ST.PHILOMENA'S COLLEGE (AUTONOMOUS), MYSORE

(AFFILIATED TO UNIVERSITY OF MYSORE)

REACCREDITED BY NAAC WITH A GRADE

Programme – B.Sc

UNDERGRADUATE SEMESTER SCHEME

CBCS SYLLABUS

The academic year 2018-19 onwards

DEPARTMENT OF FOOD SCIENCE AND NUTRITION

PREAMBLE

The syllabus for undergraduate Food Science & Nutrition is framed in such a way that it is appt for today and also an emphasis on the fundamentals of Food Science and Nutrition. As Food science is a far-reaching discipline that applies the pure science subjects of chemistry, biology and nutrition to the study of the nature, properties, and composition of foods, nutritional constituents, commodities, food quality and deterioration, food preservation, product development, Human physiology, nutrition during lifetime and nutrition for disease conditions as part of the syllabi. This syllabus is framed to give sound knowledge with an understanding of Food Science and Nutrition to under-graduate students of three years of B.Sc. degree course. The program endeavours to provide students with broad-based knowledge and training in Food Science and Nutrition to provide a solid background of basic concepts as well as exposing them to the exciting advancements in the field. They are competent to explore the field of Food and Nutrition widening their scope in areas of Food Industry, Nutritionist, Diet Therapist and much more. The program aims to skill the students with knowledge of the field to gain profitable scopes in matters of career.

The goal of the syllabus is to make the study of Food Science and Nutrition, interesting and encouraging to the students for higher studies including research and also to cater to the needs of quality trained manpower with necessary professional skills in the food industry as well as health sector and to educate the workforce in the field of food science and nutrition.

The syllabus is prepared after discussion at length with the number of faculty members of the subject from institutions and research fields. The units of the syllabus are well defined, taking into consideration the level and capacity of students. The course will take an in-depth look at various aspects of the industry and research.

The Board resolved to implement the following changes in the syllabus from the academic year 2018 – 2019.

ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSURU-570 015

Subject: FOOD SCIENCE AND NUTRITION
Syllabus for B.Sc., under CBCS Scheme.
The Scheme of Teaching & Examination
FROM THE ACADEMIC YEAR -2018 ONWARDS

Semester	Title of the Paper	TYPE	Subject Code	Teaching Hours per Week r Theory/ Practical	Credits Theory/ Practical	Exam Duration in Hours	Max. Marks Theory/Practical		
							Theory/Practical	I A Theory/Practical	Total Marks
I	Paper-I Title: Human Physiology-I	DSC		03	03	03	50	20	100
	Practical Paper-I	DSC		03	1.5	03	20	10	
II	Paper-II Title: Human Physiology-II	DSC		03	03	03	50	20	100
	Practical Paper-II	DSC		03	1.5	03	20	10	
III	Paper-III Title: Principles of Nutrition-I	DSC		03	03	03	50	20	100
	Practical Paper-III	DSC		03	1.5	03	20	10	
IV	Paper-IV Title: Principles of Nutrition-II	DSC		03	03	03	50	20	100
	Practical Paper-IV	DSC		03	1.5	03	20	10	
V	Paper-V Title: Food Science	DSC		03	03	03	70	30	300
	Practical Paper-V	DSC		03	03	03	35	15	
	Paper-VI Title: Life Span Nutrition	DSC		02	01	03	70	30	
	Practical Paper-VI	DSC		02	01	03	35	15	
VI	Paper-VII Title: Food Processing and	DSC		03	03	03	70	30	300
	Practical Paper-VII	DSC		03	03	03	35	15	
	Paper-VIII Title: Diet Therapy	DSC		02	01	03	70	30	
	Practical Paper-VIII	DSC		02	01	03	35	15	
		DSE 1		02	02	02	30	20	50
		DSE 2		02	02	02	30	20	50
					38	-			1100

Discipline Specific Elective (DSE or Soft Core (SC)

SL.No	Title of the Paper	TYPE	Semester	Subject Code	Examination Scheme				
					Theory	Exam Duration in Hours	Theory Max. Marks	I A Max Marks	Total Marks
1.	Immunology And Genetics	DSE	II to IV		2	02	30	20	50
2.	Advances in Nutrition	DSE			2	02	30	20	50
3.	Public Health Nutrition	DSE			2	02	30	20	50
4.	Food Safety and Quality Control	DSE	V And VI		2	02	30	20	50
5.	Nutrition Education	DSE			2	02	30	20	50
6.	Nutrition Counselling	DSE			2	02	30	20	50
7.	Entrepreneurship	DSE			2	02	30	20	50

Note: DSC or HC- Discipline Specific Core (DSC) or Hard Core (HC) & DSE or SC- Discipline Specific Elective (DSE or /Soft Core (SC)

FIRST SEMESTER

FOOD SCIENCE AND NUTRITION (DSC) PAPER-I
Title: HUMAN PHYSIOLOGY - I

Class duration – 03 hours per week. 16 weeks = 48hrs
Marks: Theory - 50 + Internal Assessment - 20= 70 **48 Hours**

Subject description: This course introduces the normal structure and function of the human body. Emphasis will be placed on, the hierarchy of the structural organization, medical terminology, musculoskeletal, cardiovascular, digestive and respiratory systems as well as system relationships. It will provide the foundation to prepare the student for a detailed understanding of Human Nutrition.

