


M.Sc. (Nutrition and Dietetics)					
Choice Based Credit system (CBCS) Syllabus					
COURSE OUTLINE AND SCHEME OF EXAMINATION					
FIRST SEMESTER					
Paper No.	Title	Instructions Hrs/ Week	Duration of Examination	Credits	Maximum Marks
Theory					
ND 101 T (CORE)	Human Nutrition	4	3	4	100 (80+20)
ND 102 T (CORE)	Nutritional Biochemistry-I	4	3	4	100 (80+20)
ND 103 T (CORE)	Human Physiology	4	3	4	100 (80+20)
ND 104 T (CORE)	Principles of Dietetics	4	3	4	100 (80+20)
Practical					
ND 105 P	Human Nutrition	4	2	2	50
ND 106 P	Nutritional Biochemistry-I	4	2	2	50
ND 107 P	Human Physiology	4	2	2	50
ND 108 P	Principles of Dietetics	4	2	2	50
	Total	16 T + 16P		24	600 (T+P)
SECOND SEMESTER					
Paper No.	Title	Instructions Hrs/ Week	Duration of Examination	Credits	Maximum Marks
Theory					
ND 201 T (CORE)	Principles of Foods	4	3	4	100 (80+20)
ND 202 T (CORE)	Nutritional Biochemistry II	4	3	4	100 (80+20)
ND 203 T (CORE)	Research Methodology	4	3	4	100 (80+20)
ND 204 T (CORE)	Diet in Disease	4	3	4	100 (80+20)
Practical					
ND 205 P	Principles of Foods	4	2	2	50
ND 206 P	Nutritional Biochemistry II	4	2	2	50
ND 207 P	Research Methodology	4	2	2	50
ND 208 P	Diet in Disease	4	2	2	50
	Total	16 T + 16P		24	600 (T+P)
 Chairman Board of Studies, Nutrition, OU.					

THIRD SEMESTER					
Paper No.	Title	Instructi ons Hrs/ Week	Duration of Examination	Credits	Maximum Marks
Theory					
ND 301 T (CORE)	Community Nutrition	4	3	4	100 (80+20)
ND 302 T (CORE)	Food Microbiology	4	3	4	100 (80+20)
ND 303 T (ELECTIVE POOL)	i) Food Service Management	4	3	4	100 (80+20)
	ii) Institutional Food Management				
ND 304 T (Inter- disciplinary ELECTIVE)	Food Hygiene and sanitation	4	3	4	100 (80+20)
Practical					
ND 305 P	Community Nutrition	4	2	2	50
ND 306 P	Food Microbiology	4	2	2	50
ND 307 P	i) Food Service Management	4	2	2	50
	ii) Institutional Food Management				
ND 308 P	Food Hygiene and sanitation	4	2	2	50
	Total	32		24	600(T+P)
FOURTH SEMESTER					
Paper No.	Title	Instructi ons Hrs/ Week	Duration of Examinati on	Credits	Maximum Marks
Theory					
ND 401 T (CORE)	Advanced Nutrition	4	3	4	100 (80+20)
ND 402 T (CORE)	Paediatric Nutrition	4	3	4	100 (80+20)
ND 403 T (ELECTIVE)	i) Nutraceuticals and Functional foods	4	3	4	100 (80+20)

POOL)	ii) Geriatric Nutrition				
	iii) Clinical Nutrition and Immunology				
ND 404 T (ELECTIVE POOL)	i) Diet and Psychology Counselling skills	4	3	4	100 (80+20)
	ii) Nutrition for Fitness and Sports				
	iii) Maternal and Child Nutrition				
Practical					
ND 405 P	Hospital Internship in Nutrition and Dietetics	4	2	2	50
ND 406 P	Internship-case studies presentation	4	2	2	50
ND 407 P	Project Work – Collection of Data	4	2	2	50
ND 408 P	Project Work- Report Writing and Presentation of Project Seminar	4	2	2	50
	Total Marks	32		24	600
Grand Total Marks of all the Four Semesters = 600+600+600+600=2400					Theory + Practical

SEMESTER I
ND 101 T HUMAN NUTRITION (CORE)

4 hrs/week

Objectives:

- To understand the role of adequate nutrition in stages of life cycle.
- To know the nutritional requirement and meal management of athletes.

CREDIT I: PRINCIPLES OF NUTRITION

- Energy value of foods
- Estimation of energy value of foods by Bomb Calorimeter and by Benedict's oxy Calorimeter
- Factors affecting energy requirements;
- Factors affecting BMR, SDA, RDA, and derivation of RDA.
- Physical activity, Reference man, Reference woman
- Basic five food groups, Nutritional contribution from each group
- Balanced diet, Food Pyramid
- Basic principles of meal planning
- Steps in meal planning, food cost
- Nutritional requirements of adult man
- Nutritional requirements of adult woman

CREDIT II: PREGNANCY, LACTATION AND INFANCY

Pregnancy:

- Physiological changes, Growth of fetus from conception till term
- Maternal weight gain and complications of pregnancy
- Increase in Nutritional requirements during pregnancy

Lactation:

- Development of breast, physiology of lactation
- Nutritional component of colostrum and mature milk

- Increase in Nutritional requirements during lactation, Lactogogues

Infancy:

- Growth and development during infancy
- Immunization Schedule
- Composition of different types of milk – cow, buffalo, goat and camel, formula milk
- Breast feeding Vs bottle feeding, Feeding of Low birth weight and premature infants, Human Milk Banks
- Weaning: Homemade foods Vs commercial foods

CREDIT III: PRE-SCHOOLERS, SCHOOLGOING CHILDREN AND ADOLESCENTS**Preschoolers:**

- Milestones and Growth Chart
- Nutritional requirements
- Factors to be considered while planning diet for the preschool children

School going children:

- Nutritional requirements
- Packed lunch
- Factors to be considered while planning diet for school going children
- Influence of television on eating habits of school going children

Adolescents:

- Sequence of developmental changes, Role of hormones on growth, development and maturation
- Nutritional requirements during adolescence
- Challenges in adolescence: weight control, skipping meals, anorexia, fast foods, smoking, alcohol and drug abuse, teenage pregnancy

CREDIT IV: GERIATRIC AND ATHELETES**Geriatric:**

- Physiological changes in aging
- Nutritional requirements and Dietary modification
- Common diseases affecting geriatric groups
- Common disabilities affecting geriatric groups

Athletes:

- Exercise – Benefits, Types
- Source of energy – Creatinine phosphate, glucose and glycogen, fats, proteins
- Nutritional requirements
- Meal Management – pre, during and post event, supplements
- Water and electrolyte balance
- Ergogenic aids

BOOKS RECOMMENDED

- Modern Nutrition in Health & Diseases – Eds – Maurice E. Shils, James A.Olson, Moshe Shike, 8th edition, Vol I and II, Williams & Wilkins Publication.
- Nutrition and Dietetics – Shubhangini A Joshi, 2nd edition, Tata Mc Graw Hill publication.
- Food, Nutrition and Diet Therapy – Kathleen Mahan & Krause, Sylvia Escott Stump.

SUGGESTED REFERENCES FOR ADDITIONAL READING

- Perspectives in Nutrition – Gordon M. Wardlaw, Margaret Kessel, 5th edition, Mc Graw Hill Publication.
- Nutrition and Metabolism – Nutrition Society Textbook, Eds – Michael J. Gibrey, Ian A Macdonald and Helen, Blackwell publishing.
- Decisions in Nutrition – Vincent Hegarty.
- Human Nutrition – Geissler & Powers, 11th edition, Elsevier Publications.
- Dietetics – B Srilakshmi, 5th edition, New Age International Publishers

ND 102 T NUTRITIONAL BIOCHEMISTRY- I (CORE)

4 hrs/week

Objectives:

- To enable students to understand the role of nutrients in the body.
- To know the classification, functions and metabolism of carbohydrates, amino acids, proteins and nucleic acids.

CREDIT I: CARBOHYDRATES AND THEIR METABOLISM

- Classification, sources, functions and requirements
- Digestion and absorption
- Transport, utilization and storage
- Glycolysis
- TCA cycle
- Pentose phosphate pathway
- Glycogenesis, glycogenolysis, gluconeogenesis
- Electron transport chain
- Fermentation, alcohol metabolism
- Inborn errors of Carbohydrate Metabolism- Glycogen storage diseases, Lactose intolerance, Galactosemia, Fructose intolerance

CREDIT II: AMINO ACIDS, PROTEINS AND NUCLEIC ACIDS

Amino Acids:

- ♣ Classification, Functions
- ♣ Utilization of amino acids
- ♣ Urinary excretion

Proteins:

- ♣ Classification, sources and functions
- ♣ Digestion and absorption
- ♣ Transport and storage

Nucleic acids:

- Types (DNA , RNA) and Functions
- Components of Nucleic acids
- Structure of DNA (Double Helix)
- Structure of RNA
- Types of RNA

CREDIT III: AMINO ACID METABOLISM

- Deamination, transamination
- Decarboxylation, deamidation
- Metabolism of tyrosine, tryptophan, phenylalanine
- Metabolism of methionine, leucine and arginine
- Urea cycle
- Amino acids: balance, imbalance and toxicity
- Inborn errors of amino acid metabolism
 - ♣ PKU
 - ♣ Tyrosinemia, Maple syrup urine disease
 - ♣ Homocystinuria, Alkaptonuria

CREDIT IV: PROTEIN AND NUCLEIC ACID METABOLISM

- Synthesis of purines and pyrimidines (flow chart)
- Degradation of purines and pyrimidines
- Gout
- ♣ Protein synthesis
 - ♣ Components required
 - ♣ Initiation of Translation
 - ♣ Elongation of Peptide chain
 - ♣ Termination of peptide Chain
 - ♣ Inhibitors of protein synthesis,
 - ♣ Chaperones and protein folding
 - ♣ Post transcriptional changes
 - ♣ Hypoalbuminemia

BOOKS RECOMMENDED

- Nutritional Science – B. Srilakshmi, New Age International Publishers, 2nd edition.
- Textbook of Medical Biochemistry – MN Chatterjee, Rana Shinde, 7th edition, Jaypee Brothers.
- A textbook of Biochemistry – A V S S Rama Rao, 9th edition, UBS Publisher's Distribution Pvt. Ltd.

