Syllabus

Bachelor of Science
in
Nutrition & Dietetics

Faculty of Allied Health Sciences

Shree Guru Gobind Singh

Tricentenary University,

Gurugram

SEMESTER I

Basic Nutrition (Theory)
Paper Code: 05250101

Periods/week	**Credits**	**Max. Marks:** 100
L: 4 T:0 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students will able to:

1. To learn the basic terminology of nutrition and the functions of food for healthy life.
2. To gain knowledge about different aspects of nutrients
3. To understand the different food groups and role of food pyramid in balance diet
4. Be familiar about the various methods of cooking.
5. To gain knowledge about newer trends in nutrition.

Unit 1: Introduction to nutrition - Food as source of nutrients, functions of food, definition of nutrition, nutrients &energy, adequate, optimum & good nutrition, malnutrition. Interrelationship between nutrition & health: - Visible symptoms of good health.

Unit 2: Food guide - Basic five food groups – Steps to use food guide (according to R.D.A.) Functions, classification, food sources, RDA, storage in body, Consequences of inadequate and excessive intake of the following: Carbohydrates, Proteins and Fats, Dietary fiber, protein quality.

Unit 3: Functions, sources, RDA, bioavailability, deficiency & excess of:

- Macro and micro minerals
- Water soluble and fat soluble Vitamins

Unit 4: Water – as a nutrient, components of body fluids, function, sources, requirement, water balance & effect of deficiency.

- Energy- energy balance measurement of energy, energy intake and source of food and energy requirements.

Unit 5: Objectives and Principles of Cooking- Conduction, convection and radiation. Effect of cooking & heat processing on the nutritive value of foods.

Unit 6: Novel Foods:

- Functional Foods-Antioxidants, Phytochemicals, Probiotics.
- Organic foods
- Convenience foods
- Genetically modified foods
- Textured foods
- Nano foods
- Vegetarianism

Basic Nutrition (Practical)

Paper Code: 05250102

Periods/week	**Credits**	**Max. Marks:** 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcome:

- On successful completion of this course, students will able to:

1. The students will be able to find out nutrient availability and understand the principles behind the basic recipes.
2. The students will gain knowledge about the importance of weights and measures in cookery.

Practicals:

1. Use and care of kitchen equipments.

2. Rich Sources of nutrients price list, nutrition and labeling.

3. Controlling techniques - Weights and measures standard, household measures for raw and cooked food.

4. Food preparation and classifying recipes as good, moderate or poor, sources of specific nutrients. Amount of ingredients to be in standard recipe -

- portion size -
- Beverages - tea, coffee, cocoa, fruit juice, milk, milk shakes etc.
- Cereals and flour mixtures - basic preparation & their nutritive value - boiled rice and rice pulao, chapati, puri, paratha, sandwiches, pastas, pancakes, cookies & cakes

5. Vegetables & fruits - Simple salads, Dry vegetables, Curries, fruits preparation using fresh and dried stewed fruit, fruit salad etc.

6. Milk and milk products Porridges, Curds, paneer and their commonly made preparations, Milk based simple desserts and puddings, custard, kheer, ice cream

7. Meat - cuts of meat - Meat preparations, Poultry, Fish, hard and soft cooked, poached, scrambled, fried &omlete etc.

8. Soups - Basic, clear and cream soups etc.

9. Snacks- Pakoras, cheese toast, upma, pohe, peanut, chikki, til & laddo etc.

References:

- Bamji M.S., Rao N.P. and Reddy V. (1996): Textbook of Human Nutrition. 11th Ed. Oxford and IBH
- Publishing Co. Pvt. Ltd., New Delhi.
- Swami Nathan M (1974) Essentials of Foods and Nutrition. 1st Ed. Ganesh and co.
- Nutritive Value of Indian Foods, NIN, ICMR.
- Srilakshmi B. (2010) Food Science. 5th Ed. New Age International Publishers

Nutritional Biochemistry-I (Theory)

Paper Code: 05250103

Periods/week	**Credits**	**Max. Marks:** 100
L: 3 T:1 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this unit, students shall be able to:

- Relate the biochemical aspects of nutrition and health.
- Recognize how fundamental biochemical principles and reactions are utilized in biochemical processes.
- Explain the macronutrients and micronutrients important for the body.
- Explain how nutrients are delivered and utilized by the body.
- Explain the biochemical properties and functions of various nutrients

Unit 1: Basics of energy metabolism, nutrition & dietetics - Unit of measuring energy, calorific value of food, BMR & factors affecting it, SDA of food, calculation of energy requirement, balanced diet, nutrition in health & diseases (protein energy malnutrition).

Unit 2: Chemistry of carbohydrates & their related metabolism – Introduction, definition, classification, biomedical importance Brief outline of metabolism :Glycogenesis &glycogenolysis (in brief), Glycolysis, citric acid cycle & its significance, HMP shunt & Gluconeogenesis (in brief), regulation of blood glucose level.

Unit 3: Amino acids - Definition, classification, essential & non-essential amino acids.

Unit 4: Chemistry of Proteins & their related metabolism - Introduction, definition, and classification, biomedical importance Metabolism: Transformation, Decarboxylation, Ammonia formation & transport, Urea cycle.

Unit 5: Chemistry of Lipids: - Introduction, definition, classification, biomedical importance, essential fatty acids, identification of fats & oils (saponification no, acid no, iodine no, acetyl no, reichert- miesel no. etc.)

Unit 6: Acid base balance concepts & disorders - pH, Buffers, Acidosis, Alkalosis

Unit 7: Vitamins & Minerals-sources, requirement, deficiency disorders & biochemical functions.

Unit 8: General concepts & functions of immune globulins

Nutritional Biochemistry-I (Practical)

Paper Code: 05250104

Periods/week	**Credits**	**Max. Marks:** 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this unit, students are expected to be able to:

1. Represent skills in the proper handling of apparatus and chemicals.

2. Understand the different processes used in industries and their applications.

3. Represent problem-solving skills and to nurture professional attitudes.

Practical:

1. Safe and systematic working in the Laboratory.
2. Preparation of routine and standard laboratory reagents.
3. Principle, working use, care and maintenance of various instruments used in laboratory investigations.
4. Identification of Proteins (Qualitative Tests)
5. Identification of Carbohydrates (Qualitative Tests)
6. Identification of Fats (Qualitative Tests)

References:

1) A.C. Deb (2001) Fundamentals of Biochemistry 9th Ed. New Central Book Agency (p) Ltd;
2) West and Todd (1966) Textbook of biochemistry 4th Ed. Macmillan Publishing Company
3) U.Satyanarayana and U.Chakrapani (2009) Biochemistry. 4th Ed. Elsevier
4) Singh S.P. : Viva in Biochemistry (2008). 4th Ed. CBS Publishers. 239-240
5) Sawhney S.K. and Singh R. (2014) Introductory Practical Biochemistry. 2nd Ed. Narsoha publishing house.
6) Pushpa Sundararaj and Anupa Siddhu. Qualitative tests and Quantitative Procedures in Biochemistry, A H Wheeler and Co Ltd. 2002 Second Edition, Wheeler, New Delhi

Physiology-I (Theory)

Paper Code: 05250105

Periods/week	**Credits**	**Max. Marks:** 100
L: 3 T:1 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this unit, students shall be able to:

- Understand the physiology of various organs of the body.
- Obtain a better understanding of the principles of Nutrition and Dietetics through the study of physiology.
- Understand alterations of structure and function in various organs and systems in disease conditions

Unit 1: Composition and function of blood

Red blood cells–Erythropoietin, stages of differentiation function, count, physiological variations. Hemoglobin–structure, functions, concentration, physiological variation. Methods of estimation of Hb White blood cells–Production, function, lifespan, count, differential count Platelets–Origin, normal count, morphology functions. Plasma Proteins–Production, concentration, types, Albumin, Globulin, Fibrinogen, Prothrombin functions.

