MAHATMA GANDHI UNIVERSITY

PRIYADARSHINI HILLS,

KOTTAYAM - 686 560

CURRICULUM FOR BACHELOR'S PROGRAMME

IN

Clinical Nutrition & Dietetics

MODEL-3

Under Choice Based Credit System (CBCS)
(2017 Admissions Onwards)

INTRODUCTION

Nutrition plays a primary role in growth, development, health and fitness. Maintaining appropriate nutrition throughout life can prevent, or at least delay the onset of nutrition related diseases. Food is essential for our bodies to:

- Develop, replace and repair cells and tissues;
- Produce energy to keep warm, move and work;
- Carry out chemical processes such as the digestion of food;
- Protect against, resist and fight infection and recover from sickness.

The food or liquids affect our body and health because each food or liquid contain particular nutrients which is very necessary for our physical and mental growth. A particular level of any particular nutrient is essential for our body. So we should know that what food we have to take, how much and what type of nutrients are present in a particular food. The body cannot function properly if one or more nutrients are missing. A healthy and balanced diet provides foods in the right amounts and combinations that are safe and free from disease and harmful substances.

Whenever we take any food or nourishing liquids, our body digests and absorbs the simple but essential minerals, vitamins, fats, proteins, carbohydrates, fats and water from these food or nourishing liquids and converts it into the bloodstream and energy that help our body to grow and keep it healthy The nutrition value is more important for any individual's health. The food or liquids whenever we take it affect our body and health as well both. So it is very important that we should be more aware of the foods or liquids whatever we take in our daily life. A large number of diseases occur only due to wrong diet.

Prevention is better than cure. The earlier a person starts to eat a healthy and balanced diet, the more he or she will stay healthy. Once weight has been lost it may be difficult to regain it because of tiredness and lack of appetite.

The UG programme in Clinical Nutrition & Dietetics gives special attention to the clinical aspects. An integration of theory, practical, internship and community work aim at equipping the students the necessary proficiencies for a wide variety of careers.

AIMS AND OBJECTIVES

AIMS:

- Dietitians in hospitals
- Diet consultants in hotels, flight kitchens, railways and industrial canteens.
- Nutritionist in health clinics and food industries
- Member of teaching faculty in higher education
- Research assistants/ Associate in institutes undertaking research programmes in nutrition and health
- Project officers under different welfare programmes of governmental and non - governmental organizations
- Project officers in nutrition programmes FAO, WHO, UNICEF
- Freelance Registered Dietitians(RD)

OBJECTIVES

- To impart knowledge and develop capacities of the students in the area of Clinical Nutrition.
- To develop students to become health care professionals for services in various fields of clinical nutrition and related areas such as hospitals, academics, research, industry, community service.
- To enable them to pursue higher education and research in Clinical Nutrition and Food Science .

CONSOLIDATED SCHEME

Semester	Course Type	Course Code	Course Title	Hrs/wk	Credit	Mark	
						External	Internal
1	Common		English I	5	4	80	20
	Core Theory	CN1CRT01	Basic Nutrition	4	4	80	20
	Core Theory	CN1CRT02	Basic Dietetics	4	3	80	20
	Core Theory	CN1CRT03	Family Meal Management I	4	3	80	20
	Complementary Theory	CN1CMT01	Fundamentals of Biochemistry	4	3	80	20
	Complementary Theory	CN1CMT02	Human Anatomy and Physiology I	4	3	80	20
Total				**25**	**20**	**480**	**120**
2	Common		English II	5	4	80	20
	Core Theory	CN2CRT04	Advanced Nutrition	4	4	80	20
	Core Theory	CN2CRT05	Clinical Nutrition	4	3	80	20
	Core Theory	CN2CRT06	Family Meal Management II	4	3	80	20
	Complementary Theory	CN2CMT03	General Biochemistry	2	2	80	20
	Complementary Practical	CN2CMP01	Biochemistry Practical- I	2	1	80	20
	Complementary Theory	CN2CMT04	Human Anatomy and Physiology II	2	2	80	20
	Complementary Practical	CN2CMP02	Human Physiology Practical- I	2	1	80	20
	Field Study	-	Field/Industrial visits	-	-	-	-
Total				**25**	**20**	**640**	**160**
3	Core Theory	CN3CRT07	Therapeutic Nutrition	4	3	80	20
	Core Theory	CN3CRT08	Food Commodities I	4	3	80	20
	Core Theory	CN3CRT09	Community Nutrition	4	3	80	20
	Core Practical	CN3CRP01	Therapeutic Nutrition I	1	1	80	20
	Core Practical	CN3CRP02	Community Nutrition	2	2	80	20
	Complementary Theory	CN3CMT05	Nutritional Biochemistry	5	4	80	20
	Complementary Theory	CN3CMT06	Human Anatomy & Physiology III	5	4	80	20
Total				**25**	**20**	**560**	**140**

Semester	Course Type	Course Code	Course Title	Hrs/wk	Credit	Mark	
						External	Internal
4	Core Theory	CN4CRT10	General Microbiology	4	4	80	20
	Core Theory	CN4CRT11	Food Commodities II	4	4	80	20
	Core Practical	CN4CRP03	Therapeutic Nutrition Practical II	4	3	80	20
	Core Practical	CN4CRP04	Quantity Food Production Practical	3	3	80	20
	Complementary Theory	CN4CMT07	Biochemical Aspects of Nutrition	3	2	80	20
	Complementary Practical	CN4CMP03	Biochemistry Practical- II	2	1	80	20
	Complementary Theory	CN4CMT08	Human Anatomy & Physiology IV	3	2	80	20
	Complementary Practical	CN4CMP04	Human Physiology Practical- II	2	1	80	20
Total				**25**	**20**	**640**	**160**
5	Core Theory	CN5CRT12	Food Microbiology Sanitation and Hygiene	5	3	80	20
	Core Theory	CN5CRT13	Personnel Management	3	3	80	20
	Core Theory	CN5CRT14	Research Methodology and Statistics	5	4	80	20
	Core Theory	CN5CRT15	Human Rights & Environmental Studies	5	4	80	20
	Open Course	CN5OPT16	Food Fortification	5	4	80	20
	Core Practical	CN5CRP05	Food Science Practical	2	2	80	20
Total				**25**	**20**	**480**	**120**
6	Core Theory	CN6CRT17	Food Safety	4	3	80	20
	Core Theory	CN6CRT18	Food Adulteration	4	3	80	20
	Core Theory	CN6CRT19	Preventive Nutrition	4	3	80	20
	Core Theory	CN6CRT20	Food Service Management	4	3	80	20
	Optional Core	CN6OCT21 CN6OCT22 CN6OCT23	Food Preservation Epidemiology Information Technology	3	3	80	20
	Core Practical	CN6CRP06	Meal Management Practical	4	2	80	20
	Project	CN6PRP07	Project	2	2	80	20
	On the Job Training	CN6OJP08	On The Job Training	-	1	-	100
Total				**25**	**20**	**560**	**240**

SEMESTER I

BASIC NUTRITION

CORE **CN1CRT01**
Credit: 4 Hours/week : 4

Objectives

To enable the students to:

To understand the relation between nutrition and health.

To acquire knowledge about the main nutrients and its functions in the body.

To understand the modifications in nutrient and dietary requirement for various diseases.

Module I

Introduction to Nutrition: Health, Food, Functions of food, Nutrients, Nutrition, Scope of nutrition, Basic four food groups, Food Pyramid, My Plate, Nutritional status, Visible symptoms of good health, Malnutrition.

Module II

Carbohydrates: Composition, Classification, functions, Sources, digestion, absorption and transport. Components of dietary fibre, Role of fiber in health and disease.

Protein: Composition, classification, functions, sources, requirements, digestion, absorption and transport, protein quality evaluation.

Lipids: Composition, Classification, functions, sources, requirements, digestion, absorption and transport.

Module III

Water and Electrolytes: Water, Sodium, Potassium: Distribution of water and Electrolytes, Functions, Sources, Requirements, Sodium - Potassium balance, Mechanism of Water Regulation, Water intoxication and dehydration, Water and electrolyte balance

Module IV

Energy: Unit of energy, sources, determination of energy expenditure, energy value of foods, Measurement of total energy requirement, Resting energy expenditure, Physical Activity Level (PAL), Factors affecting PAL, Basal Metabolic Rate, determination of BMR, SDA.

Suggested Readings

Garrow J.S., James W.P.T. and Ralph A (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingstone.

Antia F.P and Abraham Philip (1998), Clinical Nutrition and Dietetics, 4th edition, Oxford Publishers.

Robinson C.H., Rawler M.R., Chenoweth W.L., Garwich A.E (1986) Normal and Therapeutic Nutrition, 17th edition, Mac Millan Publiushing Co, New York.

Swaminathan M.(1974) Adavanced Text Book On Food and Nutrition ,Volume II

Manay S.N., Sadaksharaswami M. (1998), Food Facts and Principles. New Age International Pvt. Ltd., New Delhi.

Bamji M., Prahlad N., Vinodhini R (1998), Text Book of Human Nutrition. Oxford and IBH Publ. Co., New Delhi.

Vijaya D.T. (1993), Handbook of Nutrition and Dietetics, Vora Medical Publishers., Mumbai.

Indian Council of Medical Research (2010), Nutrient Requirements and RDA for Indians, ICMR.

SEMESTER I

BASIC DIETETICS

CORE **CN1CRT02**
Credit: 3 Hours/week: 4

Objectives

To enable the students to-

To impart basic knowledge in the field of dietetics.

To develop capacity and aptitude for taking up dietetics as a profession.

Module I

Dietitian and diet counseling : Role of Dietitian, specializations of dietitian, Nutrition and diet clinic, Patient check up and Nutrition counseling- directive and non directive, Strategies and goals of counseling and follow up. Psychology of feeding the patient.

Computer application: use of computers by Dietitian, Dietary computations, Dietetic management, education/training.

Module II

Basic concepts of Diet Therapy: Routine hospital diets - regular diets, clear fluid diet, full fluid diet, soft diet, Modified diets, Enteral and parenteral nutrition, Refeeding syndrome.

Diet in Infections and Fevers: Types, Aetiology, Metabolic changes, Dietary considerations in Typhoid, Influenza, Malaria, Tuberculosis, AIDS.

Module III

Diet in Obesity: Aetiology, Assessment, Types, Childhood and Adolescent Obesity, Complications, Management and preventive strategies of Obesity. Diet in Leanness: Aetiology, Nutritional requirement and Dietary management.
Diet during eating disorders- anorexia, bulimia, binge eating.