Goals:

1. To enable the students to understand the structure and basic physiology of various organs of the body.
2. To obtain a better understanding of the principles of Nutrition through the study of physiology.

Learning outcome: Able to understand the physiological processes and functions as applicable to human nutrition.

Unit- 1 Introduction to the human body **6 hrs**

1.1 Definition of Anatomy and Physiology, Body fluids, Cell, Tissues of the body.

Unit - 2 Skeletal system **6 hrs**

2.1 Structure and functions, Types of bones, Growth of long bone.

Unit – 3 Blood and Circulatory system **10 hrs**

3.1 Blood –composition, RBC, WBC, platelets – Structure, formation and function, coagulation of blood, blood groups and Rh factor,
3.2 Heart – structure and function, circulation of blood and blood pressure
3.3 Principles of blood vessels and its function.

Unit - 4 Digestive System

4.1 Teeth and mastication
4.2 Structure and functions of salivary glands, Pharynx, esophagus, stomach, small and large intestine
4.3 Duodenum, Liver and gall bladder, pancreas
4.4 Process of digestion and absorption of food.

Unit - 5 Respiratory system **6 hrs**

5.1 Respiratory passages
5.2 Physiology of respiration – rate and control

Unit – 6 Organs of special senses **6 hrs**

6.1 Tongue, Nose, Ear, Eye and Skin – Structure and functions.

PRACTICAL-I

1. Introduction to microscope
2. Identification of tissue slides – skeletal, digestive system, heart, lungs
3. Bleeding and clotting time (both methods)
4. Blood groups and Rh factor
5. Estimation of Hemoglobin (Sahli's Method)
6. Enumeration of RBC, WBC, Differential count of WBC

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SECOND SEMESTER

FOOD SCIENCE AND NUTRITION (DSC) PAPER-I

Title: HUMAN PHYSIOLOGY - II

Class duration – 03 hours per week

Marks: Theory - 50 + Internal Assessment - 20= 70

48 Hours

Unit- 1 Endocrine system **14 hrs**

1.1 Structure and functions – Hypo and hypersecretory effect of pituitary thyroid, parathyroid, and the adrenal gland.

1.2 Islets of Langerhans,

Unit - 2 Excretory system **12 hrs**

2.1 Structure of kidney and its functions

2.2 Structure of Nephron and its function – (formation of urine)

2.3 Composition of urine.

2.4 Regulation of water and acid-base balance.

Unit – 3 Nervous system **10hrs**

3.1 Nerve cells, nerve fiber – types, structure

3.2 Brain and spinal cord – structure and function.

3.3 Types of the nervous system (in brief)

Unit - 4 Reproductive system **10 hrs**

4.1 Male and female organs of reproduction structure and function, puberty, Menarche, Reproduction (conception, fertilization) and menopause.

4.2 Mammary glands – structure and physiology of milk production.

Unit - 5 Human genetics **2 hrs**

5.1 Inheritance and variations

PRACTICAL-II

1. Identification of tissues – endocrine, excretory, nervous, reproductive system.

2. Determination of ESR – demonstration
3. Determination of body temperature
4. Determination of blood pressure (under various positions) – demonstration
5. Urine analysis – microscopic observation, pH, glucose and albumin
6. Visit to anatomy and physiology units in medical college. (If Permitted)

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THIRD SEMESTER

FOOD SCIENCE AND NUTRITION (DSC) PAPER-III

Title: PRINCIPLES OF NUTRITION - I

Class duration – 03 hours per week

Marks: Theory - 50 + Internal Assessment - 20= 70 **48 Hours**

Subject description: Principles of Human Nutrition provides an integrated overview of the physiological requirements and functions of protein, energy, and the major vitamins and minerals that are determinants of health and diseases in human populations.

Goals:

1. Provide an overview of the major macro and micronutrients relevant to human health.
2. Recognizing the essential elements/ nutrients with relation to requirement, adequacy, balance, calorie control, nutrient density, moderation and variety for Humans.