Hemostasis–Definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors. Blood groups–ABO system, Rh system Blood grouping & typing, Blood Transfusion reaction Cross matching Anticoagulants–Classification, examples and uses Anemia: Classification, effects of anemia on body

Blood Volume-Normal value, determination of blood volume and regulation of blood volume ,Body fluid–pH, normal value, regulation and variation.

Unit 2: Cardiovascular system

Heart –Physiological anatomy, Nerve supply Properties of Cardiac muscle, Cardiac cycle-systole, diastole Intra ventricular pressure curves. Cardiac Output– Heart sounds-Normal heart sounds, cause characteristics and signification, Heart rate, areas of auscultation.

Blood Pressure– Definition, normal value, clinical measurement of blood pressure. Physiological variations, regulation of heart rate, cardiac shock, hypotension,

hypertension. Pulse–radial pulse, triple response

Electrocardiogram (ECG)–significance.

Unit 3:Digestive System

Physiological anatomy of Gastrointestinal tract, Functions of digestive system.

Salivary glands-Structure and functions Deglutition–stages and regulation

Stomach– structure and functions Gastric secretion–Composition, function, regulation of gastric juice secretion. Pancreas –structure, function, composition regulation of pancreatic juice. Liver–functions of liver. Bile secretion, composition, function, regulation of bile secretion.

Bilirubin metabolism- types of bilirubin, Vanden berg reaction, Jaundice-types, significance. Intestine –small intestine and large intestine Small intestine–functions-digestive, absorption, movements. Large intestine – functions, digestion and absorption of Carbohydrates, Proteins, Fats, Lipids. Defecation.

Unit 4: Respiratory System

Functions of Respiratory system, Physiological Anatomy of Respiratory system, Mechanism of normal and rigorous respiration Forces opposing and favoring expansion of the lungs Intra pulmonary pleural pressure, surface tension, recoil tendency of the wall.

Transportation of Respiratory gases: Transportation of Oxygen& Carbon dioxide.

Lung volumes and capacities. Regulation of respiration, Mechanisms of Regulation-nervous and chemical regulation. Hearing Breuer, Reflexes. Applied Physiology and Respiration: Hypoxia, Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnea.

Unit 5: Nervous system

Functions of Nervous system, Neuron structure, classification and properties

Neuroglia, Nerve fiber,classification, conduction of impulses continuous and salutatory. Velocity of impulse transmission and factor affecting Synapse –structure, types, properties Receptors–Definition, classification, properties Reflex action–unconditioned properties of reflex action, Babinski’s sign Spinal cordnervetracts-Ascendingtracts,descendingtracts–pyramidaltracts Extra pyramidal tracts Functions of Medulla, pons, hypothalamic disorders

Cerebral cortex lobes and functions, Sensory cortex, Motor cortex, Cerebellum functions of Cerebellum Basal ganglia-functions EEG, Cerebrospinal Fluid

(CSF):formation, circulation, properties, composition and functions lumbar puncture.

Autonomic, Nervous System: Sympathetic and para-sympathetic distribution and functions and comparison of functions.

Unit 6: Muscle nerve physiology:

Classification of muscle, structure of skeletal muscle, Sarcomere contractile proteins, neuro muscular junction. Transmission across neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction, muscle tone, fatigue: Rigor mortis

Physiology-I (Practical)
Paper Code: 05250106

Periods/week	Credits	Max. Marks: 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this unit, students shall be able to:

1. Identify basic physiology concepts.
2. Practice universal and essential safety precautions in hematology.
3. Understand the physiology and functions of blood, components of blood, factors affecting blood, and differences between serum and plasma.
4. Acquire knowledge about coagulation, elements of clotting cascade and laboratory blood tests.
5. Apply knowledge of physiology of human body in nutritional care practice.

Practicals:

1. Haemoglobinometry
2. White Blood Cell count
3. Red Blood Cell count
4. Determination of Blood Groups
5. Leishman's staining and Differential WBC count
6. Determination of packed cell Volume
7. Erythrocyte sedimentation rate [ESR]
8. Calculation of Blood indices
9. Determination of Clotting Time, Bleeding Time

References:

1. Chaudhari S K. (1998) Concise Medical Physiology. 3rd Ed. New Central Book Agency (P) Ltd., Calcutta.
   - Ganong, W.F.(1999) Review of Medical Physiology. 10th Ed. Prentice-Hall International, London.
   - Guyton A.C. (1996) Textbook of Medical Physiology. W. B. Saunders Co., Philadelphia, USA.
   - Jain A.K. (2001) Textbook of Physiology. Avichal Publishing Co., New Delhi.
   - Singh I., Chaurasia BD (1998) Human Anatomy. CBS Publisher and Distributors, New Delhi.
   - Tortora G.J. and Grabowski S.R. (2005) Principals of Anatomy and Physiology. 8th Ed. Harper Collins College Publishers, New York.

Communication Skills and Personality Development (Theory)

Periods/week	**Credits**	**Max. Marks:** 100
L: 4 T: P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this unit, students shall be able to:

1. Understand the concept of communication as well as their objectives towards self and national development.
2. Appreciate the role of Nutrition and Dietetics in community development.

Unit 1: Listening Comprehension

- Speeches
- Interviews
- audio-video clippings followed by exercises
- Introduction to Communication
- Importance of Communication
- Barriers to Communication and ways to overcome them

Unit 2: Conversation Skills

- Greetings and introducing oneself
- Framing questions and answer
- Role play
- Buying: asking details etc
- Word formation strategies
- Vocabulary building: Antonyms, Synonyms, Affixation, Suffixation, One word substitution

Unit 3:Reading Comprehension

- Simple narration and Stories
- Simple Passages
- Newspaper and articles clippings
- Note Making
- Paragraph Writing
- Comprehension
- Report Writing: types, characteristics
- Introduction to Letter Writing

Unit 4: Pronunciation

- Pronunciation
- Syllable and Stress

- Intonation and Modulation

Unit 5: Writing Comprehension

- Letters: types, format, style
- Précis Writing
- Paragraph: Order, Topic sentence, consistency, coherence
- Report and Proposal
- Project Writing: Features, Structure

SEMESTER II

Nutrition for Lifespan (Theory)

Paper Code: 05250201

Periods/week	Credits	Max. Marks: 100
L: 4 T: P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this unit, students shall be able to:

1. The students will understand the principles of nutritionally adequate meals for the family and the community.
2. Acquire knowledge about the nutritional needs of an individual throughout the lifecycle.