Module IV

Diet in Food Allergy and food intolerance (hypersensitivity): Definition, etiology, food allergens, symptoms and diagnosis of food allergies, nutritional management, restricted diets, elimination diets and hypo-sensitization, prevention of adverse food reaction. Skin disturbances: Types, symptoms, Diagnosis and Treatment.
Drug-Nutrient interactions (in brief)

Suggested Readings

Antia P. Clinical Dietetics and Nutrition, 2nd edition, Oxford university press.

Garrrow J.S, James W. P.T, Ralph A, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London.

Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missorie.

Michael Sharon (1994), Complete Nutrition, Avery publishing group. New York.

Mohan K. L, Krause M.V (2002), 2nd edition Food , nutrition and Diet Therapy, W.S. Suders Co, Philadelphia.

Srilakshmi B, Dietetics (2006), New Age International Publishing Ltd.

Robinson C.H., Lawler M.R, Cheweth W.L; and Gaswick A.E, Normal and Therapeutic Nutrition ,17 th edition, Mac Milan Publishers.

SEMESTER I

FAMILY MEAL MANAGEMENT I

CORE **CN1CRT03**
Credit: 3 Hours/week : 4

Objectives

To enable students to:

Learn the principles of meal planning.
Acquire knowledge on planning meals for different age groups.

Module I

Menu Planning: Balanced Diet, Food groups, Food guide, food pyramid, My Plate, Low cost balanced diets RDA, Basic principles of menu planning, Points to be considered while planning menu.

Module II

Nutrition in pregnancy: Physiological changes, Relationship between maternal and foetal nutrition, Impact of nutritional deficiency on the outcome of pregnancy, Nutritional and food requirements, Dietary guidelines, Dietary problems, Complications of pregnancy, GDM.

Module III

Nutrition during Lactation: Physiology of lactation, Hormonal control of lactation, Let Down Reflex, Nutritional and food requirements, Factors affecting volume & Composition of breast milk, Breast feeding and its advantages, Pre-term milk (PTM), Expressed Breast Milk (EBM), Drip Breast Milk (DBM), Common problems during breast feeding.

Module IV

Nutrition during Infancy: Growth & development, LBW, Small for Gestational Age and Pre term baby, Nutritional requirements, Artificial feeding, Hazards of Bottle feeding, Feeding of the Preterm and LBW babies, Weaning, Feeding problems in weaning, Family Pot Feeding, Low cost supplementary foods, ARF.

Suggested Readings

Bamji, M.S, Reddy V. (1998), Text Book of Human Nutrition, Oxford & IBH Publishing Co, New Delhi.

Gibney, M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Backwell Science Publishing Co.

Robinson, C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillian Pub. Co. New York.

Swaminathan, M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.

Guthrie, H.A & Picciano, M.F (1995), Human Nutrition, Mosby Publishing Co, New York.

Srilakshmi, B. (2005). Dietetics, 5th edition, New Age International Publishers, New Delhi.

Wardlaw. G.M and Insel, P.M (1993). Perspectives in Nutrition 2nd edition, Mosby Publishing Co, London.

SEMESTER I
FUNDAMENTALS OF BIOCHEMISTRY

COMPLEMENTARY **CN1CMT01**
Credit: 3 Hours/week: 4

Objectives

To enable the students to:

Understand knowledge about bimolecular which are the basics of life

Study about energy currency of the cell and chemical messengers

Module I

Introduction to Biochemistry: Definition, Scope of biochemistry, Concept of equilibrium - Acids and bases, buffers, molarity, molality, normality, equilibrium, viscosity, surface tension, adsorption, acidosis, alkalosis.

Molecular aspect of transport: Passive diffusion, facilitated diffusion, active transport - sodium potassium pump. Endocytosis and exocytosis.

Module II

Biological Oxidation: High energy compounds, Electron transport chain, ATP synthesis, ATP as currency of energy, substrate level phosphorylation, non-oxidative phosphorylation, oxidative phosphorylation - mechanism, inhibitors involved in oxidative phosphorylation, OR-potential.

Module III

Nucleic acids: Composition, functions, classification and structure of DNA and RNA. Nucleotide synthesis, DNA replication, Enzymes involved in DNA replication, DNA repair, Recombinant DNA technology, Protein synthesis, Genetic code, Gene mapping, Gene expression, operon concept, Lac, genotype and phenotype, epigenetics, Alleles, Epistasis.

Module IV

Prostaglandins: Introduction, chemical nature, classification, biosynthesis, biological effects, clinical significance and therapeutic uses of prostaglandins. Enzymes - Definition, classification, Apoenzymes, Coenzymes, Holoenzymes, Iso enzymes. Mechanism of action, properties, enzyme activity, factors affecting enzyme activity, enzyme kinetics, ping-pong mechanism, Enzyme inhibition. Diagnostic value of serum enzymes.

Suggested readings

Satyanarayana,U (2005), Biochemistry, Uppala Author- Publisher Interlinks Vijayavada.

Jain J.L, Jain S, Jain N. (2005), Fundamentals of Biochemistry, S. Chand & Company LTD, New Delhi.

Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.

Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, A John Wiley and Sons Publications.

Fatima D. et al., (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.

Leninger,A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.

Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

SEMESTER I

HUMAN ANATOMY AND PHYSIOLOGY I

COMPLEMENTARY **CN1CMT02**
Credit: 3 Hours/week : 4

Objectives

To enable the students to-

Understand the general structure and functions of various systems and organs of the body.

Understand the abnormal changes in the tissue and organs on several disease states.

Module I

Composition of the human body: Cell, cell organelles, tissues, organs, organ systems: digestive, excretory, respiratory, nervous, endocrine, circulatory, muscular, skeletal and reproductive systems. Cell junctions, Cell signaling, body fluids: ECF and ICF

Module II

Homeostasis and acid base balance: Organ systems in homeostasis, components, mechanism - feed back signals, regulation of acid-base balance. Disturbances of acid-base balance- acidosis and alkalosis.

Module III

Digestive System: Structure and function of mouth pharynx, oesophagus, stomach, intestine and intestinal villi. Digestive glands- salivary glands, gastric glands, liver, pancreas, gall bladder and intestinal glands. Hunger and thirst mechanism. Mechanism of digestion and absorption, defecation, Movements of GI tract and Gastro-intestinal reflexes.

Module IV

Excretory system: structure and functions of kidney and nephron. Stages of urine formation, GFR, factors affecting GFR, composition of normal urine, abnormal constituents of urine, micturition. Factors affecting urine formation and urine volume, counter current mechanism.

Suggested Readings:

Chatterjee, C.C. (2005), Human Physiology , Volume I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road , Kolkata – 700009.

Gyton and Hall (2000),Text book of Medical Physiology , 10th edition , Harcourt Asia LTD Singapore

Hole, J.W (1989), Essentials of Human Anatomy and Physiology, 3rd edition, WCB publishers, Dubuque, Iowa.

Subramanyam , S , Madavankutty , K and singh , H.D (2001) Text book of Human Physiology, S. chand and Co. Ltd , Ramnagar , New Delhi – 110055.

Wilson, K.J. and Waugh, A. (1999), Ross and Wilson Anatomy and Physiology in health and illness.

Chandra Sekar C.N, (2007), Manipal Manuel of Physiology, 1st Edition, CBS Publisbers and Distributors, New Delhi.

Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.

Guyton A.C(1991), Textbook of Medical Physiology, 8th, Philadelphia: W B Saunders

RatanVidya, (2004), Handbook of Human Physiology, 7th Edition (Reprint), Jaypee Bros Medical Publishers (P) Ltd, New Delhi

SEMESTER II

ADVANCED NUTRITION

CORE **CN2CRT04**
Credit: 4 Hours/week: 4

Objectives

To enable the students -

To understand the relation between nutrition and health.

To acquire knowledge about the main nutrients and its functions in the body.

Module I

Macrominerals: Calcium, Phosphorus, Magnesium - Functions, sources, requirements, factors affecting absorption and utilization, Deficiency and Toxicity. Calcium – Phosphorus ratio.

Module II

Microminerals: Iron, Zinc, Copper, Selenium, Chromium, Iodine, Manganese, Molybdenum and Fluorine- Functions, sources, requirements, factors affecting absorption and utilization, deficiency and toxicity.

Module III

Fat Soluble Vitamins:- Functions, sources, requirements, factors affecting absorption and utilization, deficiency, toxicity of vitamin A, D, E, K , conversion factor of vitamin A and D.

Module IV

Water Soluble Vitamins: Functions, sources, requirements, factors affecting absorption and utilization, deficiency and toxicity of Thiamin, Riboflavin, Niacin, vitamin B6, Vitamin B12, Biotin, Pantothenic acid, Folic acid and Vitamin C.

Suggested Readings

Garrow J.S., James W.P.T. and Ralph A. (2000), Human Nutrition And Dietetics, 10th edition, Churchill Livingstone.

Antia F.P and Philip A. (1998), Clinical Nutrition and Dietetics, 4th edition, Oxford Publishers.

Robinson C.H., Rawler M.R., Chenoweth W.L., Garwich A.E. (1986) ,Normal and Therapeutic Nutrition, 17th edition, Mac Millan Publiushing Co, New York.

Swaminathan M.(1974) , Adavanced Text Book On Food and Nutrition ,Volume 1

Manay S.N., Sadaksharaswami M. (1998), Food Facts and Principles, New age International Pvt. Ltd., New Delhi.

Bamji M., Prahlad N., Vinodhini R.(1998), Text Book of Human Nutrition, Oxford and IBH Publ. Co., New Delhi.

Vijaya D.T. (1993), Handbook of Nutrition and Dietetics., Vora Medical Publ., Mumbai.

Indian Council of Medical Research (2010), Nutrient Requirements and RDA for Indians, ICMR.

SEMESTER II

CLINICAL NUTRITION

CORE **CN2CRT05**
Credit: 3 Hours/week: 4

Objectives

To enable the students to:

Study the aetiology, symptoms and medical nutrition therapy in various diseases

Learn how to plan and prepare diet for various diseases.

Module I

Diet in Gastrointestinal disease: Aetiology, Symptoms and dietary management of Oesophagitis, Gastro Oesophageal Reflux Disease (GERD), Dyspepsia, Gastritis, Peptic ulcer, Constipation, Diarrhoea, Ulcerative colitis, Flatulence, Irritable bowel syndrome, Inflammatory bowel disease, Diverticulitis, Dumping syndrome, Malabsorption syndrome – Lactose intolerance, Steatorrhoea, Celiac disease, Tropical sprue.