Learning outcome:

- Understand the functions and sources of nutrients, role of nutrients in the maintenance of good health.
- Able to identify what foods are good sources for what nutrients. Students will be familiar with factors affecting the absorption of Nutrients.
- Optimal, balanced nutrition is a major determinant of health. It can be used to promote health and well-being, to prevent ill health and to treat disease.
- The study of the structure, chemical and physical characteristics, and physiological and biochemical effects of the more than50 nutrients found in foods underpins the understanding of nutrition.

Unit – 1 Introduction to Nutrition: Concept and definitions of terms- Nutrition, Malnutrition and Health, Scope of Nutrition. **2 hrs**

Unit – 2 Composition of the body

2.1 Chemical composition, body compartments- lean body mass, fat mass, water. 8hrs

2.2 Methods of studying body composition.

Unit – 3 Energy **8 hrs**

3.1 Forms of energy, food as a source of energy, units of measurements.

3.2 Determination of energy content in foods (Bomb calorimeter), physiological fuel values (at water factors), energy expenditure at rest (BMR/RMR)-methods of determination of BMR.

3.3 Factors affecting energy expenditure for physical work, the energy cost of physical activities, post- prandial thermogenesis.

Unit - 4 Macronutrients **2 hrs**

4.1 Introduction, classification and composition

4.2 **Carbohydrates** **10 hrs**

4.2.1 Classification (available, non-available), dietary sources and functions

4.2.2 Digestion, absorption, transport and utilization and excretion.

4.2.3 Glycemic response and glycemic index of foods

4.2.4 Dietary fiber- types, properties, sources and its role

4.3 **Lipids** **8 hrs**

4.3.1 Classification, sources, composition, functions

4.3.2 Distribution- visible and invisible,

4.3.3 Digestion, absorption, transport, utilization, storage & excretion.

4.3.4 Essential fatty acids – sources, function and effect of deficiency.

4.3.5 Cholesterol- sources, functions and implications.

4.4 **Proteins** **10 hrs**

4.4.1 Classification, essential and non-essential amino acids,

4.4.2 Sources – animal vegetable proteins for growth, maintenance and energy

4.4.3 Digestion, absorption, transport, utilization and excretion.

4.4.4 Methods of determining protein quality- PER/growth study, NPU, BV, NDP, chemical score and (PDCAAS).

4.4.5 Protein-energy malnutrition (In Brief).

PRACTICAL-III

1 Food groups: calculation of mean energy, carbohydrates, protein, fat and fiber content of foods using ICMR tables. Preparation of a table for all the food groups and identification of their contributions to Indian diet.

2 Standardization of house-hold measures and hand measures – dry and liquid measures.

3 Identification and preparation of energy and protein rich recipes and method of supplementing energy/protein/carbohydrate/fat to menu items.

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FOURTH SEMESTER
FOOD SCIENCE AND NUTRITION (DSC) PAPER-IV
Title: PRINCIPLES OF NUTRITION - II

Class duration – 03 hours per week
Marks: Theory - 50 + Internal Assessment - 20= 70

48 Hours

Unit - 1 Water **4 hrs**

1.1 Functions, requirements, sources

Unit – 2 Micronutrients **19 hrs**

2.1 **Minerals**

2.1.1 Classification, functions, sources, dietary requirements

2.1.2 Biological availability, body stores, effects of deficiency, toxicity

2.1.3 Calcium, phosphorus, iron, copper, iodine, fluoride, zinc, chromium, magnesium.

2.2 **Vitamins** **19 hrs**

2.2.1 History, classification, sources functions, dietary requirement, effects of deficiency and toxicity.

2.2.2 Fat-soluble vitamins – A,D,E,K.

4.2.2 Water-soluble vitamins - Thiamine, riboflavin, niacin, folic acid vitamin B_{12} and ascorbic acid.

Unit – 3 Recommended dietary allowances for Indians (ICMR) **6 hrs**

3.1 Brief knowledge of derivation, uses, applications and limitations.

3.2 Food groups and their uses.

PRACTICAL-IV

1. Identification of rich sources of vitamin – A, calcium, iron and ascorbic acid. Preparation of nutrient-dense recipes and calculation

2. Determination of edible portions of vegetables and fruit as purchased from the market calculate per cent edible portion and nutrient content (emphasize rich sources).

3. Determination of cooked weights of selected food preparations (in relation to raw weights of major ingredients and portion size).

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FIFTH SEMESTER
FOOD SCIENCE AND NUTRITION (DSC) PAPER-V
Title: FOOD SCIENCE
Class duration – 03 hours per week
Marks: Theory - 50 + Internal Assessment - 20= 70

48 Hours

Subject description: The Fundamental biological, chemical and physical scientific principles associated with the study of foods: topics include biological and chemical composition of food, processing techniques, factors affecting the cooking quality.