SUGGESTED REFERENCES FOR ADDITIONAL READING

- Nutritional Biochemistry – Tom Brody, 2nd edition, Academic Press.
- Text Book of Human Nutrition – Mahtab S. Bamji, N Prahlad Rao, Vinodini Reddy, 2nd edition, Oxford & IBH Publishing Co. Pvt. Ltd.
- Textbook of Medical Biochemistry – S Ramakrishnan, K G Prasanna, R Rajan, 3rd edition, Orient Longman, Harper's Illustrated Biochemistry – Robert K. Murray, Daryl K. Granner, Peter A. Mayes, Victor W. Rodwell, 26th edition, McGraw Hills.
- Experimental Biochemistry – A Student Companion – B Sashidhar Rao, Vijay Deshpande, IK International Pvt. Ltd.
- Biochemistry – U Satyanarayana, U Chakrapani, Books & Allied (P) Ltd.
- Clinical Biochemistry – Nagini
- Principles of Biochemistry – Lehninger A L, CBS Publishers and Distributors.
- Textbook of Biochemistry (for Medical students) – DM Vasudevan and S Sreekumari, 4th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

ND 103 T HUMAN PHYSIOLOGY (CORE)**4 hrs/week****Objectives:**

- **To enable the students to understand the functions of various systems in the body.**
- **To acquaint the students with abnormalities of endocrine system.**

CREDIT I: DIGESTIVE AND EXCRETORY SYSTEM

- Structure and functions of gastrointestinal tract
- Structure and functions of liver
- Functions of gastrointestinal secretions
- Role of enzymes in digestion
- Gut flora, role of prebiotics and probiotics in the maintenance of health of digestive system
- Structure and functions of kidney
- Urine formation
- Organic constituents of urine
- Inorganic constituents of urine
- Water and electrolyte balance

CREDIT II: RESPIRATORY AND NERVOUS SYSTEM

- Structure and functions of nose and nasal cavity, pharynx, larynx, trachea, bronchi and lungs
- Mechanism of respiration, Oxygen transport, Carbondioxide transport
- Respiratory rate, Air volume in lung in different situations
- Respiratory abnormalities; Hypoxia, Hypercapnia, carbon monoxide poisoning, Asphyxia, Cyanosis, High altitude sickness
- Emphysema, Asthma, COPD
- Structure of nerve cell, nerve impulses
- Classification of nervous system, Structure and functions of brain, spinal cord
- Peripheral nervous system
- Cerebrospinal fluid, Blood Brain Barrier, Neurotransmitters
- Alzheimer's disease, Parkinson's disease

CREDIT III: BLOOD AND CIRCULATORY SYSTEM

- Structure and functions of heart and blood vessels
- Pulmonary, Systemic and Portal circulation
- Blood pressure, Heart rate, Factors affecting BP and heart rate
- Regulation of Cardiac output
- Composition of blood
- Plasma proteins; Functions, role in fluid balance
- Organic and Inorganic compounds in plasma
- Blood Lipids – Chylomicrons, VLDL, LDL, HDL, Cholesterol, Triglycerides
- Enzymes in blood
- Blood coagulation

CREDIT IV: ENDOCRINE SYSTEM

- Endocrine glands, Formation and secretion of hormones
- Control of hormone secretion, mechanism of hormone action
- Pituitary gland: Hormones secreted and their functions, abnormalities
- Thyroid gland: Structure of thyroid gland, formation of thyroid hormones, functions of thyroid hormones, hypothyroidism, hyperthyroidism
- Adrenal gland: Structure of adrenal gland, secretions of adrenal cortex and their functions, hypoadrenalism, hyperadrenalism
- Secretions of adrenal medulla and their functions
- Parathyroid gland: Structure of parathyroid gland, functions of parathormone, hypo and hyper secretion of parathormone
- Islets of Langerhans: Structure of islets of Langerhans, functions of Insulin, deficiency of insulin, functions of glucagon
- Testes: Structure of testes, functions of testosterone, deficiency of testosterone
- Ovaries: Structure of ovaries, functions of estrogens and progesterone

BOOKS RECOMMENDED

- Textbook of Medical Physiology – Guyton, 8th edition, HBJ International Edition, WB Sanders.
- Essentials of Medical Physiology – Anil Baran Singha Mahapatra, 2nd edition, Current Books International.

SUGGESTED REFERENCES FOR ADDITIONAL READING

- Human Physiology – An Integrated Approach – DU Silverthorne, Prentice Hall.
- Human Physiology – from cells to system – L Sherwood, 6th edition.
- Textbook of Biochemistry (for Medical Students) – DM Vasudevan and S Sree Kumari,
- 4th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi

ND 104 T PRINCIPLES OF DIETETICS (CORE)**4 hrs/week****Objectives:**

- **To impart in depth knowledge regarding prevalence, etiology, diagnosis, diet and life style management in different diseases.**
- **To gain knowledge on the methods of assessment of nutritional status among individuals and interaction of drugs and nutrients.**

CREDIT I: INTRODUCTION TO DIETETICS

- Role and responsibilities of Dietitian – Administrative, Community, Hospital
- Interpersonal relationship with patient
- Nutritional counselling
- Nutritional Assessment:
- Anthropometry – Height, Weight, BMI.
- Clinical methods- SGA, MNA, MUST

- Biochemical method: Serum Albumin, Serum Transferrin, Albumin/ Globulin Ratio.
- Diet planning, implementation and follow up
- Dietetics – meaning, need for diet modification
- Modification of normal diets
- Types of hospital diets – clear fluid, full fluid, soft diet

CREDIT II: NUTRITION IN CRITICAL CARE

Enteral Nutrition:

- Types – Short term feeding methods : Nasogastric, Nasoduodenal, Nasojejunal
- Long term feeding methods: Gastrostomy, Percutaneous Endoscopic Gastrostomy,
- Percutaneous Endoscopic Jejunostomy
- Methods of delivery – Bolus, gravity, pump, Formula feeds
- Advantages, Disadvantages and complications of enteral nutrition

Parenteral Nutrition:

- Types – Total Parenteral Nutrition, Peripheral Parenteral Nutrition
- Advantages, Disadvantages and Complications of parenteral nutrition, Composition of
- parenteral nutrition solutions

Surgery:

- Physiological response, endocrine and metabolic changes
- Nutritional care in pre and post operative conditions

Burns:

- Severity of burns, Metabolic changes in burns
- Nutritional support in burns

CREDIT III ENERGY IMBALANCE AND G.I. DISORDERS

Obesity:

- Definition, types, etiology, assessment and complication
- Management of obesity – exercise, diet, behavior modification, pharmacotherapy and surgery

Leanness:

- Etiology, complications
- Dietary management

Gastrointestinal Disorders:

Etiology, symptoms, diagnosis, treatment and dietary management of

- Gastritis
- Peptic ulcer
- Diarrhea
- Constipation
- Malabsorption syndrome: ulcerative colitis, Crohn's disease, irritable bowel disease,
- lactose intolerance and celiac disease
- Diverticular diseases

CREDIT IV: FEBRILE CONDITIONS, DRUG AND NUTRIENT INTERACTION

- Metabolic changes during fever
- Febrile conditions:
- Short duration – Typhoid, Influenza
- Intermittent duration – Malaria

- Long duration – Tuberculosis
- Dietary Management
- Drug and Nutrient Interaction:
- Types of drugs – Antibiotics, Analgesics, NSAIDs, Antipyretics, Antihistamines
- Pharmacokinetics of drugs
- Effect of drugs on Pharmacokinetics
- Effect of drugs on food intake, absorption, metabolism and excretion
- Effect of food on drug therapy

BOOKS RECOMMENDED

- Clinical Nutrition – Ed Michael J Gibney, Marinos Elia, Olle Ljungqvist and Julie Dowsett.
- Text Book of Human Nutrition – Mahtab S Bamji, N Prahlad Rao, Vinodini Reddy, 2nd edition, Oxford & IBH Publishing Co. Pvt. Ltd.
- Food, Nutrition and Diet Therapy – Kathleen Mahan & Krause, Sylvia Escott Stump.
- Normal and Therapeutic Nutrition - Robinson & Lawler, 17th edition, Mac Millan Publishers.

SUGGESTED REFERENCES FOR ADDITIONAL READING

- Foods – Nutrition and Health – Dr. Vijaya Khader, Kalyani Publishers.
- Nutrition in Health and Diseases – Anderson, 17th edition.
- Modern Nutrition in Health & Disease – Eds – Maurice E. Shils, James A. Olson, Moshe Shike, 8th edition, Vol I and II, Williams & Wilkins Publication.
- Nutrition in clinical Practice – David L. Katz, Lippincott, Williams & Wilkins.
- Clinical Dietetics and Nutrition – F P Antia and Philip Abraham.
- Biochemistry – U Satyanarayana, U Chakrapani, Books & Allied (P) Ltd.
- Perspectives in Nutrition – Wardlaw Kessel, Mc Graw Hills.

SEMESTER I PRACTICALS**ND 105 P HUMAN NUTRITION****Objectives:****4 hrs/week**

- **To familiarise students with the raw and cooked quantities of food and plan diet for various age groups.**

I . To standardize raw and cooked foods.

1. Cereal and Pulse- Rice, Upma , Phulka, Chapathi, Kichidi, Idli, Dosa, Dhal with Green Leafy Vegetable
2. Beverages and Desserts - Tea, Soup, Juices, Milk Shakes, Porridges, Plain Custard
3. Vegetable and fruits- Vegetable curries and salads

II. Plan, Calculate Nutritive value, cost and Prepare a Day's diet for the following

4. Adult man/ woman
5. Pregnant woman/ Lactating woman
6. Children- Preschooler/ School going
7. Adolescent Girl/ Boy
8. Geriatric Woman / Man

ND 106 P NUTRITIONAL BIOCHEMISTRY- I**4 hrs/week****Objectives:**

- **To acquaint the students with principles, techniques and application of different methods of food analysis**
 - Qualitative analysis of Carbohydrate
 - Qualitative analysis of protein
 - Separation of fatty acid by paper chromatography
 - Separation of Amino acid by paper chromatography
 - Estimation of Total Sugar by phenol sulphuric acid method
 - Estimation of Bile Pigment in urine
 - Estimation blood glucose by Oxidase method

ND 107 P HUMAN PHYSIOLOGY**4 hrs/week****Objectives:**

- 1. To acquaint the students with principles, techniques and application of different methods of analysis for various components in blood.**

- I. Microscopic Examination of various tissues and blood vessels
 - a. Epithelial b. Muscular c. Connective d. Bone e. Artery f. Vein (Specimens)

II. Estimation of blood sample for

1. Enumeration of RBC Count
2. Enumeration of WBC count
3. Determination of blood group and Rh factor
4. PCV - determination
5. Blood glucose by glucometer method
6. Blood Hemoglobin by Cyanmethhaemoglobin method.