Module II

Diet in Diabetes Mellitus: Types, Aetiology, Symptoms, factors affecting normal blood sugar level, Diagnosis, Treatment, Dietary modifications, food exchange system, Glycemic Index, Glycemic load, Complications of diabetes, Nutrition in complication of diabetes, hypoglycemic agents and supportive therapy.

Module III

Medical Nutrition Therapy in Critical Care:

Surgery- Physiological response and dietary management.

Burns – Classification, complications, dietary management, mode of feeding and nutrition support.

Trauma and Injury- physiological, metabolic and hormonal responses to injury, dietary management of trauma.

Sepsis- systemic, metabolic and catabolic responses, Systemic Inflammatory Response Syndrome(SIRS), Multiple Organ Dysfunction Syndrome(MODS), Dietary Management.

Module IV

Diet in Gout: aetiopathology, clinical features, complications and dietary management.

Diet in Inborn Errors of Metabolism : Phenylketonuria, Maple Syrup Urine Disease (MSUD), Tyrosinemia, Homocystinuria, Galactosemia.

Suggested Readings

Mohan K. L. and Krause M.V (2002), 2nd edition Food , Nutrition and Diet Therapy, W.S. Suders Co, Philadelphia.

Antia P. Clinical Dietetics and Nutrition, 2nd edition, Oxford University Press.

Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missionery.

Sharon,M. (1994), Complete Nutrition, Avery publishing group. New York.

Garrrow J.S, James W. P.T. and Ralph A, (2000), Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London

Robinson C.H, Lawler M.R, Cheweth W.L; and Gaswick A.E, Normal and Therapectic Nutrition ,17 th edition, Mac Milan Publishers.

Bamji M.S. andVinodini Reddy (1998), Text Book of Human Nutrition, ford and IBH Publishing Co. Ltd New Delhi.

SEMESTER II

FAMILY MEAL MANAGEMENT II

CORE **CN2CRT06**
Credit: 3 Hours/week : 4

Objectives

To enable students to:

Learn the principles of meal planning.
Acquire knowledge on planning meals for different age groups.

Module I

Nutrition during early childhood (Toddler/Preschool): Growth and nutrient needs, Food requirements, Dietary guidelines, Feeding problems, Nutrition related problems, Growth monitoring, Importance of growth charts, GOBIFFF.

Module II

Nutrition of school children: Nutritional and food requirements, Dietary guidelines, Importance of breakfast, Feeding problems, Packed lunch, School lunch programmes

Module III

Nutrition during adolescence: Growth and nutrient needs, Food requirements, Food habits and dietary guidelines, Nutritional problems, Nutritional programmes for adolescence.

Module IV

Nutrition during adulthood – Reference man, Reference woman, Nutritional requirements, feeding pattern.

Geriatric nutrition: Process of ageing, Factors affecting food intake and nutrient use, Change in organ function with ageing, Nutrient needs, Nutrition related problems.

Suggested Readings

Bamji, M.S, and Reddy V (1998), Text Book of Human Nutrition, Oxford and IBH Publishing Co, New Delhi.

Gibney M.J, and Elia M Lingquist. O (2005), Clinical Nutrition, Backwell Science Publishing Co.

Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillian Pub. Co. New York .

Swaminathan M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company Ltd.

Guthrie, H.A & Picciano, M.F (1995), Mosby Publishing Co, New York,

Srilakshmi, B. (2005). Dietetics, New Age International Publishers, New Delhi.

Wardlaw. G, M and Insel, P.M (1993). Perspectives in Nutrition, Mosby Publishing Co, London.

SEMESTER II
GENERAL BIOCHEMISTRY

COMPLEMENTARY **CN2CMT03**
Credit: 2 Hours/week : 2

Objectives:
To enable students to:

6. Acquire knowledge about the importance of environmental biochemistry.
7. Understand the basis of genetic engineering.

Module I

Environmental biochemistry - Applications of radioactive isotopes, health hazards of artificial fertilizers and pesticides, pesticide residue, significance of biofertilizers and bioplastics. Recycling codes of plastics.

Module II

Introduction to genetic engineering- Gene cloning, host cells, vectors, bacteriophages, cosmids, restriction endonuclease, DNA ligases. Applications of genetic engineering.

Module III

DNA in the diagnosis of infectious diseases - tuberculosis, malaria, AIDS, CHAGAS disease, Human Papilloma Virus, lyme disease, periodontal disease.

DNA in the diagnosis of genetic diseases-cystic fibrosis, sickle cell anaemia, Alzheimer's disease, cancers, diabetes, obesity.

Artificial chromosomes, Gene knockout, Gene silencing, Bioethics

Module IV

Basic techniques in genetic engineering - electrophoresis, blotting techniques, DNA sequencing, Polymerase Chain Reaction (techniques and applications) DNA analysis for environmental monitoring, DNA finger printing or DNA profiling, FISH techniques.

Suggested readings

Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher Interlinks, Vijayavada.

Jain J.L , Jain S and Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.

Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.

Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, A John Wiley and Sons Publications.

Fatima D. et al, (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.

Leninger A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.

Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

SEMESTER II
BIOCHEMISTRY PRACTICAL - I

COMPLEMENTARY **CN2CMP01**
Credit: 1 Hours/ week : 2

Objective:

To enable the students to get practical experience in lab and clinical nutrition.

Module I

Principles and applications and methodology of colourimetry.

Module II

Qualitative analysis of Sugars

Glucose
Fructose
Maltose
Lactose

Module III

Estimation urinary creatinine
Estimation of urinary urea

Module IV

a) Estimation of urinary calcium
b) Estimation of urinary Phosphorous
c) Estimation of urinary Ascorbic Acid

Suggested readings

Satyanarayana.U (2005), Biochemistry, Books and Allied Publishing LTD.

Jain J.L , Jain S , Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.

Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.

Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, Wiley and Sons Publications.

Fatima D. et al, (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.

Leninger A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.

Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

Arti S Pandey , Arun Pandey , Naveen K srivastava, Durga P Neupane (2015), Biochemistry laboratory manual, Jaypee publishers.

Shivaraja Shankara Y M, (2013), Laboratory manual for practical biochemistry. Jaypee publishers.

SEMESTER II
HUMAN ANATOMY AND PHYSIOLOGY II

COMPLEMENTARY **CN2CMT04**
Credit: 2 Hours/week: 2

Objectives

To enable the students to-

Understand the general structure and functions of various systems and organs of the body.

Understand the abnormal changes in tissue and organs on several disease states.

Module I

Cardiovascular System

Structure of heart, conducting system of heart, cardiac cycle, Blood –functions , composition, blood clotting, blood groups, blood vessels-artery, vein capillaries, blood circulation-greater, lesser.

Module II

Lymphatic System

Tissue fluid, Lymph, Functions, formation of Lymph, lymph glands - structure and functions, lymphoid organs in the body.

Module III

Immune System

AMI and CMI, Innate and Acquired, Antigens and Antibodies, Helper T cells and Cytokines,.

Module IV

Respiratory system

Organs of respiration – structure and functions, volume and capacity of lungs, mechanism of respiration, Artificial respiration, Compliance of lung and chest wall, cell respiration.

Suggested Readings:

Chandra Sekar C.N, (2007),Manipal Manuel of Physiology, 1st Edition, CBS Publisbers and Distributors, New Delhi.

Chatterjee, C.C. (2005), Human Physiology , Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road , Kolkata – 700009.

Gyton and Hall (2000),Text book of Medical Physiology , 10th edition , Harcourt Asia LTD Singapore

Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.

Jaypee Bros Medical Publishers (P) Ltd, New Delhi

RatanVidya, (2004), Handbook of Human Physiology, 7th Edition (Reprint),

Subramanyam , S , Madavankutty , K and singh , H.D (2001) Text book of Human Physiology, S. chand and Co. Ltd , Ramnagar , New Delhi – 110055.

W B Saunders

Wilson, K.J. and Waugh , A. (1999), Ross and Wilson Anatomy and Physiology in health and illness.

SEMESTER II
HUMAN PHYSIOLOGY PRACTICAL I

COMPLEMENTARY **CN2CMP02**
Credit: 1 Hours/ week : 2

Objectives
To enable the students to

Identify and analyses body cells and fluids.

To gain technical skill in physical examination of body.

Module I

Microscopic examination of prepared slides - examines and draws the tissues

Squamous, ciliated and columnar epithelia.

Bone and cartilage

Smooth, cardiac and striated muscle

Nerve cell

Skin

Module II

Physical examination of body

a) Pulse rate at rest and after exercise
b) Determination of arterial blood pressure
c) Measurement of body temperature and diurnal rhythm.

Module III

Examine the model: identify and draw

a) Section of human heart
b) Section of human kidney
c) Histology of artery and vein

Module IV

Hematology

a) Enumeration of RBC of human blood
b) Enumeration of WBC of human blood
c) Haematocrit (PCV) and hemoglobin
d) Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Volume (MCV)
e) Mean Corpuscular Hemoglobin Concentration (MCHC)
f) Colour Index (CI)

Suggested Readings

ε. Chatterjee C.C. (2003), Human Physiology, Kalyani Mukherjee Publishers, Kolkata.

ϕ. Wilson K.J. and Waugh,A. (1999), Anatomy and Physiology in Health and Disease, British library of cataloguing in publishing data, London.

γ. Samson and Wright (1989), 'Applied Physiology', Tandon Publications.

η. Best, H. And Taylor, B. (1991)'The Physiological Basis for Medical Practice', The Williams and Wildins Company.

ι. Chandrasekar, M. and Mishra,N. (2014) Practical Physiology. Jaypee Publishers.

φ. Sood, R. Haematology for students and practitioners. Jaypee Publishers.

SEMESTER III

THERAPEUTIC NUTRITION

CORE **CN3CRT07**

Credit: 3 Hours/week: 4

Objectives

To enable the students to:

δ) To understand skills and techniques in the planning of therapeutic diet for various diseases and nutritional deficiencies.

ε) To gain knowledge in diet counseling and educating patients.

Module I

Diet in Cardiovascular diseases **:** Aetiology, Symptoms, Risk factors, pathophysiology, dietary management and prevention of Atherosclerosis, Coronary Artery Disease, Myocardial Infarction, Ischemic Heart Disease, Rheumatic Heart Disease(RHD), Congestive Cardiac Failure (CCF), Hypercholesterolemia, Hypertension – classification, sodium restricted diet, dangers of severe sodium restriction.

Module II

Diet in Diseases of Liver and Gall Bladder: Aetiology, Symptoms, Dietary treatment in Jaundice, Hepatitis, Pancreatitis, Cirrhosis, Hepatic Coma. Role of food and alcohol in developing liver diseses.

Biliary Tract Diseases- Cholecystitis Cholelithiasis and Choledocholithiasis .