Goals:

1. Obtain knowledge of different food groups and their nutritive value, Understand the scientific principles underlying food preparation
2. Develop skill and techniques in food preparation with the conservation of nutrients and palatability using cooking methods generally employed.

Learning outcome: Students will gain the knowledge regarding nutritional classification\ of food, method and media of cooking, nutritive value and processing, storage of all the food groups.

Unit- 1.1 Cereal, Millets and products **7 hrs**

1.1.1 Structure and composition of rice and wheat grains
1.1.2 Starch – types , sources, nature and effect of cooking
1.1.3 Dough development and use in various preparations.

Unit – 1.2 Legumes and oilseeds **7 hrs**

1.2.1 Structure of bean legume
1.2.2 Composition of legumes
1.2.3 Factors affecting the cooking quality of pulses, anti-nutritional factors.
1.2.4 Oilseed meal and their uses.

Unit – 2 Vegetables and fruits **6 hrs**

2.1 Classification of fruits and vegetables
2.2 Effects of cooking on colour, texture and acceptability.
2.3 Browning reaction and its prevention.

Unit – 3.1 Milk and Milk Products **6 hrs**

3.1.1 Composition of milk
3.1.2 Factors affecting the quality
3.1.3 Types of milk product and its uses.

Unit- 3.2 Eggs **6 hrs**

3.2.1 Structure, composition and grading for quality
3.2.2 Factors affecting the quality
3.2.3 Effect of cooking on egg quality
3.2.4 Use of eggs in Indian preparation

Unit- 3.3 Meat, poultry and fish **6 hrs**

3.3.1 Structure of muscle and meat quality, Post – mortem changes
3.3.2 Factors to be considered in the selection and preparation of meat, poultry and fish.

Unit- 4 Fats and oils **6 hrs**

4.1 Physio – chemical properties of fats and oils
4.2 Functions of fat in food
4.3 Importance of smoking point and its application
4.4 Rancidity in fats substitutes/speciality fats

Unit- 5 Sugar and confectionary **2 hrs**

5.1 Crystallization of sugar and its application in food preparations.

Unit 6 Spices and Condiments (In Brief). **2 hrs**

PRACTICAL –V

1. Cereals
   a. Microscopic examination of starch molecules
   b. Gelation of cereal flours (compare the time taken for gel formation)
   c. Observation of cooking time and quality of aged and parboiled rice.
2. Pulses – Effect of soaking, sprouting, the addition of acid and alkali on cooking Quality. (Any one or two pulses)
3. Vegetables and fruits
   a. Effect of adding acid and alkali on Green, Red, Yellow and White vegetables
   b. Methods of preventing browning
4. Milk and milk products, factors affecting curdling of milk (Demonstration)
   Separation of cream and preparation of paneer and khoa (Demonstration)

5. Eggs
    a. Demonstration of grading eggs for quality
    b. Ferrous sulphide formation and prevention
    a. Effect of beating egg white on the stiffness of foam and its uses
6. Sugar cookery – determination of stages of crystallization and its uses
7. Oils – smoking points of oils.
8. Visit to milk processing unit – Submission of report

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FIFTH SEMESTER
FOOD SCIENCE AND NUTRITION (DSC) PAPER-VI
Title: LIFE SPAN NUTRITION
Class duration – 03 hours per week
Marks: Theory - 50 + Internal Assessment - 20= 70

48 Hours

SUBJECT DESCRIPTION: This course will explore how nutrient needs vary during the lifespan, from nutrition during preconception, pregnancy and lactation, infant nutrition, childhood and adolescent nutrition, as well as adult and older adult nutrition. Also to focus on major nutrition-related concerns at each stage of life.

GOALS:

1. To understand the nutrient requirement.
2. To understand the role of nutrition in different stages of the life cycle and meal planning.

LEARNING OUTCOME:

- Describe the physiological and biochemical basis of energy and nutrient requirements during pregnancy and lactation, infancy, childhood, adolescence, and older adults (65+).
- Explain the physiological basis for outcomes related to energy and nutrient inadequacies and excesses, and identify global public health problems in each phase of the life cycle.
- Describe how socioeconomic, cultural and environmental factors influence nutrient needs across the life cycle.