Unit 1: Introduction to meal management: Balanced diet, food groups & the planning of balanced diet. Food faddism & the faulty food habits.

Unit 2: Food guides for selecting adequate diet, International terms used for nutrients requirement and Recommended Dietary Allowances, nutrient density, nutrient composition table.

Unit 3: Nutrition in Pregnancy: Physiological stages of pregnancy, nutritional requirements, food selection, Complication of pregnancy.

Unit 4: Nutrition during Lactation: Physiology of lactation, Nutritional requirements.

Unit 5: Nutrition during Infancy: growth & development, nutritional requirements, breast feeding, infant formula. Introduction of supplementary foods.

Unit 6: Nutrition during early childhood (Toddler/Preschool): Growth & nutrient need**,** nutrition related problems**,** feeding patterns.

Unit 7: Nutrition in school children: Nutritional requirement, importance of snacks, School lunch.

Unit 8: Nutrition during adolescence: Growth & nutrient needs**,** food choices, eating habits, factors influencing needs.

Unit 9: Nutrition during adulthood: Nutritional requirements, feeding pattern.

Unit 10: Geriatric Nutrition: Factors affecting food intake and nutrient use, nutrient needs, nutrition related problems.

Nutrition for Life Span (Practical)

Paper Code: 05250202

Periods/week	Credits	Max. Marks:50
L: T:0 P:4	2	Internal : 30
		External : 20

On successful completion of this unit, students shall be able to:

Practicals:

- Planning, preparation and nutritional evaluation of diets in relation to physiological state.
- Planning and preparation of a balanced diet for a pregnant woman.
- Diet during complication of pregnancy.
- Planning and preparation of a balanced diet for a lactating woman.
- Preparation of weaning foods.
- Planning and preparation of a balanced diet for pre-school child.
- Balanced diet for school going child. Preparation of packed lunch.
- Planning and preparation of a balanced diet for adolescence.
- Planning of meals for adult belonging to different income group.
- Planning meal for senior citizen.

References:

1) Bamji M.S., Rao N.P. and Reddy V. (1996): Textbook of Human Nutrition. 11th Ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2) Swami Nathan M (1974) Essentials of Foods and Nutrition. 1st Ed. Ganesh and co.
3) Wadlow and Ingel's (2012) Perspectives of Nutrition. 9th Ed. McGraw-Hill Education
4) Nutritive Value of Indian Foods, NIN, ICMR

Nutritional Biochemistry-II (Theory)

Paper Code: 05250203

Periods/week	Credits	Max. Marks:100
L: 3 T:1 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this unit, students shall be able to:

1. The students will gain intense knowledge about the various metabolic activities occurring in the body.
2. Understand the mechanisms adopted by the human body for regulation of metabolic pathways.
3. Become proficient for specialization in Nutrition.

Unit 1: Brief out line of metabolism: Beta oxidation of fatty acids, Ketosis, Cholesterol & it's clinical significance, Lipoproteins in the blood composition & their functions in brief, Atherosclerosis

Unit 2: Enzymes - Introduction, definition, classification, coenzymes, isoenzymes, properties, factors affecting enzyme action, enzyme inhibition, diagnostic value of serum enzymes - Creatinine kinase, Alkaline phosphatase, Acid phosphatase, LDH, SGOT, SGPT, Amylase, Lipase, Carbonic anhydrase etc.

Unit 3: Hormones - Classification, general mode of action, hormones of Pituitary, Thyroid, Parathyroid, Adrenals, Reproductive Glands, Pancreas, hormonal disorders, counter regulatory hormones.

Unit 4: Water metabolism- Distribution of fluids in the body, ECF, ICF, Water metabolism, dehydration.

Unit 5: Hyperglycemia & hypoglycemia - Diabetes mellitus - definition, types, features, gestation diabetes mellitus, glucose tolerance test, glycosuria, Hypoglycemia & its causes.

Unit 6: Liver functions and their assessment - Based on - Carbohydrate metabolism, Protein metabolism, Lipid Metabolism. Measurements of serum enzyme levels. Bile pigment metabolism: Jaundice - its types and their biochemical findings.

Unit 7: Renal functions tests - Various tests, GFR & clearance.

Unit 8: Tumor markers & their clinical applications – Including oncofeatal antigens, CEA etc.

Nutritional Biochemistry-II(Practical)

Paper Code: 05250204

Periods/week	Credits	Max. Marks:50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this unit, students shall be able to:

1. The students will understand the principles of biochemical methods used for the analysis of food and biological samples.
2. Perform biochemical analysis with accuracy and reproducibility.
3. Become proficient in biochemical analysis.
4. Use developed skills to be used in various diagnostic labs.

Practicals:

- To study general properties of the enzyme Urease & Achromatic time of salivary amylase.
- Estimation of glucose in urine by Benedict's methods
- Urine analysis - normal & abnormal constituents of urine
- Blood glucose estimation

References:

1. Textbook of Biochemistry-A.K. Berry
2. Viva in biochemistry – S.P. Singh
3. Practical biochemistry – C. Rajgopal
4. Fundamentals of Biochemistry-A.C. Deb
5. Textbook of biochemistry-West and Todd

Physiology-II (Theory)

Paper Code: 05250205

Periods/week	**Credits**	**Max. Marks:** 100
L: 3 T:1 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this unit, students shall be able to:

1. Understand the physiology of various organs of the body.
2. Obtain a better understanding of principles of Nutrition and Dietetics through the study of physiology.
3. Understand alterations of structure and function in various organs and systems in disease conditions

Unit 1: Endocrine System: Definition, Classification of Endocrine glands & their hormones. Thyroid gland hormone– Physiological, Anatomy, Hormone secreted, Physiological function, regulation of secretion**.** Disorders–hypo and hyper secretion of hormone. Adrenal gland, Adrenal cortex physiologic anatomy of adrenal gland, Adrenal cortex, cortical hormones–functions and regulation

Adrenal medulla–Hormones ,regulation and secretion. Functions of Adrenaline and nor adrenaline. Pituitary hormones–Anterior and posterior pituitary hormones, secretion, function. Pancreas–Hormones of pancreas. Insulin–secretion, regulation, function and action. Diabetes mellitus–Regulation of blood glucose level. Parathyroid gland–function, action, regulation of secretion of parathyroid hormone. Calcitonin–function and action, Calcium Homeostasis.