III. Estimation of Urine sample for

7. Sugar (Benedicts test)
8. Albumin

ND 108 P PRINCIPLES OF DIETETICS**6 hrs/week****Objectives:**

- **To familiarize the students with newer concepts in dietary management of Various disorders and diseases.**

- **Plan, Calculate Nutritive value, cost and Prepare a Day's diet for the following**
 1. Burns
 2. Obesity
 3. Leanness
 4. Peptic Ulcer
 5. Diarrhoea
 6. Constipation
 7. Ulcerative colitis
 8. Short duration fever- Typhoid
 9. Long duration- Tuberculosis

SEMESTER II**ND 201 PRINCIPLES OF FOODS (CORE)****4 hrs/week****Objectives:**

- **To provide an understanding of composition of various food stuffs.**
- **To familiarize students with changes occurring in various food stuffs as a result of processing and cooking.**

CREDIT I: CEREALS AND PULSES**Cereals**

- Starch: functions and properties
- Gelatinization, factors affecting gelatinization
- Changes in cooked starches – gel formation, retrogradation, syneresis
- Cereal protein – gluten, factors affecting gluten formation
- Nutrient changes during different treatment methods of cereal grains
- Role of natural leavening agents
- Role of yeast

Pulses

- Decortication
- Soaking and germination of pulses
- Fermentation of pulses
- Roasting and Puffing
- Effect of cooking treatments on the nutrient composition, quality and quantity of legumes

CREDIT II: ANIMAL FOODS**Milk:**

- Composition and Nutritive Value of Milk
- Types of milk
- Properties of milk proteins – effect of heat, acid and phenolic compounds on milk

Egg:

- Composition and Nutritive Value of egg
- Egg as a binding, foaming and emulsifying agent
- Quality and Grading of Eggs

Meat:

- Post mortem changes in meat – rigor mortis, curing, ageing and tenderization
- Changes during cooking of meat

Poultry:

- Advantages of white meat

Fish:

- Classification, Characteristics of fresh fish, Spoilage, Nutritional importance of fish

CREDIT III: FATS AND OILS, SUGARS

- Properties of fats and oils
- Emulsions, Fat as emulsifying agent
- Fat as leavening and shortening agent

- Rancidity – types, mechanism and prevention
- Factors affecting amount of fat absorbed during cooking
- Fat replacers
- Types of sugar
- Sugar crystallization and caramalization
- Factors affecting crystallization
- Stages of sugar cookery, preparation of candies – crystalline and non crystalline

CREDIT IV: VEGETABLES, FRUITS AND SENSORY EVALUATION

Plant pigments:

- Water insoluble and Water soluble pigments
- Factors affecting plant pigments on cooking: acid, alkali, metals, heat
- Flavour compounds: terpenoids, flavonoids, Sulphur compounds and other volatile flavor compounds
- Enzymatic Browning and its prevention
- Physio – Chemical changes in Fruits and Vegetables- Ripening, Respiration and Textural changes

Sensory Evaluation:

Subjective evaluation techniques:

- Difference tests: paired comparison test, duo-trio test, triangle test
- Rating tests – Ranking, single sample, Two sample and
- Multiple sample difference Tests, Hedonic scaling, Numerical scoring, Composite scoring
- Sensitivity tests and Descriptive tests

Objective tests to assess sensory properties of foods:

- Measurement of colour, viscosity, consistency and texture

BOOK RECOMMENDED

- Food Science – Norman N Potter, Joseph H. Hotchkiss, 5th edition, CBS Publishers & Distributors, New Delhi.
- Food Facts and Principles – Shakuntala Manay, New Age International Publishers.
- Food Science – B Sri Lakshmi, New Age International Publishers.

SUGGESTED REFERENCES FOR ADDITIONAL READING

- Fruit and Vegetable Preservation – Principles & Practices – R P Srivastava, Sanjeev Kumar. 3rd edition, international Book Distributing Co., Lucknow.
- Food Science, Chemistry and Experimental Foods – Dr.M.Swaminathan, The Bangalore Printing & Publishing Co. Ltd., Mysore

ND 202 T NUTRITIONAL BIOCHEMISTRY – II (CORE)**Objectives:**

4 hrs/ week

- To enable students to understand the role of nutrients in the body.
- To know the classification, functions and metabolism of lipids, vitamins, and minerals.

CREDIT I: LIPIDS AND THEIR METABOLISM

- Classification, sources and functions
- Digestion and absorption, Deposition and storage
- Role of essential fatty acids and Lipoproteins
- Role of Triglycerides and Cholesterol
- Oxidation of fatty acids
- Synthesis of fatty acids
- Biosynthesis of triglycerides and phosphatides
- Cholesterol metabolism
- Bile pigments, Ketosis
- Lipotropic factors, Fatty Liver

CREDIT II: IMBALANCES OF LIPIDS AND FAT SOLUBLE VITAMINS**Imbalances of Lipids**

- Obesity, Cachexia
- Inborn errors of Lipid Metabolism- Gaucher's disease, Niemann's picks disease, Tay-sach's, Fabry's disease
- Hyperlipoproteinemia
- Interrelationship between carbohydrate, fat and protein metabolism
- Metabolic Changes during starvation

Fat Soluble Vitamins

Physiological action, transport, utilization, storage, sources, functions and deficiency of:

- Vitamin A
- Vitamin D
- Vitamin E
- Vitamin K

CREDIT III: WATER AND WATER SOLUBLE VITAMINS**Water**

- Functions, Distribution, Requirements
- Disturbances in Fluid Balance- Dehydration and Oedema
- Role of solutes (Sodium and Potassium) in maintaining the volume of the fluid compartments

Water Soluble Vitamins

Physiological action, transport, utilization, storage, sources, functions and deficiency of:

- Thiamin
- Riboflavin
- Vitamin B12, Pantothenic acid
- Folic Acid
- Pyridoxine
- Niacin
- Ascorbic acid

CREDIT IV: MINERALS AND TRACE ELEMENTS

- Calcium – absorption, utilization, sources, functions and deficiency
- Phosphorous – absorption, utilization, sources, functions and deficiency
- Factors affecting calcium absorption
- Role of calcium in ossification and bone growth
- Inter-relationship between parathormone and vitamin D in the regulation of calcium and phosphorous metabolism
- Iron: Functions, sources, absorption, transport, utilization and storage of iron.
- Role of iron in prevention of anemia
- Iodine: Physiology and source of iodine, Role of iodine in human nutrition
- Physiology, sources, functions and deficiency of Fluorine and Zinc
- Physiology, sources, functions and deficiency of Copper, Manganese, Selenium and Chromium

BOOKS RECOMMENDED

- A Textbook of Biochemistry – A V S S Rama Rao, 9th edition, UBS Publisher's Distribution Pvt. Ltd.
- Nutritional Biochemistry – Tom Brody, 2nd edition, Academic Press
- Biochemistry – U Satyanarayana, U Chakrapani, Books & Allied (P) Ltd.
- Textbook of Biochemistry (for Medical Students) – DM Vasudevan and S SreeKumari, 4th edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.

SUGGESTED REFERENCES FOR ADDITIONAL READING

- Textbook of Medical Biochemistry – M N Chatterjee, RanaShinde, 7th edition, Jaypee Brothers.
- Textbook of Medical Biochemistry – S Ramakrishnan, K G Prasannan, R Rajan, 3rd edition, Orient Longman.
- Harper's Illustrated Biochemistry – Robert K Murray, Daryl K Granner, Peter A Mayes, Victor W Rodwell, 26th edition, McGraw Hills.
- Experimental Biochemistry – A Student Companion – B SashidharRao, Vijay Deshpande, I K International Pvt. Ltd.
- Clinical Biochemistry – Nagini.
- Principles of Biochemistry – Lehninger A L, CBS Publishers and Distributors.
- Nutritional Science – B. Sri Lakshmi, New Age International Publishers, 2nd edition.
- Text Book of Human Nutrition – Mahtab S Bamji, N PrahladRao, Vinodini Reddy, 2nd edition, Oxford & IBH Publishing Co. Pvt. Ltd

ND 203 T RESEARCH METHODOLOGY (CORE)**Objectives:****4 hrs/week**

- **To enable the students to understand the importance of research design**
- **To impart in depth knowledge on collection, compilation and analysis of data.**

CREDIT I: METHODS OF RESEARCH

- Definition of research, Characteristics of research, Criteria of good research
- Merits and demerits of scientific research
- Types of research - Historical research, Ex-post facto research, laboratory experiments, Field experiments, survey research, evaluative research, Case study research, operational research, participatory research
- Research Strategies in the field of Food And Nutrition- Descriptive studies (Correlation, Case studies, Cross-sectional surveys)
- Analytical studies (Observational, Case-control, Cohort studies –Prospective and Retrospective)
- Experimental studies (Clinical /Intervention trials including Randomized controlled trials)
- Steps in conducting research
- Hypothesis: Definition, purpose, types
- Reporting: Methods of reporting, Technical reports
- Research Abstract: Definition, guidelines for writing abstract
- Thesis: Definition, parts, steps in writing thesis

CREDIT II: SAMPLING DESIGN AND TYPES OF SAMPLING

- Sampling- Definition, Meaning, Aim, Characteristics of good sample
- Sampling- Basis, Advantages, Limitations and Benefits
- Survey- Meaning, Advantages, Disadvantages, Types and Quality
- Census and sample survey
- Steps in sampling design
- Types of sampling: Random Sampling - Simple random sampling, Stratified random sampling, Systematic sampling, Cluster sampling
- Non random sampling methods -Judgment sampling, Convenience sampling, Quota sampling, Volunteer sampling and Snowball sampling
- Sampling and Non sampling errors
- Sample size and its determination
- Sampling distribution and Importance

CREDIT III: METHODS OF DATA COLLECTION AND COMPLICATION

- Types of Data- Primary Data and Secondary Data, Advantages and Disadvantages, Difference between Primary Data and Secondary Data
- Methods of collecting primary data: Questionnaire, Interview, Schedule, Observation, Inventories, Checklist
- Drafting of questionnaire, training of interviewers
- Ranking and Rating Scales
- Criteria for evaluation of instruments – reliability and validity

- Sources of secondary data, precautions in the use of secondary data
- Classification of data: types of classification- Geographical, Chronological, Qualitative and Quantitative
- Tabulation of data: parts of a table, general rules of tabulation, types of tables
- Diagrammatic representation of data
- Graphic representation of data

CREDIT IV: STATISTICAL METHODS

Statistical Methods:

- Measures of central tendency: mean, median and mode, their relative advantages and disadvantages
- Measures of dispersion: Mean deviation, standard deviation
- Coefficient of variation, percentile
- Types of correlation, coefficient of correlation and its interpretation
- Rank correlation
- Regression equations and predictions
- Analysis of variance
- Contingency tables, Chi-square test
- 't' test: student's 't' test, paired 't' test, unpaired 't' test
- 'F' test

BOOKS RECOMMENDED

- Statistical Methods – S P Gupta, Sultan Chand and Sons Publishers, New Delhi.
- Research Methodology – methods and techniques – C R Kothari, Wiley Eastern Limited, Madras.
- Research Methodology (Concepts, Methods, Techniques and SPSS)-Dr.Priri R. Majhi, Dr.Prafull K. Khatua, II Edition , Himalaya Publishing House, Pvt. Ltd. 2015.
- A Handbook of Methodology of Research – Dr.Rajammal P Devadas and Dr. K Kulandaveil, Sri Ramakrishna Mission, Coimbatore.
- Research Methods in Social Science – B H V Sharma, D Ravindra Prasad, P Satyanarayana, Sterling Publications.
- Biostatistics – SundaraRao., 7th edition, Jaypee Brothers medical Publishers
- Methods in Biostatistics- B.K. Mahajan, 2010
- Manual of Biostatistics- JP Baride, AP Kulkarni, RD Mazumdar, Jaypee Publishers
- Methodology of research in Social science – O.R. Krishnaswami and M. Ranganatham, 2nd revised edition, , Himalaya Publishing house ltd, 2015.