Unit- 1 Food habits of family and community **10 hrs**

1.1 factors affecting food habits and consumption pattern of different age group in India – Pregnant women, lactating mother and children.
1.2 Methods of assessing nutritional status.
1.2.1 Indirect methods – Demography, Vital statistics, Mortality and morbidity patterns, Literacy rate, unemployment rate, Socio –economic profile.
1.2.2 Direct methods – Anthropometry, Clinical assessments, Biochemical estimations, Diet survey. (Reference standards)

Unit- 2 Nutrition during pregnancy & lactation **7 hrs**

2.1 Pregnancy- physiological stages of pregnancy complications of pregnancy, nutritional requirements, food selection.

2.2 Lactation – Physiology of lactation, nutritional requirements

Unit – 3 Nutrition during infancy & early childhood **7 hrs**

3.1 Infancy-Growth and development, nutritional requirements, breastfeeding, Infant formula, weaning and supplementary foods.

3.2 Early childhood – (Toddler/Preschool) growth and nutrient requirements feeding patterns.

Unit – 4 Nutrition during school years & adolescence **7 hrs**

4.1 School children – Nutritional requirements

4.2 Importance of snacks, school lunch,

4.3 Nutritional problem in the school age child

4.4 Adolescence – growth and nutrient needs, food choices, eating habits factors influencing.

Unit- 5 Nutrition of adults & elderly **7 hrs**

5.1 Adulthood – food and nutrient requirements. Nutrition-related problems.

5.2 Elderly – Factors affecting food and nutrient use, Nutrient needs Nutrition Related problems.

Unit- 6 Prevalence of nutrition problems & intervention programmers. **10 hrs**

6.1 Prevalence of nutritional problems in India with special reference to Pre-school children and women, Energy protein Malnutrition, Nutritional Anemia, Deficiency of Vitamin A, Iodine, Fluorine and other vitamin and mineral deficiencies.

6.2 Nutrition intervention programmes – Supplementary feeding, School lunch, Anemia and vitamin A prophylaxis, Goiter control programmes, Integrated child development services, nutrition and health education, Food supplementation, Fortification & enrichment (brief)

PRACTICAL - 6

1. Nutritional anthropometry

a. Taking measurements of heights, weights and mid arm circumference of individual students in the class and comparing them with norms.

b. Taking the above measurements on pre-school children of a nursery school and comparing with NCHS standards, interpretation of data.

2. Planning, calculation and evaluation of normal diets for adults (men and women) pregnant women, lactating women, elderly, preschool, school adolescent (boy & girl) family.
3. Planning, preparation & evaluation of different types of weaning foods and comparing with commercial weaning foods in terms of nutritive value and cost
4. Visit to Anganwadi or mid –day school lunch and other community centers to observe their activities. – Submission of report.

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SIXTH SEMESTER
FOOD SCIENCE AND NUTRITION (DSC) PAPER-VII
Title: FOOD PROCESSING AND PRESERVATION
Class duration – 03 hours per week
Marks: Theory - 50 + Internal Assessment - 20= 70

48 Hours

Subject description: The aim of the course is the students to understand the basic principles of the main methods of food processing and preservation such as blanching, pasteurization, sterilization, canning, aseptic processing, extrusion, cooking, cold storage, freezing, irradiation, high hydrostatic pressure, new non-thermal processing methods and hurdle technology.

Goals:

1. To gain knowledge of basic processing and preservation techniques
2. To know the importance of quality assurance in the food industry.
3. To know the laws and standards ensuring food quality and safety.

Learning Outcomes:

- This course helps the student's to apply basic food science knowledge and get to know biochemical changes occurring during various processing and preservation techniques.
- The changes occurring during various food processing technique also the changes during storage and preservation.
- Understand the basic principles of food preservation methods, including high temperature, drying and dehydration, high pressure, fermentation etc,

Unit- 1 Importance of Food Processing & preservation **6 hrs**

1.1 Types and its uses of the processing; Cereals – rice, wheat and pulses.
1.2 Principles of preservation

1.3 Processing techniques involving physical and chemical changes in foods
1.4 Conventional methods.

Unit- 2 Food Spoilage **8 hrs**

2.1 Causes of food spoilage
2.2 General characteristics of Micro organisms & their importance in foods
2.3 Factors affecting their growth and destruction

Unit – 3 Contamination of Foods **10 hrs**

3.1 Sources, types and methods of preservation.
3.2 Cereal and cereal products, Sugar and sugar products, vegetable and fruits, meat and meat products, fish and other seafood, Canned foods.