Unit 2: Special senses: Vision– structure of eye. Function of different parts. Structure of retina**.** Hearing-structure and function of ear, mechanism of hearing**.** Taste–Taste buds functions. Smell physiology, Receptors.

Unit 3: Excretory System: Excretory organs Kidneys:Functions of kidneys structural and functional unit nephron, vasarecta, cortical and juxta-medullary nephrons– Comparison, Juxta Glomerular Apparatus–Structure and function Renal circulation peculiarities. Mechanism of Urine formation: Ultra filtration criteria for filtration GFR, Plasma fraction, EFP, factors effecting EFR. Determination of GFR

selective reabsorption– sites of reabsorption, substance reabsorbed mechanisms of reabsorption Glucose, andurea. H+Clamino acids etc. TMG, Tubular load, renal threshold% of reabsorption of different substances, selective secretion Properties and composition of normal urine,urine output. Counter– Current Mechanisms:Micturition, Innervation of Bladder, Cysto urethrogram. Diuretics: Water, Diuretics, osmotic diuretics, artificial kidney, renal function tests–plasma clearance. Actions of ADH, Aldosterone and PTH on kidneys**.** Renal function tests.

Unit 4: Reproductive system: Function of Reproductive system. ,Puberty, male reproductive system. Functions of testes, spermatogenesis site, stages, and factors influencing semen. Endocrine functions of testes. Androgens–Testosterone structure and functions. Female reproductive system: Ovulation, menstrual cycle. Physiological changes during pregnancy, pregnancy test Lactation: Composition of milk factors controlling lactation.

Unit 5: Skin-structure and function: Body temperature measurement, Physiological variation, Regulation of body temperature by physical chemical and nervous mechanisms. Role of hypothalamus. Hypothermia and fever.

Physiology-II (Practical)

Paper Code: 05250206

Periods/week	**Credits**	**Max. Marks:** 50
L: T:0 P:4	2	Internal : 30
		External : 20

Course Outcomes:

On successful completion of this course, students shall be able to:

1. Practice universal and essential safety precautions in haematology.
2. Understand the physiology and functions of blood, components of blood, factors affecting blood, and differences between serum and plasma.
3. They will acquire knowledge about coagulation, elements of clotting cascade and laboratory blood tests.
4. They will be able to apply knowledge of anatomy and physiology of human body in nutritional care practice.

Practicals:

1. Haemoglobinometry
2. White Blood Cell count
3. Red Blood Cell count
4. Determination of Blood Groups
5. Leishman's staining and Differential WBC count
6. Determination of packed cell Volume
7. Erythrocyte sedimentation rate [ESR]
8. Calculation of Blood indices
9. Determination of Clotting Time ,Bleeding Time
10. Blood pressure recording
11. Auscultation for Heart Sounds
12. Artificial Respiration
13. Determination of vital capacity

References:

1. Chatterjee, C.C., Human Physiology, Medical Allied Agency, Kolkata
2. Chaudhari S K. (1998) Concise Medical Physiology. 3rd Ed. New Central Book Agency (P) Ltd., Calcutta.
3. Ganong, W.F.(1999) Review of Medical Physiology. 10th Ed. Prentice-Hall International, London.
4. Guyton A.C. (1996) Textbook of Medical Physiology. W. B. Saunders Co., Philadelphia, USA.
5. Jain A.K. (2001) Textbook of Physiology. Avichal Publishing Co., New Delhi.
6. Singh I., Chaurasia BD (1998) Human Anatomy. CBS Publisher and Distributors, New Delhi.
7. Tortora G.J. and Grabowski S.R. (2005) Principals of Anatomy and Physiology. 8th Ed. Harper Collins College Publishers, New York.
8. Vander, A.J., Sherman, J.H. and Luciano, D.S., Human Physiology. McGrwa Hill Publishing Co., USA,
9. Wagh, A. and Grant, A., Ross and Wilson's Antomy and Physiology in Health and Illness. Churchill- Livingstone, London.

SEMESTER III

Basic Dietetics (Theory)

Paper Code: 05250301

Periods/week	Credits	Max. Marks: 100
L: 4 T:0 P:0	4	Internal : 40
		External : 60

Course Outcomes:

On successful completion of this course, students shall be able to:

1. Understand the etiology, physiology and metabolic anomalies of acute and chronic diseases and patient needs.
2. Know the effect of various diseases on nutritional and dietary requirements.
3. Provide and recommend appropriate nutritional care for prevention and treatment of various diseases.

Unit 1: Dietician: Difference between registered dietician & Nutritionist**,** Role of dietician in hospital and community.

Unit 2: Therapeutic process: Phases of Care process**,** Diet Therapy, Objectives of Diet therapy**,** Concepts of Diet therapy. **Nutrient & diet clinics:** Introduction, Nutritional Assessment, patient checkup.

Unit 3: Principles of diet therapy: Therapeutic nutrition for changing needs**,** Role of Antioxidants in the prevention of degenerative disease.

Unit 4: Therapeutic adaptation of normal diet: consistency, energy intake, nutrient, fiber, frequency of feeding, mode of feeding, elimination of food, Introduction of therapeutic diets, Modification of diet**,** Routine hospital diets:- clear liquid diet, liquid diet, semi-solid diet, soft diet, normal diet, tube feed, PEG feed, JJ feed, bland diet, high & low calorie diet, high & low protein diet, high & low fiber diet, low cholesterol diet

Unit 5: Modification of diet: Infection: - nutrient & immune response, metabolic changes during infection, nutritional management. Surgical conditions: - general surgery, emergency surgery, gastrointestinal surgery, bariatric surgery, nutritional management.

Unit 6: Diet in fever: Types- metabolism in fever, general dietary consideration diet in influenza typhoid fever, recurrent malaria and tuberculosis. Dietary counseling, educating the patient, follow-up dietary counseling, educating the patient.

Unit 7 Feeding the patient, infant and children: Introduction objectives, feeding technique, psychology of patient, assessment of patient. Introduction, normal infant, pre-term infant, nutritional management, feeding problems, management of feeding problem.