ND 204 T DIET IN DISEASE (CORE)**Objectives:****4 hrs/week**

- **To impart in depth knowledge regarding prevalence, etiology, diagnosis, diet and life style management in acute and chronic diseases.**
- **To gain knowledge to recommend and provide appropriate nutritional care for prevention or and treatment of various diseases.**

CREDIT I: DIET FOR HEPATIC DISORDERS

Liver:

- Structure and functions
- Etiology, symptoms, diagnosis/functional test and dietary management of:
- Jaundice – Types – hemolytic, obstructive and infective
- Viral Hepatitis – Types – A, B, C, D, E and G
- Fatty liver
- Cirrhosis
- Alcoholic liver disease
- Hepatic Coma
- Liver Transplant

Gall Bladder:

- Structure, functions and composition of bile
- Etiology, symptoms, diagnosis and dietary management of:
 - ♣ Cholecystitis
 - ♣ Cholelithiasis

CREDIT II: DIET FOR RENAL DISORDERS

Kidney:

- Structure and functions
- Etiology, symptoms, diagnosis and dietary management of:
 - ♣ Acute and Chronic Glomerulonephritis
 - ♣ Nephrosis
 - ♣ Acute Renal Failure
 - ♣ Chronic Renal Failure
 - ♣ Kidney Transplant
 - ♣ Urinary calculi – Types – Calcium oxalate, uric acid and struvite
- Dialysis
 - ♣ Hemodialysis - Advantages ,disadvantages and Dietary management
 - ♣ Peritoneal dialysis- Advantages, disadvantages and Dietary management

CREDIT III: DIET FOR HORMONAL DISTURBANCES

Disease of Pancreas:

- Etiology, symptoms, diagnosis and dietary management: Acute Pancreatitis, Chronic Pancreatitis

Diabetes Mellitus:

- Types, metabolic changes
- Etiology, symptoms, diagnosis

- Complications
- Treatment – exercise, hypoglycemic drugs, insulin and diet
- Dietary Management – Role of fibre, glycemic index, food exchange list
- Diseases of Adrenal Cortex:
 - Dietary management in Addison's diseases
 - Dietary management in Cushing's syndrome
- Diseases of Thyroid Gland:
 - Dietary management in Hypothyroidism
 - Dietary management in Hyperthyroidism

CREDIT IV: DIET FOR DEGENERATIVE AND CHRONIC DISORDERS

Disorders of circulatory system

- Dietary management of Hypotension, Hypertension
- Dietary management of Cardio Vascular Diseases
 - ♣ Ischemic Heart Disease- Arteriosclerosis, Atherosclerosis, Coronary Artery Disease, Myocardial Infarction, Angina, Heart Failure
 - ♣ Non- Ischemic heart disease-Cardiac Myopathy, Congenital Heart Disease

Disorders of Musculo – Skeletal system:

- Rheumatoid Arthritis – Types, etiology, symptoms and dietary management
- Osteoarthritis – Types, etiology, symptoms and dietary management
- Gout – etiology, symptoms and dietary management.

Cancer:

- Types, mechanism
- Etiology, metabolic changes, treatment (drugs, chemotherapy and radio therapy)
- Nutritional management of cancer

AIDS:

- Causes, symptoms, metabolic changes, diagnosis
- Treatment and dietary management

BOOKS RECOMMENDED

- Clinical Dietetics and Nutrition – F P Anita and Philip Abraham.
- Food, Nutrition and Diet Therapy – Kathleen Mahan & Krause, Sylvia Escott Stump.
- Normal and Therapeutic Nutrition – Robinson & Lawler, 17th edition, Mac Millan Publishers.
- Clinical Nutrition – Ed Michael J Gibney, Marinos Elia, OlleLjungqvist and Julie Dowsett.
- Basics of Clinical Nutrition, 2nd Edition, Joshi, Jaypee Publishers

SUGGESTED REFERENCES FOR ADDITIONAL READING

- Foods – Nutrition and Health – Dr. Vijaya Khader, Kalyani Publishers.
- Nutrition in Clinical Practice – David L. Katz, Lippincott, Williams & Wilkins.
- Text Book of Human Nutrition – Mahtab S Bamji, N Prahlad Rao, Vinodini Reddy, 2nd edition, Oxford & IBH Publishing Co. Pvt. Ltd.
- Nutrition in Health and Diseases – Anderson, 17th edition.
- Modern Nutrition in Health & Disease – Eds – Maurice E. Shils, James A. Olson, Moshe Shike, 8th edition, Vol I and II, Williams & Wilkins Publication.
- Biochemistry – U Satyanarayana, U Chakrapani, Books & Allied (P) Ltd.
- Principles and Applications in Health Promotion – Sintor & Crowley, 2nd edition.
- Perspectives in Nutrition – Wardlaw Kessel, McGraw Hills.

ND 205 P PRINCIPLES OF FOODS PRACTICALS

4 hrs/week

Objectives:

- **To familiarize students with changes occurring in various food stuffs as a result of processing and cooking.**
 1. Gelatinization and factors affecting gelatinization
 2. Estimation of alkaline phosphates in milk
 3. Egg– Preparation of stable emulsion- Mayonnaise
 4. Stages of Sugar cookery – Any two Preparations
 5. Test for checking Rancidity of oils
 6. Testing pectin strength in fruits and vegetable extracts.

Sensory Evaluation:

1. Threshold test for salt/ sugar
2. Triangle Test
3. Paired Comparison Test
4. Hedonic Rating Test

ND 206 P NUTRITIONAL BIOCHEMISTRY- II PRACTICALS

4 hrs/ wk

Objectives:

- **To familiarize students with changes occurring in various food stuffs as a result of processing and cooking.**
 - Preparation of the sample
 - Estimation of the following
 1. Iron
 2. Calcium
 3. Phosphorus
 4. Sugar by DNase method
 5. Vitamin C
 6. Potassium
 7. Magnesium
 8. Chloride

ND 207 P RESEARCH METHODOLOGY PRACTICALS**4 hrs/week****Objectives**

- To familiarize the students with newer concepts in research.
- Enable the students to analyze the data for the project work with the Statistical techniques
- Application of statistical methods related to community nutrition and sensory evaluation techniques
 1. Tabulation of Raw Data
 2. Diagrammatic and Graphical representation of Raw Data
 3. Calculation of mean and Standard Deviation
 4. Calculation of t- test and its interpretation
 5. Calculation of F- test and its interpretation
 6. Calculation of ANOVA and its interpretation
 7. Calculation of Chi square test and its interpretation
 8. Calculation of Coefficient of Correlation and its interpretation

ND 208 P DIET IN DISEASE PRACTICALS**6hrs/week****Objectives**

- **To familiarize the students with newer concepts in dietary management of various disorders and diseases.**

Planning and Preparation of Diets for:

1. Viral Hepatitis
2. Cirrhosis of Liver
3. Nephritis
4. Nephrosis
5. Renal Failure
6. Renal calculi
7. Cancer
8. Diabetes with Hypertension / Nephropathy / Atherosclerosis

SEMESTER III**ND 301 T COMMUNITY NUTRITION (CORE)****4 hrs/week****Objectives:**

- **To understand the causes / determinants and consequences of nutritional problems in community.**
- **To familiarize students with various approaches to nutrition and health interventions, programmes and policies.**

CREDIT I: ASSESSMENT OF NUTRITIONAL STATUS

Anthropometry:

- Weight, height, mid arm circumference, head and chest circumference
- Skin fold thickness, BMI – uses and limitations
- Weight / Height, Weight / Age, Height / Age – ICMR, NCHS standards, Gomez and Waterloo's classification, WHO standards

Diet Surveys:

- Individual
- Institutional and National
- Uses and limitations of diet surveys
- Biochemical methods: uses and limitations
- Clinical assessment: uses and limitations
- Biomarkers – Definition, Classification – Genetic and biochemical
- Examples of biomarkers – RBC, folate, calcium, LDL receptors in CVD, vitamin A.

CREDIT II: NUTRITION EDUCATION AND HEALTH ADMINISTRATION

- Importance of Nutrition and Health Education

Tools and techniques of health education

- Audio aids
- Visual aids
- Audiovisual aids, advantages and disadvantages
- Types of approaches: personal, group and mass, advantages and disadvantages

Health administration

- Central level
- State level
- Village level
- Primary Health Care

CREDIT III: NUTRITION AND HEALTH INTERVENTIONS

- Magnitude of malnutrition in India
- Consequences of malnutrition in India

Nutritional problems in India:

- PEM, Anaemia
- Iodine Deficiency Disorder and Vitamin A Deficiency

- Dental caries, Fluorosis

Measures to combat malnutrition:

- ICDS, IDDCP
- Vitamin A Prophylaxis Programme
- Anemia Prophylaxis Programme
- Nutrition and Health Policies
- Role of National organizations in combating malnutrition: ICMR, ICAR, NIN.
- Role of International organizations in combating malnutrition: CARE, UNICEF, WHO, FAO, ICRISAT.

CREDIT IV: VITAL STATISTICS AND OCCUPATIONAL HAZARDS

Vital statistics:

- Mortality
- Morbidity

Occupational hazards:

- Physical and chemical
- Biological

Protection of health and nutritional status of workers:

- Women employees in industries and establishments
- Medical measures
- Infrastructure measures and legislation

Management during calamities and emergencies

- Nutritional relief and rehabilitation - assessment of food needs, food distribution strategy,
- Mass and supplementary feeding,
- Sanitation and hygiene,
- Evaluation of feeding programmes
- Public nutrition approach to tackle nutritional problems in emergencies

BOOKS RECOMMENDED

- Public Health Nutrition – Michale J. Gibney, Barrie M. Margetts, John M. Kearney and Lenore Arab (Eds.) – Nutrition Society Textbook Series, Blackwell Publishing.
- Nutritional Science – B. Sri Lakshmi, New Age International Publishers, 2nd edition.
- Text Book of Human Nutrition – Mahtab S Bamji, N PrahladRao, Vinodini Reddy, 2nd edition, Oxford & IBH Publishing Co. Pvt. Ltd.
- Social and Preventive Medicine – Part & Park.
- Goyet, Fish. V. Seaman, J and Geijer. U. (1978) The management of Nutrition Emergencies in Large Population, WHO, Geneva.
- The Management of Nutrition in Major emergencies, WHO in collaboration with UNHCR, International Federation of Red Cross and Red Crescent societies and WFP.
- Owen. A. Y. and Frankle, R. T. (1986) Nutrition in the Community. The Art of delivering Services, 2nd ed. Times Mirror/ Mosby.
- WFP/ UNHCR (1998) WFP/ UNHCR Guidelines for Selective Feeding Programmes in Emergency Situations. Rome and Geneva: WFP & UNHCR.
- Goyet, Fish. V. Seaman, J. and Geijer, U. (1978) The Management of Nutritional emergencies in Large Populations, World Health Organization, Geneva

ND 302 T FOOD MICROBIOLOGY**4 hrs/week****Objectives:**

- **To familiarize students with the basics of Food Microbiology.**
- **To enable students to gain knowledge on preservation techniques and food contamination.**

CREDIT I: MICROBES AND GROWTH OF MICROBES

- Scope of microbiology
- Importance of microbiology in applied areas – medical, soil, milk, air, food, Space and industry

Types of microorganisms and their general characteristics

- Fungi (molds and yeast)
- Bacteria
- Protozoa
- Viruses

Intrinsic factors affecting microbial growth:

- Nutrient content, pH,
- Redox potential, water activity

Extrinsic factors affecting microbial growth:

- Humidity, temperature
- Gaseous atmosphere

CREDIT II: METHODS OF FOOD PRESERVATION

- Principles of food preservation

Methods of food preservation

- Pasteurization,
- Blanching,
- Canning,
- Slow and quick freezing,
- Freeze drying,
- Irradiation,
- Drying and Dehydration
- Use of preservatives: salt, sugar, vinegar
- Use of chemical preservatives

CREDIT III: FOOD CONTAMINATION AND SPOILAGE

- Classification of foods by ease of spoilage
- Causes of spoilage in different types of foods
- Sources of contamination – water, air, soil, animals and humans
- Spoilage of cereals and cereal products – molding, ropiness
- Spoilage of milk and milk products – gas production, proteolysis, ropiness
- Spoilage of meat and meat products – aerobic and anerobic
- Spoilage of fish and other sea foods, poultry and eggs

- Spoilage of fresh fruits and vegetables
- Spoilage of canned products – spoilage by spore forming and non spore forming bacteria
- Spoilage of sugar products

CREDIT IV: FERMENTED FOODS

- Definition of fermentation, history of fermented foods
- Benefits of fermentation

Types of fermentation

- Acid fermented foods, Yeast fermented foods
- Solid state fermentation
- Fermented dairy products – yoghurt, cheese fermented milks
- Vegetable fermentation – Sauerkraut, cucumber, olives, and pickles
- Fermented meals, Fermented beverages
- Vinegar
- Oriented Foods – soy sauce, tempeh, miso, natto
- Indigenous products – idli, dosa, dhokla

BOOKS RECOMMENDED:

- Food Hygiene and Sanitation – S Roday, Tata McGraw Hill Publishing Co. Ltd.,3rd reprint.
- Food Poisoning and Food Hygiene – Hobbs B C and R J Gillbert, 4th edition,English Language Book Society and Edward Arnold Publishers Ltd.
- Food Contamination and Safety – VanishaNambiar.