Unit – 4 Food preservation **12 hrs**

4.1 Traditional and modern methods.

4.2 **Preservation at a different temperature -**
4.2.1 Food preservation by heat – pasteurization & canning.
4.2.2 Food preservation using low temperature – freezing and refrigeration
4.3 Preservation by dehydration
4.4 Preservation using chemicals
4.5 Irradiation

Unit- 5 Food additives- definition, types, functions and its importance. **4 hrs**

Unit 6 Food adulteration **4 hrs**

6.1 Definitions, types of common adulterants.
6.2 Classification & detection methods of Food adulterants

Unit 7 Sensory Evaluation of Foods **4 hrs**

7.1 Subjective and objective methods of evaluating food acceptability

PRACTICAL –VII

1. Processing techniques of food processing – methods of cooking, germination, Fermentation and malting.
2. Study of micro organisms
   a. Preparation of Bacterial smear and simple staining techniques
   b. Microscopic of observation of yeast & molds
3. Sensory methods of evaluating Food Quality – Recognition, Threshold & other simple tests
4. Preparation of jam or jelly, fruit concentrate, chutneys, pickles, ketchup, dehydrated Products with a demonstration on packaging (standards to be emphasized)

5. Identification of adulterants in common foods

6. Visit to food industry - Collection of information from media. Submission of Report

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SIXTH SEMESTER
FOOD SCIENCE AND NUTRITION (DSC) PAPER-VIII
Title: DIET THERAPY
Class duration – 03 hours per week
Marks: Theory - 50 + Internal Assessment - 20= 70
48 Hours

Subject description: Diet Therapy or medical nutrition therapy explores the role played by therapeutic diets in the treatment of chronic disease and other nutritional disorders. The course introduces the principles of the nutrition care process and will give knowledge and experience in nutrition assessment techniques and intervention strategies as applied to chronic disease and other nutritional disorders, this course will focus on the care of clients with pathologies caused by or causing nutritional impairments. General topics include nutrient delivery via oral, enteral, and parenteral routes, and interactions among foods, nutrients, medications, and supplements.

Goals:

1. To understand the aetiology, physiology and metabolic anomalies of acute and chronic disease and patient needs.
2. To learn the effect of the various disease of nutritional status and nutrient and dietary requirement

Learning Outcomes:

- The students will be able to intervene with the metabolic anomalies of acute and chronic diseases.
- The students will be able to plan a menu for various disease based on their nutritional status and dietary needs.

Unit- 1 Objective of diet therapy **6 hrs**

1.1 Definition of dietetics and clinical nutrition. The team approach to health care

1.2 Role of the dietitian in hospital and community and the importance of dietary counselling.

Unit- 2 Methods of assessing the nutritional status of patients

2.1 Planning, nutritional care for hospitalized patients

Unit – 3 Planning of Hospital diets- **12 hrs**

3.1 The rationale for modifications of nutrients (protein, calorie, sodium, fat and fibre)

and texture
- soft and fluid diets, nutrition in surgical conditions and burns,

3.2 Special feeding methods – enteral and parenteral feeding, Correction/ maintenance of fluid Balance

Unit – 4 Dietary management of nutritional disorders **10 hrs**

4.1 PEM, Vitamin A deficiency,
4.2 Anaemia and other related disorders – underweight and over-weight.

Unit- 5 Dietary management in disorders of organ systems **14 hrs**

5.1 Peptic ulcer, colon disease, constipation and diarrhea
5.2 Liver and gall bladder - hepatitis, cirrhosis
5.3 Cardiovascular – Myocardial infarction, stroke, atherosclerosis, hypertension and Heart failure
5.4 Renal – Nephrotic syndrome, acute / chronic renal failure
5.5 Diabetes Mellitus
5.6 Principles of nutritional management in special conditions – cancer and HIV. **2 hrs**

Unit- 6 Organization and management of Foodservice in a hospital and community feeding centres. **4 hrs**

PRACTICAL –IX

1. Assessing the nutritional status of an individual in health/sickness using Anthropomet and Diet history [dietary recall, food frequency as components
2. Conversion of cooked weights to raw weights, calculation of mean nutritive value-energy, carbohydrate, fat, protein for the food groups and exceptional value (to be used for the diet recall)
3. Planning diets for the hospital dietary
4. Regular diet and its modification – convalescent, liquid, energy, protein, fat and sodium
5. ORS preparation
6. Visit to hospital dietary unit
7. Collection of information from media and report submission.

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DISCIPLINE SPECIFIC ELECTIVES (DSE)

(For 2nd, 3rd&4th Semesters)
Title: - IMMUNOLOGY AND GENETICS
CLASS DURATION – 02 HOURS PER WEEK- 32hrs
MARKS- Theory - 30 + Internal Assessment -20= 50

Subject Description: It is a basic study of immunology and genetics which will focus on the organization of the immune system, the evolution of the immune system, and cellular and molecular mechanisms used by the immune system to protect organisms from both self and disease. Genetics allows understanding normal events such as growth, development and ageing in terms of studying molecular machinery of the cell. This includes the development and functioning of the immune system which protects us from a pathogen.