Semester-III

Subject- Basic Dietetics (Practical)

Periods/week	**Credits**	**Max. Marks:**50
L: T:0 P:4	2	Internal : 30
		External : 20

- Topic

1. Planning, preparation and nutritional evaluation of diet for normal person
2. Planning, preparation and nutritional evaluation of liquid diet for burn
3. Planning, preparations and nutritional evaluation of diet for Trauma & Surgery
4. Planning, preparation and nutritional evaluation of diets for bariatric
5. Planning, preparation and nutritional evaluation in typhoid fever and tuberculosis
6. Planning, preparation and nutritional evaluation of diets for liver, gall bladder and pancreas
7. Planning, preparation and nutritional evaluationof snacks, desserts and beverages for children

Semester-III

Paper 2- Food Science & Preservation

Periods/week	**Credits**	**Max. Marks:**100
L: 4 T:0 P:0	4	Internal : 40
		External : 60

Contents

Unit 1	**Cereals:**Structure and composition, Nutritional value, Processing- Milling, polishing. Parboiling, flaking, parching, roasting, use in variety of preparations selection, storage and care, breakfast cereals.
Unit 2	**Pulses:** Composition and nutritional value, processing, soaking, germination. Cooking and fermentations: Toxic constituents of pulses, Lathyrism.
Unit 3	**Milk and milk products:**Composition of milk, properties and effect of heat, nutritional importance, milk processing, milk products.
Unit 4	**Nuts and oil seeds:** Nutritive value, importance & classification
Unit 5	**Fats and oils:** Types, role of fat in cookery
Unit 6	**Fruits and vegetables:** Classifications, composition and importance in human nutrition storage, cooking of vegetables, changes during cooking, and effect of heat, acid and alkali.
Unit 7	**Beverages:** Coffee, tea, and cocoa, processing composition and preparation, spices and condiments, types and composition.
Unit 8	**Flesh foods-** Selection, storage, uses and nutritional aspects of meat, fish and poultry, spoilage of fish.
Unit 9	**Egg –** Composition & classification of egg & egg products, its nutritive value.
Unit 10	**Baking –** Types of bake products & its nutritive value.
Unit 11	**Role of spices in food science** - Importance, composition & classification
Unit 12	**Sugar and Sugar products**- Form of sugar and liquid sweetness Caramelization, Hydrolysis, Crystallization Indian confectionery
Unit 13	**Food additives:** Definitions, functions and uses in processed food products.
Unit 14	**Food Flavors**:Spices and flavoring constituents, flavors in food industries.
Unit 15	Food Preservation & Food Adulteration

Semester-III

Subject- Food Science & Preservation (Practical)

Periods/week	**Credits**	**Max. Marks:**50
L: T:0 P:4	2	Internal : 30
		External : 20

- Topic
- To study the effect of cooking on whole and washed dehusked /decorticated pulses and legumes.
- To prepare batter using different flours and study the effect of deep frying them.
- To demonstrate the effect of roasting on nuts and oil seeds.
- To determine the smoking point of fats and oil.
- To study the effect of heat on milk.
- To study the effect of sugar on boiling point of water.
- To prepare fruit jelly.
- To study the effect of browning in fruits and vegetables.
- Visit to food industry, dairy firm & confectionaries.
- Food preservation techniques (use of different techniques in product formulation and analysis of product for quality standards).

a. Sun drying and dehydration-cereals, legumes, vegetable based.

b. Preservation with sugar-jams, jelly, preserves, etc.

c. Preservation - salt, oil, vinegar-pickling.

d. Preservation of foods using chemicals –tomato ketchup, squash.

6. To study the effect of cooking time on the color, texture and acceptability of whole egg.

Semester-III

- Paper -3 - Community Nutrition

Periods/week **Credits** **Max. Marks:**100

L: 4 T:0 P:0 4 Internal : 40

- External : 60
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Contents

Unit 1 Malnutrition- meaning, factors contributing to malnutrition, over nutrition.

Unit 2 Nutritional disorders- Epidemiology, clinical features, prevention and dietary treatment for Protein Energy malnutrition, nutritional anemia& vitamin deficiency disorders.

Unit 3 Methods of assessing nutritional status:
a) Direct assessment – Diet surveys, anthropometric, clinical and biochemical estimation.
b) Indirect assessment- Food balance sheet, ecological parameters and vital statistics.

Unit 4 Food and nutrition security –
Definition, National and household food security. Factors affecting food security system. National and International systems to improve food security

Unit 5 Improvement of nutrition of a community:
a) Modern methods of improvement or nutritional quality of food, food fortification, enrichment and nutrient supplementations.
b) Nutrition education themes and messages in nutrition and health, Antenatal and postnatal care.

Unit 6 Nutritional and infection relationship: Immunization and its importance, Food borne
infection and intoxication diseases, foods involved, methods of prevention, Infestation of food borne diseases , Outbreak, Prevention signs and control of infection.

Unit 7 National and International agencies in uplifting the nutritional status - WHO, UNICEF,
CARE, ICMR, ICAR, CSIR, CFTRI. Various nutrition related welfare programs, ICDS and others (in brief).

Unit 8 Community nutrition program planning - Identification of problem, analysis of causes, resources constraints, selection of interventions, setting a strategy, implementations and evaluation of the program

Semester-III

Subject- Community Nutrition(Practical)

Periods/week	**Credits**	**Max. Marks:**50
L: T:0 P:4	2	Internal : 30
		External : 20

- Topic

1-Diet and nutrition surveys

(a)To study of various anthropometric methods of nutritional status assessment
(b)To study of various Biochemical methods of nutritional status assessment
(c)To study about various clinical sign and symptoms used in nutritional assessment
(d)To study of various dietary approaches used in nutritional assessment
(e)To study existing national food security system and report writing

2-Preparation of visual aids for community awareness

3-Study about various software and applications used in nutritional assessment

4-Field visit to observe the working of nutrition and health oriented programs (survey based result)

Semester-III

Paper 4 - FUNDAMENTALS OF COMPUTER SCIENCE

Periods/week	**Credits**	**Max. Marks:**100
L: 4 T:0 P:0	4	Internal : 40
		External : 60

Contents

Unit 1 **Introduction**:
What are computers, Application areas, Characteristics & limitations, Evolution of computers, Classification& generations of computers, Data representation in computer memory (numbering system)

Unit 2 **Computers Architecture /Organization:**
Basicarchitecture, Functional Block diagram, Types of computers on the basis of purpose, Signal and Portability.

Unit 3 **Hardware:**
CPU their generations and performance parameters, Input, output and storage devices. Primary (Main) Memories (RAM, ROM, Types of RAM and ROM, Cache Memory, Registers and types of registers, Storage Evaluation Criteria, Memory Capacity), Secondary Storage Devices: (Magnetic Disk, Floppy and Hard Disk, USBs, Optical Disks CD-ROMs).

Unit 4 **Software:**
Types: System Software (Machine Level Languages, Operating Systems, Device Specific Drivers), Higher Level Languages, and Applications.

Unit 5 **Languages**:
Machine Language, Assembly Languages, Programming Languages. Use of Compilers, Assemblers, Linkers, Loaders and interpreters in programming languages

Unit 6 **Operating System:**
Booting/Start Up Procedure of machines, Introduction to Operating System, Functions and Classification of Operating Systems, Basic introduction to DOS, UNIX/LINUX OS, Windows.

Unit 7 HTML, Use of Multimedia, Computer aided teaching and testing, Application Software MS office (Word, Excel and Powerpoint).

Unit 8 **Basic Introduction to Computer Networks:**
Data Communication, Network devices (Hub, Switches, Modems, and Routers etc), LAN, LAN topologies, WAN, MAN, Internet: Introduction, Basics of E-mail, Web browsers (IE, Google Chrome, and Mozilla Firefox).