Module III

Diet in Renal disease: Causes, Symptoms and dietary management in Nephritis, Nephrosis, Acute and chronic renal failure, Renal calculi, Acid and alkali producing foods, End Stage Renal Diseases (ESRD), Dialysis.

Module IV

Diet in Cancer: Tumor markers and their applications, Types of cancer, Risk factors, Symptoms, Metabolic alterations and Nutritional problems of cancer and cancer therapy, Medical Nutrition Therapy, Role of food in prevention of cancer.

Suggested Reading

Gibney M J., Elia.M, Lingqvist. O (2005),Clinical Nutrition, Blackwell Science publishing Co.

Guthrie, H.A and Picciano, M.F, (1995), Human Nutrition, Mosby Publishing Co, New York.

Kris Etherton.P and Burus J.H.(1998), Cardiovascular Nutrition, American Dietetic Association ,Chicago, Illinosis.

Kumar .P. Clark M (2005) , Clinical Medicine, 6th Edition, Elsevier Saunders Publishing Co.

Nutrition and Changing Kidney Function, National Kidney Foundation New York.

Patient Education Handbook- Diabetic Education (2000), Good Shepherd Medical Centre, Texas.

Swaminathan, M (1989), Hand Book of Food and Nutrition, Bangalore Printing and Publishing Co, Bangalore.

SEMESTER III

FOOD COMMODITIES I

CORE **CN3CRT08**

Credit: 3 Hours/week: 4

Objectives

To enable the students to:

To understand the raw and processed food commodities used in daily life.

To discuss the qualities of available commodities and their suitability for different purposes.

Module I

Introduction to Food science: Objectives of cooking, Preliminary preparations, Cooking methods – Moist heat methods, Dry heat methods, Microwave cooking, Solar cooking.

Module II

Cereals and Pulses: Composition, Nutritive value and processing of wheat, rice, barley, rye, oats, millets and its products , convenient cereal products. Cereal cookery: Gluten formation, Gelatinization and dextrinisation.

Pluses: Composition and nutritive value, Digestibility of pulses, Processing, Toxic constituents, Pulse cookery.

Module III

Nuts and Oil seeds: Composition and Nutritive value, Specific nuts and oilseeds, Toxic constituents.

Fats and Oils: Composition and Nutritive value, Specific fats and oils, Refining and processing of edible oils, storage, Emulsions, Rancidity, Smoking point and Flash point.

Module IV

Vegetables and Fruits: Vegetables - Composition and Nutritive value, Pigments, Selection and Storage, Vegetable cookery.

Fruits - Composition and nutritive value, selection, post harvest changes and storage, ripening of fruits, Enzymatic and non enzymatic browning.

Suggested Readings

Clarke. D, Herbert. E (1992).). Botton. E.R, (1999), Oils, Fats and Fatty Foods, their practical application, Biotech Publishing Company.

Eckles C.H, Combs. W.B, Macy. H (1998). Milk and Milk Products, MC Graw Hill Companies.

Gopalan. C, Ramashathri V.V, Balasubramanyan S.C (1996), Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR.

Manay N.S, Shadaksharaswamy. M (2005), Foods – Facts and Principles. New Age International Publishers.

Matz. S.A (1996). The Chemistry and Technology of Cereals and Food of Feed; Chapman and Hall, New York.

Peckham C.G, Greaves H.T (1979). Foundation of food preparations, Mac Millan Publishing Co, New Delhi.

SEMESTER III

COMMUNITY NUTRITION

CORE **CN3CRT09**
Credit: 3 Hours/week :4

Objectives

To enable the students:

To understand the importance of nutrition in national progress and the significance of the assessment of nutritional status.

To find solutions to overcome problems of malnutrition in the community.

Module I

Introduction to nutrition and health in national development. Nutritional problems existing in our country - causes and preventive measures - PEM, VAD, IDA, IDD, VDD, Relationship between nutrition and infection.

FoodFortification:Needs,objectives,advantages,limitations.Restorationand enrichment

Module II

Methods of assessment of nutritional status: Direct assessment and indirect assessment. Significance of nutritional assessment of community, improvement of nutrition of community, Importance of Antenatal and post natal care.

Module III

Nutrition Education: Meaning, Importance, Principles of planning, Executing and evaluating nutrition education programs, Problems encountered in nutrition education.

Nutrition intervention schemes in the community: Lecture method demonstrations, nutrition exhibitions and visual aids.

Module IV

National and International Agencies and intervention programs in Community Nutrition: FAO, WHO, UNICEF, ICDS, NIN, CFTRI, CARE, ICMR, ANP, SNP, mid day meal program.

Suggested Reading

Dandiya, P.C, Zafer, Z.Y.K and (2003), Health education and community pharmacy, Vallabh Prakashan Printers, New Delhi.

Khader, V. (2003), Foods – Nutrition and Health, Kalyani Publishers, New Delhi.

Park. K, (2005), Park's Textbook of Preventive and Social Medicine, 18th edition, Banarsidas Bhanot Publishers, Jabalpur.

Reddy, R.S. (1998), Nutrition Education, Commonwealth Publishers, New Delhi.

Swaminathan, M. (2004), Food and Nutrition, Vol. II, 2nd edition, BAPPCO Publishers, Bangalore.

Bamji, M.S, Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

Srilakshmi, B. (2004), Nutrition Science, New Age International Pvt. Ltd, New Delhi.

Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.

Ramachandran, L. and Dharmalingam, T. (2005), Health Education, Vikas Publishing House Pvt. Ltd., New Delhi.

SEMESTER III

THERAPEUTIC NUTRITION PRACTICAL - I

CORE **CN3CRP01**
Credit: 1 Hours/week: 1

Objectives

To emphasis skill development in planning therapeutic diets using food exchange lists.

To provide greater exposure to dietetic practices followed in Indian hospital.

Module I

Planning of routine hospital diet:

1. Clear fluid diet
2. Full fluid diet
3. Soft diet
4. High calorie and low calorie diet
5. High residue and low residue diet

Module II

Planning of diet in infectious diseases:

a) Typhoid
b) Tuberculosis

Module III

Planning of diet in cancer, surgery and burns

Module IV

Planning of diet in deficiency diseases:

b) Vitamin A deficiency
c) Calcium deficiency
d) PEM

Suggested Readings

Bhala S.M.L, Bhatia N, Gopinath(1983). Diet Manual for heart patient, CTC, AHMS, New Delhi

Gibney M.J, Elia, M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science Publishing Co.

Robinson C.H and Winely E.S, (1984) Basic Nutrition and Diet Therapy 5th ed, Macmillian Pub. Co. New York .

Swaminathan, M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company.

SEMESTER III
COMMUNITY NUTRITION PRACTICAL

CORE **CN3CRP02**
Credit: 2 Hours/week : 2

Objectives

To enable the students to:

Develop skills in field application of the techniques of assessing nutritional status.

Acquire skills in organizing and implementing community nutrition projects.

Module I

Methods for assessment of nutritional status: direct and indirect parameters

Module II

Nutritional assessment of various age groups

- Preschool children
- School children
- Adolescents
- Adults
- Elderly

Module III

Nutrition education

Prepare ten visual aids and provide nutrition education to different age groups in community

Module IV

Observation reports on

- Noon meal programme
- Anganwadi visit
- Visit to star hotel

Suggested Reading

Dandiya, P.C, Zafer, Z.Y.K and (2003), Health education and community pharmacy, Vallabh Prakashan Printers, New Delhi.

Khader, V. (2003), Foods – Nutrition and Health, Kalyani Publishers, New Delhi.

Park. K, (2005), Park's Textbook of Preventive and Social Medicine, 18th edition, Banarsidas Bhanot Publishers, Jabalpur.

Reddy, R.S. (1998), Nutrition Education, Commonwealth Publishers, New Delhi.

Bamji, M.S, Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.

Ramachandran, L. and Dharmalingam, T. (2005), Health Education, Vikas Publishing House Pvt. Ltd., New Delhi.

SEMESTER III

NUTRITIONAL BIOCHEMISTRY

COMPLEMENTARY **CN3CMT05**
Credit: 4 Hours/week : 5

Objectives

To enable the students to-

Gain an understanding of the application of biochemistry in foods, nutrition and diet therapy.
Know the different metabolic pathways of macronutrients in human body

Module I

Carbohydrate Metabolism: Basic structure, Metabolism of glucose (glycolysis), fructose and galactose; Metabolism of pyruvate and lactate; Metabolism of acetyl Co A (TCA cycle); energetic of glucose metabolism, Synthesis of ribose (HMP Shunt); Synthesis of glucose from noncarbohydrates (gluconeogenesis); Metabolism of Glycogen- Glycogenesis and Glycogenolysis.

Module II

Lipid metabolism: Basic structure, Metabolism of Triacylglycerol, synthesis of fatty acid-saturated and unsaturated; Beta-oxidation of fatty acid-; Metabolism of Cholesterol; Metabolism of Ketone bodies

Module III

Protein metabolism: Basic structure of protein and amino acids; General pathways of aminoacid metabolism -Deamination, transamination, decarboxylation, and demethylation; urea cycle and fate of ammonia.

Module IV

Integration of metabolic pathways of energy metabolism, Metabolism in diabetes, obesity, starvation.

Regulation of metabolism: Interrelationship of carbohydrate, protein and lipid metabolism.

Metabolic adaptation during starvation, exercise, stress and diabetes mellitus.

Suggested readings

Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher Interlinks,Vijayavada,A.

Jain J.L , Jain S , Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.

Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.

Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, A John Wiley and Sons Publications.

Fatima D. et al, (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.

Leninger A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.

Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

SEMESTER III

HUMAN ANATOMY AND PHYSIOLOGY III

COMPLEMENTARY **CN3CMT06**
Credit: 4 Hours/week: 5

Objectives
To enable the students to:

α) Understand the general structure and functions of various systems and organs of the body.

β) Understand the abnormal changes in the tissue and organs on several disease states.

Module I

Endocrine System

Endocrine glands: structure and functions of Pituitary, Thyroid, Parathyroid, Adrenal, Pancreas, Placenta, Ovary, Testes, Thymus and Pineal body. Disorders of over and under secretions.

Module II

Reproductive system

Male and Female reproductive organs: structure and functions, reproductive hormones, Menstruation, Puberty, menopause, fertilization, development of fertilized ovum, placenta and its functions, parturition.

Module III

Muscular system

General account of the system, types of muscles, muscle contraction, Sliding filament theory, Biochemical events in muscular contraction, skeletal muscles of organs (brief)-pharynx, larynx, diaphragm, abdominal wall.

