventing temperature abuse - Methods to maintain temperature of food - Importance of good personal hygiene - Cross contamination - Other sources of contamination - Work area sanitation
III	Cleaning and sanitizing operations - Principles of cleaning and sanitizing - Removal of food particles - Application of cleaning agents - Methods of cleaning - Commonly used cleaners and detergents - Frequency of cleaning - Sanitizing principles - Types of sanitizing- heat and chemical sanitizing - Factors affecting sanitizing - Chemicals used for sanitizing- chlorine, iodine, quaternary ammonium compounds. - Equipments and supplies used for cleaning- mechanical dishwashing, manual dishwashing, cleaning fixed equipments.
IV	Environmental sanitation and maintenance - Condition of the establishment- proper water supply and sewage disposal systems - Condition of building- infrastructure, facilities, maintenance and

	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

Bibliography

1. Longree, K., and G. Armbruster (1996). *Quality Food Sanitation*. Wiley Interscience, New York, NY.
2. Adams, M.R and M.O. Moss (2000). *Food Microbiology*. Royal Society of Chemistry, London, England.
3. Banwart, G. J. 1989. *Basic Food Microbiology* (2nd ed.). Van Nostrand Reinhold: New York.
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5. Bennett, G, W., J. W. Owens, and R. M. Corrigan (1997) *Truman's Scientific Guide to Pest Control Operations* (5th ed.). Advanstar Communications, Cleveland, OH.
6. Jay, James J. (2000). *Modern Food Microbiology* (6th ed.). Aspen Publishers, Gaithersburg, MD.