SUGGESTED REFERENCES FOR ADDITIONAL READING

- Food Science – B Sri Lakshmi, New Age International Publishers.
- Foods – Nutrition and Health – Dr.VijayaKhader, Kalyani Publishers.
- Food Science – Norman H Potter, Joseph H. Hotchkiss, 5th edition, CBS Publishers & Distributors, New Delhi.
- Text Book of Human Nutrition – Mahtab S Bamji, N PrahladRao, Vinodini Reddy, 2nd edition, Oxford & IBH Publishing Co. Pvt Ltd.
- Food Science – Sumati R. Mudambi, Shalini M. Rao, M V Rajagopal, Revised 2nd edition, New Age International Ltd. Publishers.
- Catering Management – An Integrated Approach – MohiniSethi, SurjeetMalhan, 2nd edition, New Age International Publishers.

ND 303 T i) FOOD SERVICE MANAGEMENT (ELECTIVE)

4 hrs/week

Objectives:

- To gain knowledge on requirements and management of various food service establishments.
- To know the types of food cost involved and the methods to control them.

CREDIT 1: MANAGEMENT OF FOOD SERVICE ESTABLISHMENTS

Function of management:

- Managing, Planning, Organizing
- Directing, Coordinating,
- Controlling and Evaluating
- Tools of management – Tangible
- Tools of management – Intangible tools
- Management of resources – Natural environment, Work environment
- Catering Management – Principles of Management (basic guidelines)
- Principles of Management

Type of food service establishment:

- Commercial, Non Commercial, Street – mobile food unit
- Temporary food service establishment, vending machine, food court, High risk food

CREDIT II: ORGANISATION OF SPACE AND EQUIPMENT IN FOOD SERVICES ESTABLISHMENT

- Kitchen Space – Size and types, Developing kitchen plan, Work simplification
- Features to be considered in kitchen designing
- Storage Space – Types of storage
- Factors to be considered while planning storage spaces
- Service Area – Location
- Structural designing and planning storage spaces
- Equipment – Classification of equipment
- Selection of equipment, Designing, installation and operation
- Purchasing equipment
- Care and maintenance of equipment

CREDIT III: FOOD MANAGEMENT

- Characteristic of food – Types of food, quality of food – quantity
- Sensory quality and nutritional quality
- Food purchasing – Importance
- Types – open market, formal, negotiated and wholesale
- Receiving and Food storage – Delivery methods
- General guidelines for storing perishable and non perishable foods
- Menu Planning – Importance of menu planning
- Types of menus – A la carte, table d'hote and combination

Food service

- Style of service
- Waiter service, self service and vending

CREDIT IV: STANDARDISATION OF FOOD AND PATENT REGULATIONS AND FINANCIAL MANAGEMENT

- Formulation and standardization of recipes
- Steps involved in formulation and standardization of recipes
- Significance of food standardization
- Patent laws- Definition
- Evolution of IPR
- Patent rights in India
- Food product labelling - purpose and types, Food product labelling regulations.

Financial management:

- Component of cost, Behavior of cost
- Concept of contribution and breakeven

Cost control:

- Importance of cost control, Factors affecting losses
- Methods of controlling food cost and labour cost

BOOKS RECOMMENDED

- Catering Management – An Integrated Approach – MohiniSethi, SurjeetMalhan, 2nd edition, New Age International Publishers.
- Food Hygiene and Sanitation – S Roday, Tata McGraw Hill Publishing Co. Ltd., 3rd reprint.
- Institutional Food Management –MohiniSethi.

ND 303 T ii) INSTITUTIONAL FOOD MANAGEMENT (ELECTIVE)**4 hrs/week****Objectives:**

- To know the types and variety of foods available in the markets
- To learn to purchase, receive and store different foods.
- To understand the importance of hygiene, sanitation and safety in kitchens

CREDIT I: MENU PLANNING AND FOOD SERVICE

- Factors affecting menu planning
- Types of menus, wording of menu and construction of menu card
- Delivery and Service of Foods:
 - Food service systems : Conventional
 - Commissary
 - ready prepared
 - assembly service
- Types of service : Self-service, tray service, waiter-waitress service, portable meals
- Types of food services: Campus food service, Food service in commercial restaurants, Hotel food service, Hospital food service, Industrial food service, School food service
- Clearing and winding up after service
- Customer relations

CREDIT II: FOOD PURCHASING, SELECTION AND STORAGE

- Food Purchase: Food purchasing procedure
- Purchasing methods
- Selection of foods
- Important points to be observed for various food commodities
- Importance of sanitary procedures while preparing, cooking and holding of foods
- Food Storage: General Guidelines for Storage of food
 - Dry Storage
 - Refrigerated Storage
 - Freezer Storage
- Importance of pest control

CREDIT III: QUANTITY FOOD PRODUCTION

- Construction and selection of recipes for quantity cooking
- Standardization of recipes
- Storage and use of leftover foods
- Quality control of food production, hygiene and safety procedures
 - for prevention of contamination of raw and cooked foods
 - for different areas of food service
 - for personnel working in food service
- Calculation of food costs, portion control, loss and profit made
- Kitchen Management : Cost control, optimal utilization of space, material, manpower

CREDIT IV: FINANCIAL MANAGEMENT

- Financial Management
- Component of cost, Behavior of cost
- Concept of contribution and breakeven

Cost control:

- Importance of cost control, Factors affecting losses
- Methods of controlling food cost and labour cost
- Cost concept Food cost control
- Book keeping
- Books of account

References

- Sethi M and Mahan S (Revised 2nd edition, 2007)). Catering Management, An Integrated Approach. New Age International (P) Ltd
- Andrews S (2009) Food and beverage service : Training Manual 2nd edition. New Delhi Tata McGraw Hill.
- Bessie Brooks West and Levelle Wood MS (1988). Food Service in Institutions (6th ed.). John MacMillan Publishing Co., New York
- Harris N (1984) Meal management (6th ed.). New York : Mac Millan.
- Wailey BH (1986) Production management handbook. U.K. : Gower Publishing.
- Kotas R (1981). Accounting in hotel and catering industry. publisher- Thomson Learning; 4th Revised edition edition (Jun 1981)
- Fuller J and Thomas S (2006). Modern Restaurant Service, Amazon
- Kotler P and Keller K (2008). Marketing Management (13th ed.). Prentice Hall, USA.

INTERDISCIPLINARY PAPER/(ELECTIVE)**PAPER 304 T (ELECTIVE)****(4 Hrs/ Wk)****ND 304 T FOOD HYGIENE AND SANITATION****OBJECTIVES**

- To make students understand environmental sanitation and the link between environmental sanitation and health.
- To make students understand the importance of personal hygiene and Environmental Sanitation.
- To make students assess and practice controlling factors in the environment that can potentially affect public health.

CREDIT I:- HYGIENIC HANDLING OF FOOD

- Definition of hygiene, food hygiene and sanitation
- Basic aspects of personal hygiene
- Procedures to minimize microbial load
- Common faults in food preparation
- Sanitation training and education

- Steps in planning and implementing a training program
 - Sanitation of premises and environment
- Layout and premises
- Ventilation and lighting of premises
- General guidelines of cleaning equipment
- General guidelines for cleaning preparation area

CREDIT II:- PERSONAL HYGIENE, SAFETY AND PEST CONTROL

- Introduction to pest and classification of pest
 - Control of household pest with special reference to---
- Mosquito
- Housefly
- Rats and rodents
- Cockroaches
- Importance of pest control
- Use of pesticides and insecticides
- Personal hygiene
- Necessity of personal hygiene
- Health and hygiene of food handler
- Personal appearance and sanitary practices

CREDIT III:- WATER AND WASTE MANAGEMENT

- Uses of water
- Sources of water
- Contamination of water
- Hazards of water pollution
- Large scale purification of water
- Small scale purification of water
- Chlorination and methods of chlorination
 - Waste management
- Disposal of solid waste
- Disposal of liquid waste or sewage
- Disposal of gaseous waste

CREDIT IV :- ENVIRONMENTAL POLLUTION

- Air pollution
- Prevention of air pollution
- Water pollution
- Prevention of water pollution
- Soil pollution
- Prevention of soil pollution
- Noise pollution
- Prévention of noise pollution
- Pollution by pesticide residue
- Solid waste pollution

BOOKS RECOMMENDED

1. Social and preventive medicine --- park and park
2. Food hygiene and sanitation --- S Roday , Tata Mc graw Hill publishing Co Ltd., 3rd print
3. Public health Nutrition --- Michael J. Gibney,Barrie M . Margetts , John M. Kearney and Lenore arab (Eds.) --- Nutrition society textbook series , Blackwell publishing.

**ND 305 P COMMUNITY NUTRITION
PRACTICALS****4hrs/week****Objectives:**

- To give an insight into the various low cost ingredients available in market and develop low cost nutritious recipes for vulnerable segments of the community
 - To develop teaching aids for Nutrition and Health Education
1. Development of low cost nutritious recipe
 - Standardization of Recipe
 - Calculation of cost and Nutritive Value
 2. Diet survey – Food frequency questionnaire and 24 hr dietary recall.
 - Data collection and compilation.
 3. Development of Teaching aids for Nutrition and Health Education :
 - Audio, Visual, or Audio Visual aids.
 4. Market survey on Labelling of Food Products

ND 306 FOOD MICROBIOLOGY PRACTICALS**4hrs/wk****Objective:**

- To familiarize students with the sterilization techniques.
 - To develop skill in formulating and standardizing of new recipes
1. Sterilization techniques:
 - a. Dry Heat
 - b. Moist Heat
 2. Methods of media preparation and solution
 - a. Nutrient agar
 - b. Potato Dextrose Agar
 - c. Nutrient Broth
 - d. Preparation of staining solution
 3. Inoculation techniques
 4. Preparation of bacterial staining – simple, gram
 5. Motility of microorganisms by hanging drop technique
 6. Methylene Blue Reduction Test for viable bacterial count in milk.

ND 307 P i) Food Service Management Practical

1. Menu planning for quantity food production:
 - a. Packed meals in School canteens, Airline catering.
 - b. Restaurant
2. Principles of Menu planning and planning of meals for
 - a. Banquet s- 7 course meal
 - b. Outdoor Catering events like Weddings, Birthday parties etc.
3. Standardization of any 3 Recipes, Determination of standard serving size. Calculation of Food cost.
4. Calculate the Recipe conversion factor and Yield for the above standardized recipes. Calculation of nutritive value.
5. Preparation and Sale of a special meal for 50 people using the principles of yield and recipe conversion factor.
6. Evaluation of food service Units- –Conventional, Commissary
7. Visit to a food service unit.
8. Develop a HACCP Plan for an Indian Recipe. Identify Critical control points and corrective measures.