Module IV

Nervous System : Structure of nerve cell, nerve fiber. Classification of nervous system – CNS, PNS, ANS – their functions. Nerve impulses, synapse, reflex action, voluntary action.

Suggested Readings:

Chatterjee, C.C. (2005), Human Physiology , Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road , Kolkata – 700009.

Gyton and Hall (2000),Text book of Medical Physiology , 10th edition , Harcourt Asia LTD Singapore.

Subramanyam , S , Madavankutty , K and singh , H.D (2001) Text book of Human Physiology, S. chand and Co. Ltd , Ramnagar , New Delhi – 110055.

Wilson, K.J. and Waugh , A. (1999), Ross and Wilson Anatomy and Physiology in health and illness.

Sarada Subramanyam. S, Text book of Human Physiology, S Chand and Company Ltd, New Delhi.

Chandra Sekar C.N,(2007),Manipal Manuel of Physiology, 1st Edition, CBS Publisbers and Distributors, New Delhi.

Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.

Guyton A.C (1991), Textbook of Medical Physiology, Philadelphia: W B Saunders.

RatanVidya, (2004), Handbook of Human Physiology, 7th Edition (Reprint), Jaypee Bros Medical Publishers (P) Ltd, New Delhi

SEMESTER IV
GENERAL MICROBIOLOGY

CORE **CN4CRT10**
Credit: 4 Hours/week: 4

Objectives
To enable the students to:

To acquire an elementary knowledge about microorganisms
To understand basics of microbial culture

Module I

Introduction to Microbiology: Definitions of microbiology and microbes, Beneficial effects of microorganisms.
Microbial growth curve, Effect of intrinsic and extrinsic factors on growth curve: PH, Moisture, Temperature, Oxygen availability, Nutrients and others.

Module II

Microorganisms: General morphology, Characteristics, Reproduction and Economic importance of:

Bacteria,
Fungus
Virus
Algae
Protozoa

Module III

Culture Media: Common ingredients, Culture techniques: Streak, Stroke, Pour plate, Lawn, Cough plate methods, Observation of Microorganism: Direct and Indirect methods

Module IV

Medical microbiology: Causative pathogens and clinical features of - Nosocomial infection (HAI) - Bacteremia, Surgical site infection, UTI, Wounds and burns. Opportunistic pathogens. Other common infections- Malaria, Filariasis, Meningitis, Endocarditis, Dengue, Chickungunya, H1N1, Leptospirosis, Cystscercosis, Hide angle cysts, Osteomyelitis, Skin infections.

Suggested Readings

Ananthanarayan R, Jayaram Panicker CK (2009) Text book of Microbiology, Eighth edition, Universities Press Pvt. Ltd., Hyderabad

Banwart, G.J, Basic Food Microbiology, AVI, New York

Frazier W.C and Westhoff D.C (1992), Food Microbiology, Tata McGraw Hill

Jeffery C Pommerville, Alcamo's Fundamentals of Microbiology, 10th edition, 2014, Jones and Bartlett Learning India Pvt Ltd. New Delhi.

Kathleen Park Talaro (2002) Foundations in Microbiology, Fourth Edition, Mc Graw Hill, New York.

Narayanan, L.M. and Mani,L. Microbiology.Saras Publications, Nagercoil.

Prescott, L.M., Harley, J.P. and Klein, D.A. Microbiology. 4th edition McGraw-Hill, NewYork. 1999

Ray, B, Fundamentals of Microbiology, CRC Press, Boca Raton FL.

Stuart Walker T. Microbiology, 1998, W.B Saunders Company, United States.

SEMESTER IV
FOOD COMMODITIES II

CORE **CN4CRT11**
Credit: 4 Hours/week: 4

Objectives

To enable the students to:

ιι) To understand the basic commodities, both raw and processed used in catering and various aspects of their production and distribution.

ιιι) To discuss the qualities and standard of available commodities and their suitability for different purposes.

Module I

Milk and Milk Products : Composition, Nutritive value, Processing- clarification, homogenization, pasteurization and freezing, Types of milk, Fermented and non fermented milk products, Milk cookery.

Module II

Beverages : Tea, Coffee, Chocolate, fruit beverages, Milk beverages, Carbonated beverages, Malted beverages, Non alcoholic beverages and alcoholic beverages. Spices and condiments, Raising agents.

Module III

Meat :Classification, structure, Composition and Nutritive value, Post mortem changes, Ageing , Tenderizing, Curing, Selection and storage, Meat cookery.

Poultry : Classification, Processing, Composition and nutritive value, Storage.

Fish :Classification, Composition and Nutritive value, Selection, Fish cookery, Storage

Egg : Structure, Composition and Nutritive value, Egg quality and evaluation, Egg cookery, Egg white foams, Iron sulphide formation.

Module IV

Sugar and related products: Nutritive value, Properties, Sugar related products, stages of sugar cookery, Crystallization, Crystalline and non crystalline candies, Role of sugar in cookery.

Suggested Readings

Clarke. D, Herbert. E (1992).). Botton. E.R, (1999), Oils, fats and fatty foods, their practical application, Biotech Publishing Company

Eckles C.H, Combs. W.B, Macy. H (1998). Milk and Milk Products, MC Graw Hill Companies.

Gopalan. C, Ramashathri V.V, Balasubramanyan S.C (1996), Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR.

Manay N.S, Shadaksharaswamy. M (2005),), Foods – Facts and Principles. New Age International Publishers.

Matz. S.A (1996). The chemistry and technology of cereals and food of feed; Chapman & Hall, New York.

Peckham C.G, Greaves H.T (1979). Foundation of food preparations, Mac Millan Publishing Co, New Delhi.

Srilakshmi B (2011), Food Science, New Age International Publications, New Delhi.

SEMESTER IV
THERAPEUTIC NUTRITION PRACTICAL- II

CORE **CN4CRP03**
Credit: 3 Hours/week : 4

Objectives

To enable the students to:

δ. To emphasis skill development in the planning and preparation of therapeutic diet
ε. To provide greater exposure to modification in normal diet

Module I

Standardisation of portion sizes for different food preparations, use of weights and measures (raw weight v/s cooked weight), use of food composition table, menu planning and calculation

Planning and preparation of diet in cardiovascular diseases
Hypertension with obesity
CVD with Cirrhosis

Module II

Planning and preparation of diet in renal diseases
Glomerulonephritis with CVD
Nephrosis
Renal failure

Module III

Planning and preparation of diet in gastrointestinal diseases
Lactose intolerance with PEM and anaemia
Constipation
Peptic ulcer with Diarrhoea

Module IV

Planning and preparation of diet in diseases of liver and pancreas
Cirrhosis with Hypertension
Hepatitis
Pancreatitis

Suggested Readings

Bhala S.M.L, Bhatia N, Gopinath. Diet Manual for heart patient, CTC, AHMS, New Delhi (1983)

Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Backwell Science Publishing Co.

Robinson C.H and Winely E.S, Basic Nutrition and Diet Therapy 5th ed, Macmillian Pub. Co. New York (1984)

Swaminathan M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company to Ltd.

SEMESTER IV
QUANTITY FOOD PRODUCTION PRACTICAL

CORE **CN4CRP04**
Credit: 3 Hours/week: 3

Objective

To enable students to organize, prepare and serve food for three different meals.

Module I

Cereal Preparations

Rice Preparations : Chicken Biriyani, Vegetable Pulao, Tomato Rice.
Wheat Preparations : Aloo Paratha, Spicy Potato Puri, Spring Roll.

Module II

Vegetable Preparations

Gobi Manchurian, Vegatable Khorma, Shahi Mattar.

Module III

Meat and Fish Preparations

Meat Preparations: Chicken Peggy Digo, Chicken curry, Green Chicken,
Fish Preparations: Tomato Fish, Chilly Fish, Fish Moilee

Module IV

Snacks, Sweets , Puddings And Desserts

Snacks: Onion Pakoda, Rainbow Sandwich, Vegetable Burger
Sweets : Carrot Burfi, Bread Gulab Jamun, Coconut Sweet
Puddings and Desserts: Chocolate Pudding, Bread Pudding, Fruit Triffle.

Suggested readings

Khandwala V. (1987), Relish Food The Vegetarian Way, Vakils, Fefferr and Simons Ltd., Bombay

Mathew K.M (2000), Modern Kerala Dishes

Ravindran B. (1990), My Favourite Recipes – Puddings and Desserts, Bhavi Publishing, Cochin.

SEMESTER IV

BIOCHEMICAL ASPECTS OF NUTRITION

COMPLEMENTARY **CN4CMT07**
Credit: 2 Hours/week: 3

Objectives
To enable the students to:

- To acquire knowledge about the micro nutrients and its functions in the body.
- To understand the metabolism of micro nutrients in human body

Module I

Metabolism of Macrominerals: Functions, Biochemical importance, metabolism, deficiency, and toxicity of the following minerals: Calcium, phosphorus, magnesium.

Module II

Metabolism of Microminerals: Functions, Biochemical importance, Metabolism, deficiency and toxicity of the following minerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluorine.

Module III

Metabolism of Fat Soluble Vitamins: Functions, biochemical importance, metabolism, deficiency and toxicity of vitamin A, D, E, K.

Metabolism of Water Soluble Vitamins: Functions, Biochemical importance, metabolism , Deficiency, Toxicity of Thiamin, Riboflavin, Niacin, vitamin B6, Vitamin B12, Biotin, Pantothenic acid, Folic acid and Vitamin C.

Module IV

Nutrient-Nutrient interrelationships: Role of Vitamins and Minerals in macronutrient metabolism, micronutrient interrelationships.

Suggested readings

Satyanarayana.U (2005), Biochemistry, Uppala Author-Publisher Interlinks,Vijayavada,A.

Jain J.L , Jain S , Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.

Hames B.D and Hooper N.M (2001) Instant notes on Biochemistry, Viva books private limited, New Delhi.

Devlin T.M (2002), Text book of Biochemistry with Clinical Correlations, A John Wiley and Sons Publications.

Fatima D. et al, (1999) Biochemistry, Saras Publication, Nagarcoil, Tamil Nadu.

Leninger A.L (1987), Principles of Biochemistry, CBS Publishers and Distributors.

Pattabhiraman T.N (1993), Principles of Biochemistry, Prithvi Book Agency.

SEMESTER IV
BIOCHEMISTRY PRACTICAL II

COMPLEMENTARY **CN4CMP03**

Credit: 1 Hours/ week : 2

Objectives:

To enable the students to get practical experience in lab and clinical nutrition.
To make the students aware of the constituents of blood.