Goals:

1. To promote critical thinking among students;
2. To provide students with a foundation in immunological processes
3. To provide students with knowledge on how the immune system works building on their previous knowledge from biochemistry, genetics, cell biology and microbiology; be able to clearly state the role of the immune system;

Learning Outcomes: The student shall develop the following:

- An understanding of humoral and cellular immunity and their relative significances to transfusion science theory and practice.
- An understanding of the characteristics of antigens and antibodies.
- An understanding of the nature of antigen-antibody reactions.
- An understanding of genetic disorders.

Unit 1:Immune System **12hrs**

1.1 Introduction to the Immune System Cells and Organs of the Immune system
1.2 Innate immune responses Cells of the innate immune system, Inflammatory response
1.3 Antigen capture and presentation to lymphocytes. Antigen recognition in the adaptive immune system
1.4 Cell-mediated Immune responses. Effector mechanisms of Cell-mediated Immu responses
1.5 Humoral immune responses. Effector mechanisms of Humoral Immune responses

Unit 2:Immunization **7hrs**

2.1 Immunization, vaccines, immunization schedule
2.2 Congenital and acquired Immuno-deficiencies

Unit 3: Genetics **7hrs**

3.1 Introduction to Genetics – Concept of Genes, Chromosome, DNA structure;
3.2 Gene principles; Linkage and Crossing over
3.3 Gene Mutations; Chromosome abbreviations (Numerical and Structural variation)

3.4 Sources of variation; Sex-linked genes, genetic imprinting, polygenic inheritance.

Unit 4: Genetic disorders **6hrs**

4.1 Chromosomal and Gene-linked Syndrome – Down's syndrome, Klinefelter's syndrome, Fragile X syndrome, Turner syndrome, XYY syndrome.

References

1. Immunology. Roitt, L., Brostoff, J. and Male, D. Grower Medical Publishing, London. 1990.
2. Immunology –Instant notes. Lydyard, P.M., Whelan, A., and Fanger, M.W. Viva Books Pvt. Ltd., New Delhi, 2000.
3. An Introduction to Immunology. C.V.Rao. Narosa Publishing House, New Delhi. 2002,
4. Microbiology: Dynamics and Diversity. M. J. Pelczar, R. D. Reid, Chan, E.C.S. New York, Harcourt Brace College Publishers, 1997.
5. Microbiology. Prescott, Lansing M, Harley, John P, Klein, Donald A.Oxford, W M.C. Brown publishers, 1993.
6. Microbiology. Sharma, P.D. Meerut, Rastogi Publications, 1991.
7. Microbiology: An Introduction. Tortora, Gerard, J, Funke, Berdell, R, Case, Christine L. California, Cumming Publishing Company Inc, 1992.

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DSE (For 2nd, 3rd&4th Semesters)
Title: ADVANCES IN NUTRITION
CLASS DURATION – 02 HOURS PER WEEK - 32hrs
MARKS-Theory - 30 + Internal Assessment -20= 50

Subject Description: The online course deals with health-promoting nutritional factors and bioactive constituents, their potential health implications and mechanisms of action. It covers the area of nutritional requirement during special conditions and most common drug-nutrient interactions encountered in patient care.

Goals: This course is designed to:

1. Provide in-depth knowledge of the physiological and metabolic role of various nutrients and their interactions in human nutrition.
2. Enable students to understand the importance of functional foods and nutraceuticals.
3. Enable students to understand the pharmacological actions of nutrients and their implications.
4. Familiarize students with recent advances in nutrition.

Learning outcomes: Students will be able to

- Discuss neutraceuticals and their effects on health.
- Recognize functional food.
- Understand the role of nutritional requirement during the special condition.
- Identify the process of drug and nutrient interaction.

Unit 1: Neutraceuticals **8hrs**

1.1 Introduction & definition
1.2 use of neutraceuticals in health sciences
1.3 Their role in preventing and controlling diseases.

Unit 2: Prebiotics and probiotics **8hrs**

2.1 The usefulness of probiotics and prebiotics in gastrointestinal health and other benefits
2.2 Beneficiary microbes; prebiotics ingredients in foods- types of prebiotics and their effects on gut microbes.

Unit 3:Nutrition for special conditions **8hrs**

3.1 Nutrition and work performance including exercise and sports.
3.2 Nutrition for space, mines and underwater
3.3 Nutrition during disaster and emergency.

Unit 4: Nutrition and drug interactions **8hrs**

4.1 Effect of food on drug absorption, ,
4.2 Effect of drug on digestion
4.3 Absorption, storage and excretion of food/nutrients
4.4 Recent concepts in human nutrition- Nutrigenomics, metabolomines.