Unit 9 Structure of Universal Resource Locator, Domains (.com, .in, .country specific, .org and rationale behind them), IP address, Backbone network, Network connecting devices, HTTP, DNS, Network Security and Search Engine.

Semester-III

Paper 5- FOOD LAWS &FOOD SAFETY

Periods/week			**Credits**		**Max. Marks:**100
L: 4	T:0	P:0	4	Internal : 40	
•				External : 60	

Contents

Unit 1	Concept and meaning of Food quality and food Safety, food adulteration, food hazards, Natural toxins.
Unit 2	Food laws and regulations –National and international food laws, Governing bodies.
Unit 3	Exposure, estimation, toxicological requirements and risk assessment
Unit 4	Safety aspects of water and beverages such as soft drinks, tea, coffee, cocoa.
Unit 5	Safety assessment of food contaminants and pesticide residues.
Unit 6	Safety evaluation of heat treatments and related processing techniques.
Unit 7	Quality assurance, Total Quality Management; GMP/GHP; GLP, GAP; Sanitary and hygienic practices; Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex; Export import policy, export documentation; Laboratory quality procedures and assessment of laboratory performance; Applications in different food industries.
Unit 8	Quality control in food service institutions

Semester-IV

Paper 1- Therapeutic Nutrition

Periods/week		**Credits**		**Max. Marks:**100
L: 4	T:0 P:0	4	Internal : 40	
•			External : 60	

Contents

Unit 1 **Nutrition for gastrointestinal diseases-**

1 Problem of stomach:- diarrhea, constipation, peptic ulcer, type, nutritional management

2 Intestinal disorder:- diverticular disease, IBS, celiac disease, lactose intolerance, nutritional management .

Unit 2 **Nutrition for diseases of Liver**-Hepatitis, Cirrhosis, alcoholic, liver disease, Gall stones - Causes, prevention and dietary management.

Unit 3 **Diet for cardiovascular disease**: - introduction, stages of development, etiology, risk factor, nutritional management

Unit 4 **Diet for Diabetes Mellitus**

1**.** Introduction, classification, symptoms nutritional management

Unit 5 **Diet in Kidney disease**

1. Kidney transplant, Dialysis:- introduction, types of dialysis, nutritional management
2. Kidney Stones, Types, Nutritional Management

Unit 6 **Diet in Cancer**

1. Introduction, origin, causes, types of cancer, diagnosis, relation of nutrition & cancer, effect of cancer on nutritional status, objectives of nutrition therapy, nutritional management.

Unit 7 **Diet in AIDS & Allergy**

1. AIDS: - Introduction, stages of disease progression, relation of nutrition & AIDS, impact of AIDS on nutritional status, nutritional management.
2. Diet in allergy: Definition, classification, manifestations, common food allergies and test

Unit 8 **Diet for metabolic disorder**

1. Introduction, definition, causes, types, nutritional management.

Unit 9 **Diet in burn and surgery:-**

1. Burn**: -** Introduction, types & extent of burn, nutritional management.
2. surgery:- Introduction, factors affecting surgery, pre-operative nutrition, post- operative nutrition, goals of dietary management, dietary management

Unit10 **Diet in addictive behavior & Obesity:-**

1. Anorexia nervosa**: -** Introduction, types, difference between dieting and anorexia, symptoms, causes, risk factor, effect, treatment, nutritional management.
2. Bulimia nervosa: - Introduction, symptoms, causes, risk factor, effect, treatment, nutritional management.
3. Alcoholism: - Introduction, symptoms, causes, diagnosis, treatment, nutritional management.
   - Obesity-Introduction, assessment , hazards and nutritional management

Semester-IV

Subject-Therapeutic Nutrition (Practical)

Periods/week		**Credits**	**Max. Marks:**50
L:	T:0 P:4	2	Internal : 30
			External : 20

- Topic

1. Standardization of common food preparations.
2. Planning and preparation of following diets:
   - Normal diet
   - Tube feed,
   - liquid and soft diet
   - Bland diet
4. Planning, preparation and calculations of therapeutic diets for different disease conditions

Semester-IV

- Paper 2- Product Development & Sensory Evaluation

Periods/week **Credits** **Max. Marks:**100

L: 4 T:0 P:0 4 Internal : 40

- External : 60
-

Contents

Unit 1 **Sensory evaluation of foods**:
a. Importance and application for product formulation,
b. Basic tastes, threshold tests for basic tastes,
c. Requirements for sensory analysis,
d Sensory panel, type, selection and training,
e. Subjective and objective sensory evaluation,
f. Different types of sensory tests
g. Instrumental tests for sensory attributes – colour, texture and odour.

Unit 2 **Product Development**
a. Designing new product – types and drawing forces
b. Need for product development
c. Stages of product development
d. Success in product development
e. Consumer research
f. Role of sensory evaluation in consumer product acceptance

Unit 3 **Consumer Behavior** in purchasing foods, Factors influencing product acceptance andpurchasing trends. Market place changes in processed foods.

Unit 4 **Special food processing technologies and novel food ingredients** – Membrane technology(reverse osmosis and ultra filtration), agglomeration, agitation, air classification, extrusion, automation in food industries.

Semester-IV

- Product Development & Sensory Evaluation (Practical)

Periods/week **Credits** **Max. Marks:**50

L: T:0 P:4 2 Internal : 30

- External : 20
-

S.NO **Contents**

1 Sensory analysis: Different types of sensory tests for basic taste and sensory attributes of products.

2 Stepwise development of a new food product, standardization, acceptability studies and submission of project report.

Semester-IV

- Paper 3- Food Service Management

Periods/week **Credits** **Max. Marks:**100

L: 4 T:0 P:0 4 Internal : 40

- External : 60
-

Contents

Unit 1. **Catering industry-**
Definition of catering. Classification of food service institutions according to
a. Function: Profit oriented, service oriented and public health facility oriented.
b. Processing method: Conventional system, commissary system and fast food service systems.
c. Service of food: Self-service, tray service and waiter-waitress service.

Unit 2. **Floor planning and layout-**Characteristics of typical food service facilities.

Unit 3. **Equipment** –Classification, factors involved in selection, use and care ofmajor equipments.

Unit 4. **Quantity food preparation-** Selection, purchasing methods and storage offoods.

Unit 5. **Menu planning** –Definition, principles involved in planning and types ofmenus.

Unit 6. **Standardization of recipe** –Definition, standard recipe format and uses.

Unit 7. **Standard portion sizes** - Definition, portioning equipments and portioncontrol.Use of left over foods.

Unit 8. **Management-** Definition, principles and techniques of effectivemanagement.

Unit 9. **Tools of management-** Organization chart, work study and workimprovement.