Module I

Analysis of Blood for

Glucose
Total Protein, albumin and globulin
Total Cholesterol and lipid profile

Module II

Estimation of Acid phosphatase
Estimation of Alkaline phosphatase

Module III

Estimation of Iron
Estimation of Haemoglobin

Module IV

Estimation of SGPT
Estimation of SGOT

Suggested readings

- Satyanarayana.U(2005), Biochemistry, Uppala Author-Publisher Interlinks,Vijayavada,A.
- Jain J.L , Jain S , Jain N.(2005),Fundamentals of Biochemistry, S.Chand & Company LTD , New Delhi.

SEMESTER IV
HUMAN ANATOMY AND PHYSIOLOGY IV

COMPLEMENTARY **CN4CMT08**
Credit: 2 Hours/week : 3

Objectives

To enable the students to

Understand the general structure and functions of various systems and organs of the body.

Understand the abnormal changes in the tissue and organs on several disease states.

Module I

Sense Organs

Structure, functions, physiology and diseases and disorders of Skin (integumentary system), Eye, Ear , Nose and Tongue .

Module II

Skeletal system

General structure and functions of bone, bone mineralization, factors affecting bone formation, A general account of axial skeleton and appendicular skeleton. Types of joints, Arthrology.

Module III

Regulatory Mechanism

Regulation of blood pressure, pulse, heart rate and temperature, adaptations during exercise.

Module IV

Physiology in special conditions

High altitude and space physiology, aviation physiology, deep sea physiology, effect of exposure to cold and heat.

Suggested Readings:

Chatterjee, C.C. (2005), Human Physiology , Vol I & II Medical Allied Agency, 82/1, Mahatma Gandhi Road , Kolkata – 700009.

Gyton and Hall (2000),Text book of Medical Physiology , 10th edition , Harcourt Asia PTE LTD Singapore

Hole, J.W (1989), Essentials of Human Anatomy and Physiology , 3rd edition , WCB publishers , Dubuque , Iowa.

Subramanyam , S , Madavankutty , K and singh , H.D (2001) Text book of Human Physiology, S. chand and Co. Ltd , Ramnagar , New Delhi – 110055.

Chandra Sekar C.N,(2007),Manipal Manuel of Physiology, 1st Edition, CBS Publisbers and Distributors, New Delhi.

Indu Khurana and Arushi (2009), Text Book of Anatomy and Physiology for Health Professionals, CBS Publishers and Distributors, New Delhi.

Guyton A.C(1991), Textbook of Medical Physiology, 8th, Philadelphia: W B Saunders

RatanVidya, (2004), Handbook of Human Physiology, 7th Edition (Reprint), Jaypee Bros Medical Publishers (P) Ltd, New Delhi

SEMESTER IV

HUMAN PHYSIOLOGY PRACTICAL- II

COMPLEMENTARY **CN4CMP04**

Credit : 1 Hours/ week : 2

Objectives

To enable the students to identify and analyses body cells and fluids.

To gain technical skill in physical examination of body.

Module I

Smear preparation of human blood for RBC and WBC types

Module II

Haematology

Testing of blood group

Bleeding time : Duke's method

Blood clotting time : Wright's method

Module III

Clinical examination of urine

Physical examination: Volume, colour, odour, appearance, p^H, specific gravity

Test for abnormal constituents of urine

Sugar

Blood

Albumin

Bile salts

Bile pigments

Ketone bodies

Module IV

Analysis of saliva

Amylase

Mucin

Calcium

Inorganic Phosphate

Suggested Readings

Chatterjee C.C (2003), Human Physiology, Kalyani Mukherjee Publishers, Kolkata.

Wilson K J and Waugh A, (1999), Anatomy and Physiology in Health and Disease, British library of cataloguing in publishing data, London.

Samson and Wright (1989), 'Applied Physiology', Tandon Publications.

Best, H. And Taylor, B (1991)'The Physiological Basis for Medical Practice', 8th Edition, The Williams and Wildins Company.

M. Chandrasekar & Nitesh Mishra , Practical Physiology. Jaypee 2014.

Ramnik Sood , Haematology for students and practitioners. Jaypee Publishers.

SEMESTER V

FOOD MICROBIOLOGY, SANITATION AND HYGIENE

CORE **CN5CRT12**
Credit: 3 Hours/ week: 5

Objectives

To enable the students to:

Understand the role of micro organisms in food spoilage
Know the need for implementing sanitary procedures and attitudes.

Module I

Contamination and spoilage of food: Sources of contamination and spoilage, Classification of foods based on perishability, General principles underlying food spoilage, factors affecting kinds and number of micro organisms in food, factors affecting the growth of micro organisms in food, chemical changes caused by microorganisms.

Module II

Contamination, spoilage and preservation of different foods:

i) Cereals and Cereal products
ii) Fruits and Vegetables
iii) Meat, Fish, Egg and Poultry
iv) Milk and milk products
v) Fats and oils

Module III

Quality control in food industry: Microbiology in food plant sanitation, Microbiological criteria for foods, packaging and labeling of foods.

Control of microbial growth in foods: Microbial control strategies and methods of control, Measuring effectiveness of anti microbial agents, phenol coefficient, TDP, TDT, DRT (D-value, z-value, F-value).

Module IV

Introduction to Sanitation and Hygiene: Definition of sanitation and hygiene, Significance of sanitation in food industry. Personal Hygiene of food handler.

Cleaning Methods: Sterilization and Disinfection- products and methods, use of detergents, heat, chemicals, steps in cleaning utensils and equipments. Waste Product Handling – garbage and sewage disposal, Pest control.

Suggested readings

Frazier.W.C& Westhoff.D.C (1997), Food Microbiology,Tata McGraw-Hill publishing company Ltd, New Delhi.

James.M.J (1996) Modern Food Microbiology 4th edition, CBS Publications and distributors, New Delhi.

Mani.A, Selvaraj.A.M ,Narayanan.L.M ,Arumugham.N.(1999) Microbiology-General and Applied, Saras publications , Nagarcoil.

Roday.S. (1999) Food Hygiene And Sanitation, Tata McGraw-Hill Publishing Co. Ltd, New Delhi.

Powar.C.B and Daginawala H.F. (1999) General Microbiology , Vol.II , Himalaya Publishing House.

Khetarpaul .N. (2009) Food Microbiology, Daya publishing , New Delhi.

Adams.M.R and Moss.M.O (2000) Food Microbiology, New Age International Ltd. New Delhi.

SEMESTER V

PERSONNEL MANAGEMENT

CORE **CN5CRT13**
Credit: 3 Hours/week: 3

Objectives

To enable the students to

Understand the management of human resources in food service establishment.
Understand the management of material resources in food service establishment.

Module I

Organization and management : Organization- Definition, Functions, Types and Organization process, Management- Functions and tools of management, Technique of effective management, Energy and time management.

Module II

Food Material Management – Meaning, definition, importance, food selection, budgeting, purchasing, purchasing procedures, receiving, and receiving procedures, store-room management and store records.

Module III

Personnel Management – Recruitment, selection, induction and training of personnel, work standards, productivity, supervision, performance appraisal - objectives, modern and traditional methods, motivations, incentives for effective performance.

Module IV

Laws affecting food service operations- Hospital, Flight/Railway kitchen, Hotels, Restaurants, Canteen and Industry. Labour policies and legislation, Union and contract negations.

Suggested Readings

Chunawalla, S.A (2000), Essentials of Management, Himalaya Publishing House, Mumbai.

Jitendra, M.D (1999), Catering Management, Dominant Publishers and Distributors, Delhi.

Mamoria, C.B (2000), Personnel Management, Himalaya Publishing House, Mumbai.

Pylee, M.V and George, A.S (2007), Industrial Relations and Personnel Management, 2nd edition, Vikas Publishing House, New Delhi.

Rao, P.S (2000), Personnel and Human Resource Management, Himalaya Publishing House, Mumbai.

Sethi, M. and Malhan, S. (2008), Catering Management, New Age International Publishers, New Delhi.

Jitendra, M.D (1999), Catering Management, Dominant Publishers and Distributors, Delhi.

SEMESTER V

RESEARCH METHODOLOGY AND STATISTICS

CORE **CN5CRT14**
Credit: 4 Hours/week : 5

Objectives

To enable the students to learn

The fundamentals of research and statistics

Practical application of statistics in research

Module I

An introduction to research methodology: Meaning and importance of research, Objectives, Characteristics of research, Types of research, Criteria of good research, selection and formulation of research problem, Research design-Need and features.

Module II

Methods and tools of data collection: Sourcess of data-Primary, secondary and tertiary, Types of data-categorical, nominal and ordinal. Methods - Survey, observation, interview, case study. Tools - Questionnaire, Interview schedule, rating scales, other methods, Collection of secondary data.

Module III

Scientific Writing: Structure and components of scientific report, types of report, steps in report writing, components, precautions for report writing. preparation of scientific paper, bibliography, referencing and foot notes, plagiarism, citation and acknowledgement, ISBN and ISSN.

Module IV

Sampling and tabulation of data, Diagrammatic representation of data line and bar diagram, frequency polygon and pie diagram.

Statistical Methods and Analysis – Mean, Median, Mode, Standard deviation and Variance, Correlation, Regression analysis.

Suggested Readings

Ahnad Q.S, Ismail M.V, Khan S.A (2008), Biostatistics, University Science Press, New Delhi.

Best J.W., Khan J.V (2003), Research in education, 9th edition, Prentice Hall of India Althoel S.C., (2002), Statistics, Cambridge University Press, UK.

Sharma K.R (2002). Research Methodology, National Publ. House, New Delhi.

Pillai R.S, Bagavathi. V, (2002), Statistics, S. Chand and Company Ltd, Chennai.

Gupta S.C (2000), Fundamentals of statistics, Himalaya Publishing House.

Kothari, C.R (2004), Research Methodology, 2nd edition, New Age International (P) Ltd, New Delh

SEMESTER V

HUMAN RIGHTS & ENVIRONMENTAL STUDIES

CORE **CN5CRT15**
Credit: 4 Hours/week: 5

Module I

- Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness. (2 hrs)

- Natural Resources :

Renewable and non-renewable resources : Natural resources and associated problems.

a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources, Case studies.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification

Role of individual in conservation of natural resources. Equitable use of resources for sustainable life styles. (10 hrs)

- Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem Producers, consumers and decomposers Energy flow in the ecosystem
  Ecological succession: Food chains, food webs and ecological pyramids.
  Introduction, types, characteristic features, structure and function of the given ecosystem:- Forest ecosystem (6 hrs)

Module II

- Biodiversity and its conservation

Introduction, Biogeograhical classification of India
Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation, Hot-spots of biodiversity
Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts Endangered and endemic species of India (8 hrs)

- Environmental Pollution: Definition, Causes, effects and control measures of: -

a. Air pollution
b.Water pollution
c. Soil pollution
d.Marine pollution
e. Noise pollution
f. Thermal pollution
g.Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution, Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides. (8 hrs)

- Social Issues and the Environment, Urban problems related to energy

Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies
Environmental ethics: Issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion , nuclear accidents and holocaust, Case studies
Consumerism and waste products Environment Protection Act, Air (Prevention and Control of Pollution) Act Water (Prevention and control of Pollution) Act Wildlife Protection Act, Forest Conservation Act
Issues involved in enforcement of environmental legislation, Public awareness (10hrs)

Module III

Space Nutrition: Physiological changes during space flight, types of space foods, space shuttle food system, and essential quality criteria required for space foods.