ND 307 P ii) INSTITUTIONAL FOOD MANAGEMENT**Objective:**

- Gain knowledge on quantity food production
 1. Principles of Menu planning and planning of meals for
 - Banquet s- 7 course meal
 - Outdoor Catering events like Weddings, Birthday parties etc.
 2. Standardization of any 3 Recipes
 3. Determination of standard serving size.
 4. Calculation of Food cost.
 5. Calculate the Recipe conversion factor and Yield for the above standardized recipes. Calculation of nutritive value.
 6. Preparation of inventory list to check personal hygiene of food handlers
 7. Develop a HACCP Plan for an Indian Recipe. Identify Critical control points and corrective measures.
 8. Visit to a food service unit

ND 308 P FOOD HYGIENE AND SANITATION Practicals

Objective:

- Understand the principle of food hygiene and sanitation

Personal Hygiene:

1. Preparation of inventory list to check personal hygiene of food handlers
2. Hand hygiene and wash hand technique
3. Care of skin, hair, hand , feet, nails and mouth

Hygiene and Sanitation:

1. Estimation of hardness of water using EDTA method
2. Microbial Contamination of Water
3. Small scale methods of purification of water
4. Disposal of waste(dry and wet)

Visit to a food service unit

SEMESTER IV**ND 401 T ADVANCED NUTRITION (CORE)****Objectives:****4 hrs/week**

- **To familiarize students with the recent advances in nutrition.**
- **To impart knowledge on bioavailability of nutrients.**

CREDIT I: CURRENT TRENDS IN NUTRITION

- Designer foods
- Genetically modified foods
- Novel proteins – leaf protein, single cell protein
- Fortification
- Irradiation of foods
- Application of irradiated foods in armed forces
- Role of leptin and ghrelin in food intake
- Space foods
- Organic foods
- Extruded Foods- Advantages and Disadvantages

CREDIT II: BIOAVAILABILITY OF NUTRIENTS

- Animal and human metabolic studies-use in assessment of nutrient bioavailability
- Ethics in conducting human and animal metabolic studies
- Methods of evaluating protein quality – need, Amino acid score
- NPU, BV, Digestibility coefficient
- Methods of determining bioavailability of vitamins and minerals
 - ♣ Radio-isotopes
 - ♣ Balance studies
 - ♣ Growth and specific tissue response
 - ♣ Repletion-depletion techniques
 - ♣ Plasma appearance
 - ♣ Microbial assays
 - ♣ Invitro studies
- Factors affecting bioavailability of calcium
- Factors affecting bioavailability of iron

CREDIT III: NUTRITION ASSOCIATED WITH IMMUNITY AND GENE EXPRESSION

- Active immunity – Humoral, cellular and combination of both
- Passive immunity – Normal human Ig, Specific human Ig, animal antitoxins or antisera
- Immunoglobulins – IgG, IgM, IgA, IgD, IgE
- Role of nutrients on immune function
- Malnutrition and immune function

- Fundamentals of gene structure

Principles of gene expressions

- Transcription mechanism and regulation
- Translation mechanism and regulation
- Effects of nutrients on gene expression
- Thrifty genotype – phenotype hypothesis

CREDIT IV: PACKAGING AND LABELING OF FOODS

- Food packaging: Importance, Definition, Principles of packaging

Types of packaging material:

- Metal, glass, Paper, plastic,
- edible packaging material, miscellaneous packaging materials

Packages with special features:

- Boil-in-bag package, plastic-shrink package,
- Cryovac film, microwave oven packaging, high barrier plastic bottles
- Aseptic packaging in composite cartons, military food packaging,
- ovenable paper, boards, distribution packaging
- Packaging laws-SWMA
- Nutrition labelling- Principles and Codex guidelines
- Labelling Provisions in existing Food Laws- FSSAI

BOOKS RECOMMENDED

- Nutrition and Metabolism – Michael J. Gibney, Marinos Elia, Olle Ljungqvist,
- Julie Dowsett (Eds.) – Nutrition Society Textbook series, Blackwell Publishers.
- Nutrition Science – B Sri Lakshmi, New Age International Publishers.
- Normal and Therapeutic Nutrition – Robinson & Lawler, 17th edition, Mac Millan Publishers.
- Text Book of Human Nutrition – Mahtab S Bamji, N Prahlad Rao, Vinodini
- Reddy, 2nd edition, Oxford & IBH Publishing Co. Pvt. Ltd.

BOOKS SUGGESTED FOR ADDITIONAL READING

- Social and Preventive Medicine – Park & Park.
- Modern Nutrition in Health & Disease – Eds – Maurice E. Shils, James A.
- Olson, Moshe Shike, 8th edition, Vol I and II, Williams & Wilkins Publication.
- Human Nutrition – Geissler & Powers, 11th edition, Elsevier Publications.

ND 402 T PEDIATRIC NUTRITION (CORE)**Objectives:****4 hrs/week**

- **To understand the growth, development and nutritional requirements of children.**
- **To get an insight knowledge on inborn errors of metabolism and pediatric critical care.**

CREDIT I: ASSESSMENT AND MANAGEMENT OF CRITICALLY ILL CHILDREN

- Normal growth in children – formulae for average weight, height and head circumference in children (Birth to 12 years), factors affecting normal growth in children, milestones.

Assessment

- Physical examination - Blood pressure, respiratory rate, body temperature, head to toe examination.
- Anthropometry – Weight, Height, MUAC, Head circumference.
- Interaction of nutrition and infection in children.
- Determination of nutritional requirements in hospitalized children – calories, proteins, fats, carbohydrates, vitamins, minerals, water & electrolytes and immunonutrients.
- Nutritional support in critically ill children – metabolic changes during critical illness.
- TPN, EN and dietary management.
- SAM, PEM - Identification criteria, causes.
- Management of PEM – Resuscitation, Restoration and Rehabilitation.
- Dietary management of PEM.

CREDIT II: DIETARY MANAGEMENT IN GASTROINTESTINAL TRACT, LIVER AND KIDNEY DISEASES

- Nutritional support in diarrhoeal disease
- Adverse effect of diarrhoea
- Acute diarrhoea – Nutritional management, Oral Rehydration Therapy (ORT), Fluid & Electrolyte Therapy.
- Persistent diarrhoea – pathogenesis and dietary management.
- Constipation - dietary management.
- Irritable Bowel Syndrome (IBD) – (Crohn's disease, Ulcerative colitis), dietary management.
- Liver – Hepatitis, Indian Childhood Cirrhosis - dietary management.
- **Renal diseases** – Dietary management in
 - Nephrotic syndrome
 - Acute Renal Failure
 - Chronic Renal Failure

CREDIT III DIETARY MANAGEMENT IN DIABETES, CARDIOVASCULAR DISEASES AND AIDS**Cardio vascular Diseases**

- Congenital Heart Disease – etiology, factors affecting growth in CHD and management of CHD
- Pediatric dyslipidemias and management.

Juvenile Diabetes

- Metabolic changes in Juvenile Diabetes, criteria for diagnosis.
- Management – Medical Nutrition Therapy, nutrient requirement, insulin regime and diet plan
- Exercise and hypoglycemia.
- Considerations in different stages of childhood – infants, toddlers, school children, adolescents.
- Complications of Diabetes – hypoglycemia, diabetic ketoacidosis, somogy&dawn effect.

AIDS

- Effect of HIV on nutrition, role of nutrition and nutritional requirements for HIV infected child.
- Effect of Anti-Retroviral Therapy (ART), feeding of HIV exposed child, breast feeding, replacement feeding.

CREDIT IV: DIETARY MANAGEMENT IN SPECIAL CONDITIONS**Allergies and intolerance:**

- Pathogenesis and types of allergic reactions – Type I hyper sensitivity, Type II hyper sensitivity, Type III immune complex reaction, Cell mediated reaction.
- Common food allergens and manifestations – skin, respiratory tract, GI (milk, egg, soy, fish, shell fish, peanuts)
- Diagnosis, treatment and dietary management

Inborn errors – diagnosis and dietary management

- CHO – glycogen storage disease, galactosemia, fructosemia.
- Proteins – PKU
- MSUD, Alkaptonuria
- Homocysteinuria, Tyrosenemia.
- Minerals – Wilson's disease.

Nutrition for children with special needs

- Ketogenic diet – Epilepsy.
- Neutropenic diet – marrow transplant.
- Autism

BOOKS RECOMMENDED

- Madhu Sharma, Pediatric Nutrition in Health and Disease, 1st edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 2013
- K. E. Elizabeth, Fundamentals of Pediatrics, 2nd Edition, Paras Publishers, Hyderabad, 2002
- Meenakshi N. Mehta, Nitin J. Mehta, Nutrition and Diet for Children Simplified, 1st edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, 2014
- Suraj Gupta (Ed), Recent advances in Pediatrics – Nutrition, Growth and Development, Special Volume 20, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi, 2010.
- Anjana Agarwal, Shobha Udipi, Text book of Human Nutrition, 1st edition, Jaypee Brothers Medical Publishers (P) Ltd, New Delhi, 2014
- Clinical Dietetics Manual- Indian Dietetic Association, 2011.

ND 403 T- i) NUTRACEUTICALS AND FUNCTIONAL FOODS (ELECTIVE)**Objectives:****4 hrs/week**

- **To familiarize students with the recent advances in nutraceuticals.**
- **To impart knowledge on the health benefits of nutraceuticals and functional foods.**

CREDIT I: NUTRACEUTICALS

- Nutraceuticals :Definition, History, Market Trends, Sources
- Classification of nutraceuticals based on chemical nature and mechanism of action
- Phytochemicals as nutraceuticals – Isoprenoids, polyphenolics, glucocyanovates, phytosterols, dietary fiber
- Animal products and microbes (prebiotics and probiotics) as nutraceuticals
- Significance and relevance of nutraceuticals in the management of disease and disorders – CVD, cancer, diabetes, obesity, osteo arthritis, immune enhancement, endurance, performance and mood disorders.
- Application of nutraceuticals in Indian and International market
- Basis of claims for a compound to be called as nutraceutical, safety (adverse effects and toxicity) regulatory issues of nutraceuticals.