Unit 10. **Financial management-** Principles and methods of food cost control,factors affecting food cost, labor cost, operating cost and overhead cost.
1. Calculate food cost, labor cost, operating cost and overhead cost of a home-made dish.
2. Calculate gross profit percentage of an establishment welfare/ commercial/ transport catering.

Unit 11. **Personnel management-** Methods of selection, orientation, training,supervision and motivation of employees.

Semester-IV

Subject-Food Service Management (Practical)

Periods/week	**Credits**	**Max. Marks:**50
L: T:0 P:4	2	Internal : 30
•		External : 20

1. Standardization and costing of recipes.

    Cereal and cereal products
    Vegetables.
    Fruits.
    Meat, chicken and other fleshy foods.
    Sugar and jaggery
    Milk and its products.
    Pulses.
    Nuts and Oil seeds.

2. Survey of hostels and cafeteria to assess various aspects of food service management.

Semester-IV

Paper 4- Nutrition Counselling

Periods/week	Credits	Max. Marks:100
L: 0 T:0 P:8	4	Internal : 60
		External : 40

Contents

Unit 1

Counselling and educating patient
a) Introduction to nutrition counselling
b) Determining the role of nutrition counseller
c) Responsibilities of the nutrition counseller
d) Practitioner v/s client managed care
e) Conceptualizing entrepreneur skills and behaviour
f) Communication and negotiation skills.

Unit 2

Practical consideration in giving dietary advice and counselling -
a) Factors affecting and individual food choice.
b) Communication of dietary advice
c) Consideration of behaviour modification
d) Motivation.

Unit 3

Teaching aids used by dietitians- charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.

Unit 4

Computer application
a) Use of computers by dietitian
b) Dietary computations
c) Dietetic management
d) Education/ training
e) Information storage
f) Administrations
g) Research

Semester-IV
Paper -4- SPORTS NUTRITION

Periods/week	Credits		Max. Marks:100
L: 4 T:0 P:0	4	Internal : 40	
•		External : 60	

Contents

Unit 1. **Approaches to the management of fitness and health:** Nutrition, exercise, physical fitness and health- their inter relationship. Significance of physical fitness and nutrition in prevention and management of weight control regimes. Nutrition guidelines for maintenance of health and fitness.

Unit 2. **Nutritional requirements of exercise:** Effect of specific nutrients on work performance and physical fitness. Nutrients that support physical activity, Mobilization of fuel stores during exercise. Fluid requirements.

Unit 3. **Nutrition in sports:** Sports specific requirements- Importance of carbohydrate loading, pre game and post game meals, Diets for persons with high energy requirements, stress, fracture and injury.

Unit 4. **Dietary supplements and Ergogenic aids:** Definitions, Use of different nutragenic / ergogenic aids and commercial supplements, Sports drinks, sports bars etc.

Semester-V
Paper -1- SPORTS NUTRITION

Periods/week	Credits		Max. Marks:100
L: 4 T:0 P:0	4	Internal : 40	
•		External : 60	

Contents

Unit 1. **Approaches to the management of fitness and health:** Nutrition, exercise, physical fitness and health- their inter relationship. Significance of physical fitness and nutrition in prevention and management of weight control regimes. Nutrition guidelines for maintenance of health and fitness.

Unit 2. **Nutritional requirements of exercise:** Effect of specific nutrients on work performance and physical fitness. Nutrients that support physical activity, Mobilization of fuel stores during exercise. Fluid requirements.

Unit 3. **Nutrition in sports:** Sports specific requirements- Importance of carbohydrate loading, pre game and post game meals, Diets for persons with high energy requirements, stress, fracture and injury.

Unit 4. **Dietary supplements and Ergogenic aids:** Definitions, Use of different nutragenic / ergogenic aids and commercial supplements, Sports drinks, sports bars etc.

Semester-V
Subject-Sports Nutrition (Practical)

Periods/week			**Credits**	**Max. Marks:**50
L:	T:0	P:4	2	Internal : 30
•				External : 20

1. Development and standardisation of a sports bars or meal replacement bars.

2. Composition and brand names of supplements that improve Muscle mass commonly available in the market and role of nutrients listed in athletic performance.

3. Composition and brand names of protein,carbohydrate, fat supplements commonly available in the market.

4. Composition and brand names of supplements micronutrients commonly available in the market.

5. Composition and brand names of metabolite supplements commonly available in the market.

6. Planning a diet for strength athletes with supplements for muscle building.

7. Planning a diet for endurance athletes with supplements for energy and micronutrients.

8. Providing diet for clinical conditions with supplement usage (Planning the type, quantity and timing of supplement intake).

9.Planning and preparation of diets for pre game and post game meal.

Semester-V

- Paper -2- Food Microbiology

Periods/week **Credits** **Max. Marks:**100

L: 4 T:0 P:0 4 Internal : 40

- External : 60
-

Contents

Unit 1. Introduction of microbiology and its relevance to everyday life. General characteristics of bacteria, fungi, virus, protozoa, and algae.

Unit 2. Growth of microorganisms: Growth curve, effect of environmental factors in growth of microorganism - pH , water activity , oxygen availability, temperature and others.

Unit 3. Microbiology of deficient food: Spoilage. contamination sources, types, effect on the following :
(a) Cereal and cereal products
(b) Sugar and sugar products.
(c) Vegetables nd fruits
(d) Meat and meat products.
(e) Fish, egg and poultry,
(f) Milk and milk products
(g) Canned foods.

Unit 4. Environmental microbiology:
(a) Water and water borne diseases.
(b) Air and air borne diseases.
(c) Soil and soil borne diseases.
(d) Sewage and diseases.

Unit 5. Waste product handling : -
(a) Planning for waste disposal.
(b) Solid wastes and liquid wastes.

Unit 6.	Microbial intoxication and infections: Sources of contamination of food, toxin production and physiological action, sources of infection of food by pathogenic organisms, symptoms and method of control.
Unit 7.	Beneficial effect of organism
Unit 8.	Relevance of microbial standards for food safety.

Semester-V

- Subject-Food microbiology (Practical)

Periods/week **Credits** **Max. Marks:**50

L: T:0 P:4 2 Internal : 30

- External : 20
-
- Topic

1. Study of equipments in a microbiology lab.
2. Preparation of laboratory media and special media, cultivation of bacteria, yeasts and moulds.
3. Staining of bacteria: gram-staining.
4. Cultivation and identifications of important molds and yeast in food items.
5.Demonstration of available rapid methods and diagnostic kits used in identification of microorganisms or their products.
6. Visit (at least one) to food processing units or any other organization dealing with advanced methods in food microbiology.