Module IV

Nutrition In High Altitude: Physiological Changes, Nutritional Requirement, Food supplements, special foods.
Sea voyages: Food on board, possible socio cultural and psychological causes for malnutrition, psychosocial and physical stress, diet pattern.

Module – V

Human rights (10 hours)

- Human Rights– An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights).

- Human Rights and United Nations – contributions, main human rights related organs- UNESCO, UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights.

- Human Rights in India – Fundamental rights and Indian Constitution, Rights for children and women, Scheduled Castes, Scheduled Tribes, Other Backward Castes and Minorities
- Environment and Human Rights - Right to Clean Environment and Public Safety: Issues of Industrial Pollution, Prevention, Rehabilitation and Safety Aspect of New Technologies such as Chemical and Nuclear Technologies, Issues of Waste Disposal, Protection of Environment Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghats-mention, gadgil committee report.

  Kasthurirengan report. Over exploitation of ground water resources, marine fisheries, sand mining etc. (8 Hrs)

REFERENCES

1. Bharucha Erach, Text Book of Environmental Studies for undergraduate Courses. University Press, IInd Edition 2013 (TB)

2.Clark.R.S., Marine Pollution, Clanderson Press Oxford (Ref)

3.Cunningham, W.P.Cooper, T.H.Gorhani, E & Hepworth, M.T.2001 Environmental Encyclopedia, Jaico Publ. House. Mumbai. 1196p .(Ref)

4.Dc A.K.Enviornmental Chemistry, Wiley Eastern Ltd.(Ref)

5.Down to Earth, Centre for Science and Environment (Ref)

6.Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140pb (Ref)

7.Jadhav.H & Bhosale.V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p (Ref)

8.Mekinney, M.L & Schock.R.M. 1996 Environmental Science Systems & Solutions. Web enhanced edition 639p (Ref)

9.Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB)

10. Odum.E.P 1971. Fundamentals of Ecology. W.B. Saunders Co. USA 574p (Ref)

11. Rao.M.N & Datta.A.K. 1987 Waste Water treatment Oxford & IBII Publication Co.Pvt.Ltd.345p (Ref)

12. Rajagopalan. R, Environmental Studies from crisis and cure, Oxford University

SEMESTER V
FOOD FORTIFICATION

Core **CN5OPT16**
Credit: 4 Hours/week: 5

Objectives

To enable the students to-

To understand the role of fortication in national nutritional development.

To acquire knowledge about advantages, techniques and limitations of food fortification.

Module I

Food fortification – Needs, Objectives, Principles and rationale, Selection and basis of fortificants, Fortification as means of improving nutrition, Advantages of fortification, Criteria for selecting vehicles for food fortification, Limitations, Design of fortification programme, General techniques of food fortification.

Module II

Economic aspects of food fortification, Restoration and enrichment, Technological and cost limits of fortification, Enrichment and fortification programmes in India, Organic Vs inorganic salts,Newer trends and researches in food fortification.

Module III

Fortification with vitamin A, Iron, Iodine, Safety in nutrient fortification, Multiple nutrient fortification, Nutrient interaction and bioavailability of nutrients from fortified foods, Quality assurance and control in food fortification, Steps in implementation of food fortification quality assurance programme.

Module IV

Technology of fortifying cereals, beverages, snack products: Characteristics of nutrients used in cereal fortification, Types and levels of micronutrients to be added, Fortification of breakfast cereals.

Technology of fortifying beverages: Importance of beverage fortification, Health benefits of beverage fortification.

Snack products: Rationale for micronutrient fortification of snack products, Merits and demerits of snack fortification, and bioavailability.

Suggested Readings

Manay N.S, Shadaksharaswamy. M (2005) Foods – Facts and Principles. New Age International Publishers.

Bamji M., Prahlad N., Vinodhini R (1998), *Text Book of Human Nutrition.* Oxford and IBH Publ. Co., New Delhi.

Srilakshmi, B. (2005). Nutrition Science, 5th edition, New Age International Publishers, New Delhi.

Potter N.N, Hotchkiss J.H (1996), Food Science C.B.S. Publication, New Delhi.

SEMESTER V

FOOD SCIENCE PRACTICAL

CORE **CN5CRP05**
Credit: 2 Hours/week: 2

Objectives

To enable the students to:

Understand the effect of various cooking methods on different food groups.

Understand the various methods of sensory analysis

Module I

Starch cookery

- Gluten formation
- Gelatinization temperature
- Thickening power of starch

Sugar cookery

- Stages of sugar cookery

Module II

Milk cookery

- Curd formation
- Scum formation
- Scorching of milk

Meat cookery

- Various cooking methods and their effect on meat
- Meat tenderization

Egg cookery

- Characteristics of egg
- Eggs cooked in shell
- Egg white foaming

Module III

Fruits and Vegetables

- Darkening of fruits
- Prevention of darkening
- Effect of acid and alkali on vegetable pigments
- Blanching

Module IV

Sensory evaluation of foods: Sensitivity tests, Duo-trio test, Triangle test, Paired comparison test.

Suggested Readings

Clarke. D, Herbert. E (1992) Botton. E.R, (1999), Oils, fats and fatty foods, their practical application, Biotech Publishing Company.

Eckles C.H, Combs. W.B, Macy. H (1998). Milk and Milk Products, MC Graw Hill Companies.

Gopalan. C, Ramashathri V.V, Balasubramanyan S.C (1996), Nutritive Value of Indian Foods, National Institute of Nutrition, ICMR.

Manay N.S, Shadaksharaswamy. M (2005), Foods – Facts and Principles. New Age International Publishers.

Matz. S.A (1996). The chemistry and technology of cereals and food of feed; Chapman & Hall, New York.

Peckham C.G, Greaves H.T (1979). Foundation of food preparations, Mac Millan Publishing Co, New Delhi.

Srilakshmi B (2011), Food Science, New Age International Publications, New Delhi.

SEMESTER VI

FOOD SAFETY

CORE **CN6CRT17**

Credit: 3 Hours/week : 4

Objectives

To enable the students to acquire knowledge on:

Food safety , hygiene and food hazards

Food regulations (national as well as international)

Design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.

Module I

Introduction to Food Safety : Definition, Types of hazards and their impact on health, biological, chemical, physical hazards, and their control measures, Factors affecting Food Safety, Hygienic Food Handling, Purchasing and Receiving Safe Food—Important points to be observed for receiving various foods.

Sanitary procedures while preparing, cooking and holding food, Safety of left over foods, Food Storage- Guidelines for storage of foods at various temperatures, Storage of Specific Foods.

Module II

Food Borne Illness and Food Hazards

Food borne illnesses caused by Bacteria, Virus and Parasites. Natural toxicants in foods, Chemicals, Antibiotics, Hormones and Metal contamination.

Module III

Food Safety Management : Basic concept, Prerequisites - GHPs, GMPs and SSOPs , HACCP, ISO series, TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis, Accreditation and Auditing (in brief)

Safety concerns in food packaging: Principles in the development of safe and protective packaging , Product labeling, Nutritional labeling and safety assessment of food packaging materials.

Module IV

Food laws and Standards**:** Indian Food Regulatory Regime, Global Scenario, Other laws and standards related to food, FPO, PFA, FSSAI, AGMARK, BIS. GRAS and permissible limits for chemical preservatives and legal aspects for γ-irradiations.

Recent concerns in food safety: New and Emerging Pathogens. Genetically modified foods / Transgenics / Organic foods. Newer approaches to food safety.

Suggested Readings

Lawley, R., Curtis L. and Davis,J.(2004) The Food Safety Hazard Guidebook , RSC publishing.

De Vries. (1997) Food Safety and Toxicity, CRC, New York.

Marriott, Norman G. (1985). Principles of Food Sanitation, AVI, New York,

Forsythe, S J. (1987) Microbiology of Safe Food, Blackwell Science, Oxford, USA.

Roday .S. (1999) Food Hygiene and Sanitation, Tata McGraw-Hill company Limited, New Delhi.

SEMESTER VI

FOOD ADULTERATION

CORE **CN6CRT18**

Credit: 3 Hours/week: 4

Objectives

To enable the students to:

To study different food adulterants and its impacts

To identify the hazards from adulterants

Module I

Adulteration – Food adulteration - definition, types, natural toxins- naturally occurring toxicants in plants, mycotoxins, metal contaminants, pesticide residues, presence of extraneous material, residue from processing and packaging material, common adulterants and its detection, food grains, wheat flour, Bengal gram flour, dhal, sweet meat, milk and milk products, edible oils, ghee or butter, sugar, jaggery, honey, tea, coffee, soft drinks, spices and condiments.

Module II

Food additives - BHA or BHT, MSG, hydrolysed vegetable protein or autolysed yeast extract, potassium bromate, propyl gallate, sulfites, sodium nitrate, sodium benzoate, hydrogenated or partially hydrogenated oils.

Module III

Food colourants and sweetners – Detection and health hazards of brilliant blue, indigo, carmine, citrus red, fast green, erythrosine, allura red, tartarzine, sunset yellow, food sweetners: high fructose corn syrup (HFCS), aspartame, sucrolase, saccharin, neotame, sorbitol and non certified sweetners.

Module IV

Emulsifiers, stabilizers, thickening and gelling agents: Tara gum, soyabean, hemicelluloses, sucroglycerides, stearyl tartarate, talc, gluconic acid, candelilla wax, carbamide, argon.

Suggested Readings

Duffus, J.H. and Worth, H.G. J. (2006) Fundamental Toxicology The Royal Society of Chemistry.

Gerorge, A.B. (2004). Fenaroli's Handbook of Flavor Ingredients. CRC Press.

Madhavi, D.L., Deshpande, S.S and Salunkhe, D.K. (2006). Food Antioxidants, Technological, toxicological and Health Perspective. Marcel Dekker.