CREDIT II: FUNCTIONAL FOODS

- Functional foods – Evolution and Definition of functional foods.
- Legal status in different countries and Types of foods categorized as functional foods
- Health benefits of functional foods and future promises in Indian diet
- Development of biomarkers to indicate efficacy of functional ingredients
- Safety and Regulatory aspects of functional foods
- Dietary Fibre
- Oligosaccharides
- Resistance starch
- Omega 3 fatty acids
- Conjugated Linoleic Acid

CREDIT III: PROBIOTICS AND PREBIOTICS

- Probiotics – definition, types,
- Health benefits of probiotics in gastrointestinal health, cancer, and other diseases
- Recent advances in probiotics – Lactobacillus, Lactobacillus casei, L. casei strain shirota
- Challenges and regulatory issues related to probiotics
- Prebiotics – definition, types
- Health benefits of prebiotics
- Recent advances in prebiotics – galacto-oligosaccharides (GOS), functional disaccharides (lactulose, lactitol and lactose), Resistant starch (RS)
- Prebiotic ingredients in foods

CREDIT IV: PHYTOCHEMICALS AND ANTIOXIDANTS

- Phytochemicals: Definition, mode of action
- Classification of Phytochemicals: **I. Terpenoids, II .Carotenoids** - Carotene, Leutein, zeaxanthin, Lycopene
- **III. Poly Phenols:** **A.** Non Flavonoid polyphenols, **B.** Flavonoids - Flavanols, Flavanol (Catechin) Flavan-3-ol, Flavones, Flavanones, Anthocyanidins, Phytoestrogens (isoflavonones), **C.** Other Poly Phenols: Curcumin, Tannins, Lignan and Resveratrol
- **IV. Sulphur containing Compounds:** Sulphides and Glucosinolates

ANTIOXIDANTS:

- Formation of Free Radicals, Reactive Oxygen Species and oxidative Stress.
- Antioxidant Definition and Mechanism of action
- Classification Of antioxidants: Endogenous and Exogenous
- Role of endogenous antioxidants- Super Oxide Dismutase (SOD), Catalases, Glutathione Reductase, Peroxidases- Glutathione Peroxidase in protecting cells.
- Role of Exogenous antioxidants- Retinol, β -carotene, Ascorbic acid and Tocopherol in prevention of Cancer, CVD, Ageing and Inflammation

REFERENCE BOOKS :

- Text Book of Human Nutrition- Anjana Agarwal, Shobha AUdipi, Jaypee Brothers Medical Publishers(P) LTD.
- Food Science, B. Srilakshmi, Sixth Edition, New Age International Publishers.
- Text book of Human Nutrition – Mahtab S Bamj, N Prahlad Rao, Vinodini Reddy, Second Edition, Oxford and IBH Publishing Co.Pvt.Ltd.
- Orientation for Food Professionals a hand book – PV Suryaprakash Rao.
- Hand book of Nutraceuticals and functional foods, second editin.CRC press- Wilman REC
- Functional Foods - Concept to Product (2000) - Gibson GR and Williams CM
- Functional Foods: Designer Foods, Phrama Foods (2004) - Goldberg I
- Dietary supplements: Toxicology and clinical Pharmacology – Cuppj and Tracy TS, Humana Press 2003.

ND 403 T – ii) GERIATRIC NUTRITION (ELECTIVE)**Objectives:****4 hrs/week**

- To make the students aware of the issues facing the elderly in india
- To know the theoretical frame work in the study of ageing
- To impart necessary skills for making effective interventions for care of elderly

CREDIT I: INTRODUCTION TO AGEING

- Introduction to geriatric care- concept of gerontology
- Ageing - Biology of ageing
- Theories of ageing – disengagement theory, activity theory, selective theory and continuity
- Microscopic theories, changes in ageing scenario
- Interaction between biological and psychological in ageing
- Interaction between physiological and social processes in ageing
- Drug, food, and nutrient reaction
- Dietetics of Geriatric care-Nutritional requirement
- Food requirement, dietary modification
- Implication of ageing population for rehabilitation: Demography, mortality and morbidity.

CREDIT II: ISSUES AND CHALLENGES OF AGEING

- Issues and challenges of ageing – economic dependence/ poverty, elderly in rural/ urban area.
- Abuse, neglect, abandonment, physical, health and sensory problems.
- Crime against elderly, retirement and related issues.
- Ageing sensory system and issues with falling
- Common complaints during ageing
- Geriatric guidance and counseling
- Depression in old age.
- Exercise- yoga, meditation
- Behavior therapy: rational- emotive behavior therapy (REBT), horticultural therapy.
- Music therapy, Art therapy, Bibliotherapy

CREDIT III: CLINICAL GERIATRIC

- Nutritional related problems of old age-osteoporosis ,obesity, neurological dysfunction
- Anaemia, Malnutrition and constipation
- Infection and Immunity
- Degenerative disorders in elderly-Dementia, Alzheimer, Parkinson's disease
- Disorders of upper GIT
- Disorders of lower GIT
- Disorders of Liver
- Disorders of Billiary system and pancreas
- Infection of Respiratory system

- Coronary heart disease

CREDIT IV: SOCIAL GERIATRIC

- Types of family – Joint family System, Role of Elders and Younger generation.
- Isolation, Loneliness and Dependency – Dependency Ratio – Generational equality.
- Financial aspects – Sources of income, Old age pension.
- Role of Govt. and NGOs in Socio – economic status of the elderly
- Geriatric service for the elderly in western countries and India.
- Structure of geriatric service, family as basic unit- models of geriatric service.
- Day hospital, day care centre, long stay care institution.
- Home for the aged, function of the day hospital staff and patients of day hospital.
- Ethical issues in geriatric medicine- age limits on health care.
- Life sustaining measures.

BOOKS RECOMMENDED

1. Bali ,P.A(2001) care of the Elderly in India. Changing configurations, Indian Institute of Advanced study, Shimla
2. Bhai, L.T,(2002) Ageing on Indian perspective, Decent Books Pubs, New Delhi
3. Dietetics 5th edition by B.Srilakshmi
4. Singh. R. (1994) Educational and Vocational Guidance, Common Wealth pub, New Delhi

SUGGESTED REFERENCES FOR ADDITIONAL READING

1. Jacobs, M (2010) Psychodynamic Counselling in Action (4th edition) Sage publications, New Delhi
2. Maerns and Thorne (2007) Person-centered Counselling in Action (3rd edition), Sage publications, New Delhi
3. Rao ,S.N.(1991) counseling and Guidance, Tata McGraw Hill Pub, New Delhi
4. Trower, P, Jones, J, Dryden, W and Casey, A (2011) Cognitive Behavioural Counselling in Action (2nd edition) ,Sage pub, New Delhi
5. www.Gerontologyindia.com

403 T- iii) CLINICAL NUTRITION AND IMMUNOLOGY (ELECTIVE)**OBJECTIVES:****4 hrs/week**

- To assess nutritional status of patients.
- Be familiar with recent advances and medical nutritional management.
- To understand management of stress.
- To enable students gain knowledge on immunological aspects.

UNIT-I CELLULAR ADAPTATION TO STRESS

- Definition and meaning of stress
- Types of stress
- Effects of stress on hormone secretion
- Effect of stress on CNS
- Effect of stress on immune system and cellular changes
- Effect on cells and tissues
- Management of stress:
 - Meditation
 - Yoga
 - Exercise
 - Diet(stress busters) food, naturopathy

UNIT-II NUTRITION CARE PROCESS

- Identification risk grows
- Nutritional screening assessment of nutritional status of hospitalised and outdoor patients
- Nutrition intervention and diet modification based on interpretation of patient data:
 - Clinical data
 - Biochemical parameters
 - Other relevant data
- Nutritional education and counselling
- Evaluation of nutritional care
- Exchange list as a total in planning diet
- Nutrition care plan, monitoring and follow up
- Nutritional supplements

UNIT III: IMMUNE SYSTEM

- Immunity : definition and types
- Physiology and functions of immune system
- Immune responses: Humoral and CMI
- Immunizing agents:
 - Immunoglobulin
 - Vaccines

- Antisera
- Cellular fraction
- Immune mechanisms in stress
- Nutrients involved in the inflammatory response
- Auto immunity and hypersensitivity

UNIT IV: NUTRITION AND IMMUNITY

- Role of individual nutrients in the inflammatory response and functions
 - Effects of under nutrition on immunity
 - Immuno enhancers
 - Immune suppressants
 - Conditionally essential nutrients
- Nutritional management in allergies:
- Allergies : definition and types
 - Diagnosis
 - Management
 - Prevention with special references to GM foods.

BOOKS RECOMMENDED

1. Mahan, LK and Escott Stump.S (2000), Krause's food nutrition and diet therapy, 10th edition W.B SaundersLtd
2. Escott Stumps. S(1998) nutrition and diagnosis related 4th edition, William and Wilkins
3. Garrow J.S James, WPT and Ralph A(2000), Human nutrition and dietetics, 10th edition , Churchill and Wilkins
4. Williams S.R(1993), Nutrition and diet therapy ,7th edition , Times mirror/ Moshy college publishing
5. Gable J (1997) Counselling skills for dieticians Blackwell publishing house.

ND 404T- i) DIET AND PSYCHOLOGY COUNSELLING SKILLS (ELECTIVE)**4 hrs/week****Objective:**

- **To familiarise students with diet counselling skills and acquaint them with basic principles of psychology**

CREDIT I: BASICS OF DIET COUNSELING

- Diet Counselling-meaning, significance, process, types
- Goals of counselling, individuals, group and family counselling
- Basic sequence in counselling.
- Materials needed for counselling –models, charts, posters, AV aids, Hand outs etc
- Communication process in counselling and linguistics in clinical dietary practices, problems in communication
- Role of Counsellor & Counselee
- Techniques of obtaining relevant information- 24 Hour Dietary recall, List of food likes and dislikes, Lifestyle
- Dietician as a part of medical team and research team
- Impact of counselling on health and disease of individuals – discussion of hospital case studies

CREDIT II: DIET COUNSELING AT HOSPITAL AND COMMUNITY LEVEL

- Role of counselling in hospital
- Role of counselling in community
- Organizing health camps and patient feedback – at hospital level
- Organizing health camps and patient feedback – at community level
- Diet counselling for obese people
- Diet counselling for Diabetics
- Diet counselling for CVD
- Diet counselling for mother and child care
- Diet counselling for adolescent
- Patient follow up / home visits

CREDIT III: INTRODUCING TO PSYCHOLOGY AND COUNSELING

- Introduction to psychology – Definition , Nature and Scope
- Attention and perception – Types of attention and factors influencing attention , principles of perceptual organization and abnormalities in perception
- learning and memory- Types of learning, Types of memory, Forgetting and its causes
- motivation and emotion- Types of motives, types of emotions, emotional expression
- Personality- nature and definition , factors influencing personality, Psycho analytic theory of personality
- Nature and goals of counseling
- Principles of counseling
- Characteristics of a good counselor
- Ethical principles of counselling
- Special areas of counselling: Educational, family, health, community and counselling of alcoholic and drug addicts.

CREDIT IV: COUNSELING SKILLS

Approaches to counselling –

- Psycho analytic approach,
- Behaviouristic
- Humanistic approach

Pre – Helping phase:

- Rapport building skills,
- Attending and listening skills.

Stage I skills:

- Empathy, respect,
- Genuineness and concreteness.

Stage II skills:

- Advanced empathy, self disclosure
- Immediacy and Confrontation.
- Stage III skills : Goal setting, Action plan Programme and Brainstorming

BOOKS RECOMMENDED

- Gibson, R.L., Mitchell, M.H.(2005). Introduction to counselling and guidance (6th Ed)
- Gelso, C.J., Fretz, B.R.(1995). Counselling Psychology, Bangalore, Prism Books Pvt Ltd.
- Sharma, T.C.(2002). Modern Methods of Guidance and Counseling, New Delhi, sarup& sons.
- Beena and Parweshwaran- Invitation to Psychology, Neel Kamal Publications.