Semester-V

Paper -3- FOOD LAWS & SAFETY

Periods/week **Credits** **Max. Marks:**100

L: 4 T:0 P:0 4 Internal : 40

External : 60

Contents

Unit 1	Concept and meaning of Food quality and food Safety, food adulteration, food hazards, Natural toxins.
Unit 2	Food laws and regulations –National and international food laws, Governing bodies.
Unit 3	Exposure, estimation, toxicological requirements and risk assessment
Unit 4	Safety aspects of water and beverages.
Unit 5	Safety assessment of food contaminants and pesticide residues.
Unit 6	Safety evaluation of heat treatments and related processing techniques.
Unit 7	Quality assurance, Total Quality Management; GMP/GHP; GLP, GAP; Sanitary and hygienic practices; Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex; Export import policy, export documentation; Laboratory quality procedures and assessment of laboratory performance; Applications in different food industries.
Unit 8	Quality control in food service institutions

Semester-V

Subject-FOOD LAWS &SAFETY (Practical)

Periods/week		**Credits**	**Max. Marks:**50
L:	T:0 P:4	2	Internal : 30
			External : 20

- To identify various food adulterants and natural food toxins
- To study various safety aspects of food
- To review various national food safety regulations
- To study various sanitary and hygiene practices
- To study the applications of HACCP to food products

Semester-V

Paper 4- NEUTRACEUTICALS AND HEALTH FOODS

Periods/week **Credits** **Max. Marks:**100

L: 4 T:0 P:0 4 Internal : 40

External : 60

Contents

Unit 1. **Nutraceuticals**:
(a) Use of neutraceuticals in traditional health sciences. Their role in preventing /controlling diseases.
(b) Definition, Classification, food and non-food sources, mechanism of action. Role of omega-3,fatty acids, carotenoids, dietary fiber, phytoestrogens; glucosinates; organosulphur compounds as neutraceuticals.

Unit 2. **Prebiotics and probiotics**: Usefulness of probiotics and prebiotics in gastro intestinal health and other benefits. Beneficiary microbes; prebiotic ingredients in foods; types of prebiotics and their effects on gut microbes.

Unit 3. **Functional foods**: Definition, development of functional foods, health benefits and sources of functional foods.

Unit 4. **Development of nutraceutical and functional foods** – Standards for health claims, Process of developing - preclinical & clinical studies, Marketing and Regulatory issues, Regulatory bodies in India.

Semester-V

Subject- NEUTRACEUTICALS AND HEALTH FOODS (Practical)

Periods/week **Credits** **Max. Marks:**50

L: T:0 P:4 2 Internal : 30

- External : 20

1. Identification of various nutraceuticals and functional foods available in the market

2. Preparation and sensory evaluation of probiotic/prebiotic/synbiotic foods

3. Preparation and sensory evaluation of antioxidant dietary fiber rich foods.

5. To conduct the market survey for identification of health claims of various nutraceuticals products.

6. Preparations of some traditional, fermented, functional and other products.
7. Preparation of soybeanproducts, nondairy milk and their acceptability test.

Semester-V

- Paper -5- Research & Biostatics

Periods/week **Credits** **Max. Marks:**100

L: 4 T:0 P:0 4 Internal : 40

External : 60

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Contents

Unit 1 **Introduction**

Meaning,definition, and characteristicsofstatistics
Importance ofthestudyofstatistics
Branchesofstatistics
Statisticsandhealth science includingnursing
Parametersandestimates
Descriptive andinferentialstatistics
Variablesandtheirtypes
Measurement scales

Unit 2 **TabulationofData**

Rawdata,thearray,frequencydistribution

Basic principlesofgraphical representation
Typesofdiagrams-histograms, frequencypolygons,smoothfrequencypolygon,cumulativefrequencycurve, Normalprobabilitycurve

Unit 3 **MeasuresofCentralTendency**

Introduction: Uses, applications and practical approach
Definitionandcalculationofmeanforungroupedandgrouped data
Meaning,interpretationandcalculationofmedianungroupedandgrouped data
Meaningandcalculationofmode
Comparisonofthemean,andmode
Guidelinesforthe use ofvariousmeasuresofcentraltendency

Unit 4	**MeasuresofVariability** Introduction: Uses, applications and practical approach The range,the average deviation or mean deviation The variance andstandarddeviation Calculationofvariance andstandarddeviation for ungroupedandgrouped data Propertiesandusesofvariance and standard deviation
Unit 5	**SamplingTechniques** Introduction: Uses, applications and practical approach Criteriafor good samples ApplicationofsamplinginCommunity Sampling Methods, Sampling and Non-sampling errors Samplingvariationandtestsofsignificance

Semester-VI

- Subject- Internship/Training Paper 1Credit hours- 6

S.No.	**Contents**
1	Internship in Food Service Institutions / Food industry/ Hospitals & Clinics.
2	Submission of report on case studies on a minimum of patients in any disease condition.

Semester-VI

- Subject- Project work Paper 2 Credit hours-12

S.No.	**Contents**
1.	The project is to be carried out over a period of approximately 2 to 3 months. Students will select project in consultation with their respective supervisors. The projects will be selected such that a student can reasonably be expected to make an original contribution to the chosen area within the time period allotted. The purpose of the project is to provide the student with training in academic research and acquisition of practical skills, including the design of a project, planning of experiments, dealing with practical problems, recording, presenting and analyzing the data. Report will be evaluated as stated under project work regulations.
2.	

Semester-VI

- Paper 3- Food Packaging

Periods/week **Credits** **Max. Marks:**100

L: 4 T:0 P:0 4 Internal : 40

External : 60

-

Contents

Unit 1. Food Packaging: Definition, functions of packaging materials for different foods, characteristics of packaging material.

- Food packages – bags, pouches, wrappers, tetra packs.

Unit 2. Packaging Materials: Introduction, purpose, requirements, types of containers.

- Modern Packaging Materials and Forms: Glass containers, metal cans, composite containers, aerosol containers, rigid plastic packages, semi rigid packaging, flexible packaging.

Unit 3. Packages of Radiation Stabilized Foods: Introduction, rigid containers, flexible containers, general methods for establishing radiation stabilization.

- Radiation measurement of radiations. Biodegradable packaging material - biopolymer based edible firm.

Unit 4. Packages of dehydrated products. Orientation, metallization, co-extrusion of multilayer films, stretch, package forms and techniques.
Aspectic packaging, retortable containers, modified and controlled atmosphere packaging, skin, strink and cling film packaging, micro-ovenable containers, other package forms and components of plastics.

Unit 5. Packaging of Finished Goods: Weighing, filling, scaling, wrapping, cartooning, labeling, marking and trapping.

Unit 6	Food Labeling:Standards, purpose, description, types of labels, labeling regulation barcode, nutrition labeling, health claims, mandatory labeling provision.

Semester-VI

Subject-Food Packaging (Practical)

Periods/week		**Credits**	**Max. Marks:**50
L:	T:0 P:4	2	Internal : 30
•			External : 20

1. Identification of different types of packaging and packaging materials.
2. Identify the latest trends in packaging consulting the web sites and magzines.
3. To study the health claims of packaged food.
4. Identify the packaged food labelling and their advantages.
5 Visit to relevant industries and prepare report.