Pomeraz, Y. and MeLoari, C.E. (2006), Food Analyasis, Theory and Practice, CBS publishers and Distributor, New Delhi.

SEMESTER VI

PREVENTIVE NUTRITION

CORE **CN6CRT19**
Credit: 3 Hours/week: 4

Objectives

To enable the students:

15. To understand the importance of preventive nutrition in the current scenario
16. To understand the role of Food security in National Development

Module I

Functional foods- free radicals, antioxidants, phytochemicals, prebiotics, probiotics and symbiotic. Fibre – classification, role, physiological and metabolic effect, Role of fibre in prevention of diseases.

Module II

Food security- Food Security Bill, Role of PDS, Dietary diversification, Food Revolutions, agencies for control of food losses- FCI, SGC, SWC, CWC.

Module III

Perspectives in preventive nutrition- fortification, enrichment, restoration, health supplements and proprietary foods, Nutrigenomics. Biomolecules as antibiotics,vitamins, pigments.

Module IV

Immunization – Significance, immunization schedule for children, adults and for foreign travels, Importance of vaccination in adulthood, Role of individual, family and community in promoting health.

Suggested Readings

Leathers, H.D. and Fosters, P., The World Food Problem: Tackling the Causes of Undernutrition in the Third World, 3rd Edition. Lynne Rienner Publishers, 2004.

Southgate, D., Graham, D.H. and Tweeten, L., The World Food Economy, Blackwell Publishing, 2007.

Wildman, R.E.C. (2007) Handbook of Nutraceuticals and Functional Foods, second edition. CRC Press.

Goldberg I. *Functional Foods: Designer Foods, Pharma Foods*. 2004.

Brigelius-Flohé, J & Joost *HG. Nutritional* Genomics: Impact on Health and Disease, Wiley VCH. 2006.

Park. K, (2005), Park's Textbook of Preventive and Social Medicine, 18th edition, Banarsidas Bhanot Publishers, Jabalpur.

Lalitha. M, (1997), Major Issues in Food and Nutrition Science, Kanishka Publishers, New Delhi.

Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.

SEMESTER VI

FOOD SERVICE MANAGEMENT

CORE **CN6CRT20**

Credit: 3 Hours/week : 4

Objectives

To enable the students to:

To develop skills in menu planning for quantity preparation.

To understand the different styles of food service in volume feedings.

Module I

Introduction to different food service outlets: Definition of catering industry, functions, types of catering establishments, commercial catering (hotels and restaurants), welfare catering (hospital), industrial catering and transport catering. Different food and beverage service outlet.

Module II

Menu planning: Sequence of course, Technique of writing menus, Functions of menu, Types of menu – Ala carte, Table d hote and combination menu, novelle cuisine, Different types of cuisines, Types of service, Styles of service, Services available in restaurant.

Module III

Equipments in food service: Classification of equipments, factors for selection of equipments, Service equipments, Care and use of equipment. Kitchen layout-Types of kitchen, location and layout.

Module IV

Staff organization of different outlets – manager, hostess, supervisor, steward, waiter. Uses of bills and checks on control system outlets.

Suggested Readings

Anderson, F. (1996), Home Appliance Servicing Taraporwals Sons. & Co.

Arora, K., (2002), Theory of Cookery, Frank Bros. & Co., Ltd., New Delhi.

Berry, M., (1995), Complete Cook Book, Dorling Kindersley Ltd., London.

Hsiung, D.T., (1994), Chinese Cantonese Cooking, Parragon Book Service Ltd., England.

Johnson, J.B, (1995), Equipment for Modern Living, Macmillan company Ltd

Khan, M.A. (1987), Food Service Operations, Avi Publishing Company.

Lillicrap, D.K., (1989), Food and Beverage Service, 2nd edition, BLBS.

Shiring, S.B., Jardine, R.W. and Mills, R.J (2000), Introduction to Catering, Thomson Asia Ltd., Singapore.

Kinton, R. and Cesarani, V. (1999), The theory of catering, ELBS publishing.

Varghese, B. (1999), Professional Food and Beverage Service Management, Macmillan India Ltd.

Sethi, M and Malhan, S (1991), Catering Management, Wiley Eastern Ltd,

SEMESTER V

FOOD PRESERVATION

CORE **CN6CRT21**

Credit: 4 Hours/week: 5

Objectives

To enable students to:

To study the principles and methods of food preservation

To understand about the various preservatives and their use in food

Module I

Principles of food preservation: Classification of food in relation to shelf life, Principles and importance of food preservation

Processing and preservation by heat : Blanching, Pasteurization, Sterilization and UHT processing, Canning, Extrusion cooking, Dielectric heating, Microwave heating, Baking, Roasting and Frying, Retort processing of ready to eat products.

Module II

Processing and preservation by low temperature : Refrigeration, CA, MA and dehydro-freezing. Food irradiation, Principles of using electromagnetic radiation in food processing, Ionizing radiation and non-ionising radiation, Advantages and disadvantages.

Module III

Processing and preservation by drying, concentration and evaporation : Various methods employed in production of dehydrated commercial products, Selection of methods based on characteristics of foods to be produced, Advantages and disadvantages of different methods, Sun-drying, tray or tunnel drying, Spray drying, Drum drying, Freeze drying ,Fluidized bed drying.

Module IV

Processing and preservation by non-thermal methods : High pressure, Hurdle technology. Use and application of enzymes and microorganisms in processing and preservation of foods, Food fermentations, Pickling, Smoking.

Suggested Readings

Kalia M, Sood. S (2000), Food Preservation and Processing, Kalyani Publishing, New Delhi.

Potter N.N, Hotchkiss J.H (1996), Food Science C.B.S. Publication, New Delhi.

Vangarde S.J, Wood Burn M (1999), Food Preservation and Safely, Surabhi Publications, Jaipur.

Manay N.S, Shadaksharaswamy. M (2005), Foods – Facts and Principles. New Age International Publishers.

SEMESTER VI

EPIDEMIOLOGY

CORE **CN6OCT22**

Credit: 3 Hours/week : 3

Objectives

To enable the students to-

To understand the role of epidemiological approach in disease prevention.

To acquire knowledge about the water and waste management.

Module I

Concept of Epidemiology: Study of the epidemiologic approach-determinants of disease preventive & social means, vital statistics and their significance. Principles of disease control

Module II

Secondary Sources of Community Health data: Sources of relevant vital statistics of infant, child & maternal mortality rates.

Module III

Immunization: Importance and schedule of Immunization for children, adults and for foreign travels, role of individual, family and community in promoting health.

Module IV

Water and Waste Management: Importance of water to the community, etiology and effects of toxic agents, water borne infectious agents, sources of water, safe drinking water, potable water, treatment of water for drinking purpose, waste and waste disposal, sewage disposal and treatment, liquid waste disposal.

Suggested Readings

Smith, G.W.: Preventive Medicine and public health. 2nd edition. Macmillan Co. New York.

Park: Park's Textbook of preventive and Social Medicine. M/s. Banarasidas Bhanot. Jabalpur.

Lalitha. M, (1997), Major Issues in Food and Nutrition Science, Kanishka Publishers, New Delhi.

Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.

SEMESTER VI

INFORMATION TECHNOLOGY

CORE **CN6OCT23**
Credit: 3 Hours/week: 3

Objectives
To enable the students :

To understand the fundamentals of computer applications.
To understand the practical applications of computer in nutrition science.

Module I

Computer Fundamentals: Computer Organization, Characteristics of computers, Input-Output Devices, Primary - Secondary memory, Hardware and Software, Types of Computers, Computer Languages, operating systems.

Module II

Computer arithmetic: Binary number system- addition, subtraction, multiplication and division. Conversion- binary to decimal, octal, and hexadecimal, conversion from hexadecimal, octal, decimal to binary.

Module III

Spread sheet packages: Spreadsheet concepts, Basic operations in EXCEL, Working with Charts, Formatting worksheets, Functions - Mathematical, Logical, Statistical, Text and Date and Time functions, Goal Seek, Scenarios, Auditing, Important Data menu commands.

Module IV

Use of computers in the field of nutrition - patient registration, diet prescription, counseling, research applications. Softwares in nutrition research: DIETCAL, WHO ANTHRO PLUS, ESHA etc. Statistical packages in research- SPSS, ATLAS.ti, Plagiarism softwares.
Search engines, browsers, e-mail etiquettes.

Suggested Readings

Computer Fundamentals – P. K. Sinha and Priti Sinha
Foundations of Computing – P. K. Sinha and Priti Sinha
MS DOS 6.2 Quick Reference – Rajiv Mathur
Microsoft Office for Windows – Steve Sagman
MS Office 2000 – Dinesh Maidasani, Firewall Media

SEMESTER VI

MEAL MANAGEMENT PRACTICAL

CORE **CN6CRP06**
Credit: 2 Hours/week : 4

Objectives

To enable the students to:

- Learn the principles of meal planning
- Plan and prepare meals for the family members at different income levels and different physiological status

Module I

Basic principles of meal and menu planning.

Daily food guide – Basic five food groups, food pyramid, My plate, use of food groups, food costing.

Module II

Plan and prepare a diet for

a) Sedentary pregnant woman
b) Lactating mother (0 – 6 months)
c) Infant (0 – 6 months)

Module III

Planning and prepare a diet for

a) a pre-school child (1-3 years)
b) a school going child (boy and girl of 7- 9 years)
c) an adolescent (boy and girl 17 – 19 years)

Module IV

Plan and prepare a diet for

a) sedentary, moderate and heavy worker (male and female)
b) a senior citizen
c) a middle income family

Suggested Readings

- Guthrie, H.A. (1985), Introductory Nutrition, 6th edition, Mosby Publication, St. Louis.
- Mudambi, S.R and Rajagopal M.V, Fundamentals of food and nutrition, Wiley Eastern Ltd., New Delhi – 19.
- Recommended Dietary Intake for Indians, ICMR (2010)

SEMESTER VI

PROJECT

CORE **CN6PRP07**

Credit: 2 Hours/week : 2

Objectives

To enable the students to:

- To initiate research work among students

INSTRUCTION

The students will be guided and supervised by a member of the teaching faculty of the concerned department. The project in which the research culminates should reflect the student's own work.

SEMESTER VI

ON JOB TRAINING

CORE **CN6OJP08**

Credit: 1

Objectives

To enable the students to:

- Understand clinical and pathological conditions of various diseases, planning diet, prescription and dietary intervention for the same
- Observe and study the food service management practices

INSTRUCTION

1. Each student is instructed to take up three case studies in order to familiarize various diseases and dietary management.
2. Assignment – 1
3. Seminar – 1
4. Project report – Presentation and viva