ND 404 T- ii) NUTRITION FOR FITNESS AND SPORTS (ELECTIVE)**Objectives:****4 hrs/week**

This paper will enable the students to

- 1 Understand special nutritional requirements for physical fitness and sports
- 2 Apply the knowledge of nutrition to improve the performance of sports person

CREDIT I: INTRODUCTION TO PHYSICAL FITNESS

- Physical Fitness: Definition and Components- Health related and Skill related
- Assessment of Physical Fitness: Anthropometry, Body composition, Cardio -respiratory endurance, muscular fitness, musculoskeletal flexibility
- Benefits of physical fitness on wellness dimensions
- Holistic approach in management of fitness and health
Energy input and output diet and exercise
- Healthy life style: strategise ,factors that promote life style change
- Nutrition, Exercise, Physical Fitness and Health – their interrelationship
- Factors affecting Physical Work Capacity and Work Efficiency
- Effect of Specific Nutrient on work performance and physical fitness and training diet
- Significance of physical fitness and nutrition in prevention and management of weight control, obesity, Diabetes Mellitus, CV disorders, bone health and cancer
- Alternative system for health and fitness: Ayurveda, Yoga , Meditation, Vegetarianism

CREDIT II: EFFECTS OF EXERCISE

- Sports Physiology
- Types of exercises and its impact on fitness
- Effect of exercise on musculoskeletal system
- Muscle fatigue , prevention and recovery
- Effect of exercise on cardiac cycle, cardiac output,blood pressure
- Athlete heart, Index of training, importance of heart rate monitoring
- Effect of exercise on respiratory system
- Effect of training on Heart and lung performance, chronic and acute adaptation
- Hypoxia and hypercapnia
- Lung function test and its importance, spirometry

CREDIT III: Dietary intake and optimal exercise performance

- Nutritional Requirement of sports person as compared to normal active person
- Factors affecting fuel utilization
- Energy substrate for activities of different intensities and duration, aerobic and anaerobic activities
- Carbohydrate as a energy source for sports and exercise
- Role of fat as energy source for sports and exercise

- Protein and amino acid requirements for sport and exercise
- Important micronutrients for exercise. B complex vitamin and specific minerals
- Exercise induced oxidative stress and role of antioxidants
- Fluid balance in sports : importance , symptoms and prevention of dehydration
- Sports drink- Hypo, Iso and Hypertonic drink for hydration/ energy and recovery drink

CREDIT IV: SPORT SPECIFIC NUTRIENT REQUIREMENT

- Sport specific requirement of nutrient: diet manipulation
- Pre game and Post game regime
- Special Nutrition for Female Athlete
- Menstrual problem of female athlete, athlete triad
- Chronic dieting and eating disorder- sports anaemia
- Nutrition of Athlete in hot cold and high altitude
- Alcohol influence on athlete
- Dietary supplements and ergogenic aids (nutritional. Pharmacological and physiological), Potentials and Concerns
- Role of nutrition in stress , fracture and injury
- Nutrition education to athlete and coach

BOOKS RECOMMENDED

1. Bamji S.M., Rao NP and Reddy V. 1998. Text book of Human Nutrition. Oxford and IBH publishing C. New delhi.
2. Fink H.H., Mikesky E.A and Burgoon A.L. 2012. Practical Applications in sports Nutrition. 3rd ed. Jones and Barlett Learning. USA.
3. Burke Louse and Deakin Vicky (2006) Clinical sports Nutrition.
4. Ira Wolinsky (Ed) (1998): Nutrition in Exercise and Spots, 3rd Edition, CRC Press.

SUGGESTED REFERENCES FOR ADDITIONAL READING

1. Mahan, L.K & Ecott- Stump, S. (2000): Krause's Food, Nutrition and Diet Therapy
2. Shils, M.E., Olson, J.A., Shike, N. and Ross, A.C (Ed) (1999): Modern Nutrition in Health & Disease, 9th Edition, Williams & Wilkins.
3. Mc Ardle, W. Katch, F. and Katch, V. (1996) Exercise Physiology. Nutrition and Human Performance, 4th edition, Williams and Wilkins, Philadelphia.
4. Gibney J.M. Macdonald A.I and Roche M.H. 2003. Nutrition and Metabolism. Blackwell publishing.
5. Nutrition for Health, Fitness and Sports, eight edition, by Melvin Williams, 2007, McGraw-Hill.

ND 404 T- iii) MATERNAL AND CHILD NUTRITION (ELECTIVE)**Objective:****4 hrs/week**

- To enable the students to understand the role of nutrition during pregnancy, lactation and infancy
- Get acquainted with growth and developmental changes from conception till adolescence.

CREDIT I: IMPORTANCE OF MATERNAL NUTRITION

- Meaning and objectives of maternal and child health
- Main health problems of mother and child in India
- Current scenario of maternal and child nutrition in India. Vital statistics related with mother and child
- Nutritional aspects of embryogenesis
- Factors affecting the outcome of the pregnancy
- Management and importance of ante natal care
- Physiological and psychological changes during pregnancy
- Importance of pre natal and post natal nutrition
- Complications of pregnancy
- Pregnancy and AIDS

CREDIT II: LACTATION

- Development of mammary tissues and role of hormones
- Physiology and endocrinology of lactation
- Composition of human milk
- Lactation amenorrhea and effects of breast feeding on maternal health
- Effect of nutritional status of mother on quantity and quality of breast milk
- Recent guidelines in infant feeding and complimentary feeding
- Factors affecting breast feeding
- Breast feeding in AIDS and Drug abuse
- Breast feeding vs Bottle feeding
- Management of lactation- sore nipples, engorged breasts, inverted nipples

CREDIT III: INFANCY

- Infant physiology
- Growth and development during infancy
- Immunization schedule
- Nutritional requirements of infants
- Food requirements and modification of foods for infants
- Preterm LBW infants, implications for feeding and management
- Weaning and principles in preparing complementary food supplements
- Nutritional management in Diarrhoea and Lactose Intolerance
- Congenital malformation, Foetal alcoholic syndrome

- Maternal and child malnutrition: etiology and management

CREDIT IV : CHILDHOOD AND ADOLESCENCE

- Growth and development of children
- Growth Chart
- Nutritional requirement of Preschool and school going children
- Nutritional challenges and nutrition for child with special need
- Childhood Obesity
- Nutritional requirement during adolescence
- Adolescence pregnancy, weight control, anorexia nervosa
- Influence of life style on eating pattern during adolescence
- Maternal and child health Programs in India.
- ANP
 - Supplementary Feeding Programs
 - Special Nutrition Programs
 - Balwadi Nutrition Programs
 - Mid-day Meal Programs
 - Prophylactic doses (vitamin A and iron)
 - ICDS
- The world Breast Feeding Week and the role of BPNI in promotion of breast feeding in India.

REFERENCES:

1. Park, K, (2000): Park's Textbook of preventive and social medicine 18th edition.
2. Modern Nutrition In health & Disease –Eds A Catherine Ross, Benjamin Cabellaro, Robert j. Cousins, Katherine L. Tucker, Thomas R. Zeegler, 11th edition, Williams & Wilkins Publicatio
3. Food Nutrition And Diet Therapy –Kathelene Mahan & Krause, SlviaEscott Stump.
4. Bamji MS, Rao NP & Reddy V. 1999. Text book of Human Nutrition. Oxford & IBH

SUGGESTED REFERENCES FOR ADDITIONAL READING

1. Falner F & Tanner JM. 1978. Human Growth-Postnatal Growth and Neurobiology. Vol II Plenum press
2. National Nutrition Policy (1993) Dept of WCD, Govt of India

PRACTICALS**ND 405 P HOSPITAL INTERNSHIP IN NUTRITION AND DIETETICS****4 hrs/week**

AIM: Internship is a phase of training wherein a graduate is expected to conduct actual practice of diet management and health care and acquire skills under supervision of a Practicing dietician so that he/she may become capable of functioning independently.

OBJECTIVES:

At the end of the Internship Training, the student shall be able to:

- (i) Manage Diet prescription independently for clinically common disease conditions encountered to higher level.
- (ii) Use of parenteral feeds and nasal /tube feedings
- (iii) Manage– Medical, Surgical, Obstetric, Neonatal and Paediatric specialties
- (iv) Monitoring the National Health Programmes and Schemes, oriented to provide promotive, preventive, curative and rehabilitative health care services to the community.
- (v) Develop leadership qualities to function effectively as a leader of the Dietetics team organized to deliver the health and family welfare services in existing socio-economic, political and cultural environment.
- (vi) Render services to chronically sick and disabled (both physical and mental) and to communicate effectively with patient and the community.
- (vii) Acquire adequate communication skills for proper interactions with:
 - (a) Patients and Attendants
 - (b) Seniors
 - (c) Peer Group
 - (d) Other paramedical workers
- (viii) Acquire ability, to judiciously select appropriate diet prescription as per clinical situation, patient's likes and dislikes and priorities

1) Period of Internship: Two months internship in a multispecialty hospital with dietary department.

2) Case Studies: Five case studies of different diseased conditions have to be taken up during the Internship.

3) Report to be submitted in the hospital: Submit a bound copy of the word-processed, printed internship report to the dietician for evaluation at the end of the internship.

ND 406 P INTERNSHIP - CASE STUDIES PRESENTATION**4 hrs/week**

1) Report to be submitted in the Department: Submit a bound copy of the word-processed, printed internship report to the programme in charge for necessary action after the internship.

2) Presentation and Viva-voce: Students shall give a presentation on their internship.

ND 407 P PROJECT WORK –COLLECTION OF DATA**4hrs/week****Objective:**

- **To continue the project work initiated and to submit dissertation at the end of Semester IV.**

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

An independent research project work undertaken by student under the guidance of an advisor, can either be a survey or Laboratory oriented research. The research should be submitted at the end of semester in the form of a thesis. The project work can be undertaken at University departments, affiliated research institutions, quality control laboratories, food industries or other institutions with prior approval.

ND 408 P PROJECT WORK –REPORT WRITING AND PRESENTATION OF PROJECT SEMINAR**4 hrs/week****Internal Examination**

25 marks are based on day-to-day work of the concern student in terms of experimental designing, Practical performance in the laboratory, interpretation of the results obtained, regularity and any other criteria relevant to the study.

Presentation of the work in front of the faculty of the department at least 2 times during this project work as follows.

- (1) Deciding of the project and state of the art presentation10 marks
- (2) Discussion of the materials and methods and protocols..... 10 marks
- (3) Presentation of the obtained results5 marks

External Examination

- (1) 50 marks examination of the dissertation examiners which includes viva-voce conducted by examiners

Scheme of Examination (Model for M.Sc Question Paper)

I, II, III, and IV semesters Paper I to Paper IV

Time: 3 hrs**Max marks: 80****Note : Answer ALL questions from Section A & Section B.****Each question carries 4 marks in Section A and 12 marks in Section B****Section A****(8 X4 = 32 M)**

1. Unit I
2. Unit I
3. Unit II
4. Unit II
5. Unit III
6. Unit III
7. Unit IV
8. Unit IV

Section B**(4 X 12= 48M)**

9. a) Unit I
OR
b) Unit I
10. a) Unit II
OR
b) Unit II
11. a) Unit III
OR
b)Unit III
- 12.a) Unit IV
OR
b) Unit IV

Internal Assessment: 15 marks

Two internal assessment are conducted per semester and the average of the internal is included. The pattern for internal is

Multiple Choice Question – 10- ½ mark each

Fill in the Blanks – 10 – ½ Mark each

Short Notes – 5- 1 Mark each

Assignment- 5 Marks for each paper.