References:

1. Gropper, Advanced Nutrition and Human Metabolism. 7th edition. 2017.
2. Ross, Modern Nutrition in Health and Disease. 11th edition. 2012.
3. Srilakshmi.B. Dietetics , New age international Pvt. Ltd. New Dehli, 2007.
4. David L Katz. Nutrition in Clinical Practice: A Comprehensive, avid Evidence-Based Manual for the Practitioner (Nutrition in Clinical Practice), 2nd Edition
5. Carolyn D. Berdanier, Johanna T. Dwyer, Elaine B. Feldman. Handbook of Nutrition and Food, Second Edition

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DSE (For 2nd, 3rd&4th Semesters)
Title: PUBLIC HEALTH NUTRITION
CLASS DURATION – 02 HOURS PER WEEK – 32 hrs
MARKS-Theory - 30 + Internal Assessment -20= 50

Subject Description: This course covers a range of topics around nutritional issues related to population-level health. Community or public health work appeals to many graduates of Nutritional Sciences because it allows them to directly affect the nutritional status of large groups of people. Health inequities, as explained by the social determinants of health, and their impact on nutritional health and well-being are covered in detail. Consideration is given to factors which influence consumer food choices, dietary habits and food consumption patterns including social, cultural and environmental factors.

Goals:

- To provide a better understanding of public health nutrition with a focus placed on the importance of building a sustainable, nutritious and healthy food supply for all.

Learning outcomes:

Students learn the practical aspects of community assessment, policy development, intervention planning, and program management and will have an opportunity to practice the skills necessary to carry out these activities through in-class activities and assignments.

Unit 1	**Common infections and Food Borne illness**	**8hrs**
1.1	Infection through gastrointestinal tract	
1.2	Infection through respiratory tract	
1.3	Infection through skin and mucous membranes & arthropods	
1.4	Foodborne illnesses	
Unit 2	**Environmental Sanitation and Food Safety**	**8hrs**
2.1	Environmental hazards and food chain	
2.2	Control of hazards associated with different foods	
2.3	food safety control programs	
Unit 3	Primary Health Care system	**8hrs**
3.1	Concept of health	
3.2	common health problems in India	
3.3	evolution of health care delivery systems	

3.4 national health policy and national health programs

Unit 4 Primary health care 8hrs

4.1 Health Statistics

4.2 Nutritional Epidemiology

4.3 Demographic and Socio-Economic Transitions

4.4 Nutrition and Health Transitions

References:

1. http://dx.doi.org/10.1136/jech.2004.028985
2. Popkin BM. Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases.Am J Clin Nutr. 2006; 84:28998.
3. WHO Commission on Social Determinants of Health Globalization, Food and Nutrition Transitions, WHO, 2006.
4. Siegel, Jacob SThe Demography and Epidemiology of Human Health and Aging, 2012.
5. Alho, Juha, Spencer, BruceStatistical Demography and Forecasting, 2005.
6. Emily Grundy, Demography and public health, 2011
7. brief.Eldridge, Thomas.Scott, Jonathan.Day, Walter J.Tabachnick Arbovirus Diseases, Medical epidemiology, Kluwer Academic Publishers, 2004.
8. Adetokunbo O. Lucas, Herbert Michael Gilles, Arthropod-Borne Infections, ShortTextbook of Public Health Medicine for the Tropics, 4th edition, CRC Press, 2002.
9. M.W. Service (ed.), The Encyclopedia of Arthropod-transmitted Infections of Man and Domesticated Animals.2001, 579 pp. CABI Publishing, Wallingford,
10. William Marquardt **(ed.),** Biology of Disease Vectors, 2nd Edition, Academic Press, 2004
11. Beaton GH, Bengoa JM, Nutrition in Preventive Medicine. The Major Deficiency Syndrome, Epidemiology and Approaches to Control, World Health Organization, 2008.
12. *https://books.google.com › Science › Life Sciences › Microbiology*
13. S Roday, Food Hygiene and Sanitation, Tata McGraw-Hill Education,01-Nov-1998
14. British Columbia's a foodservice and hospitality industry, Food Safety, Sanitation, and Personal Hygiene2012
15. Rai Bahadur Jaising P. Modi, Elements of Hygiene and Public Health (Second Edition), Copyright © 1920 Elsevier Ltd

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DSE (For 5th & 6th Semesters)
Title: FOOD SAFETY AND QUALITY CONTROL
CLASS DURATION – 02 HOURS PER WEEK- 32 hours
MARKS-Theory - 30 + Internal Assessment -20= 50

Subject Description: The primary objective of this course is to develop the students' understanding of food safety and quality management, provide them with knowledge of safety and sanitation that can be applied in food preparation. This course also aims at enriching the minds of those students who have an interest in learning the course in the broader context of food safety and quality management.

Goals: It aims to develop a multidimensional understanding

1. Be familiar with food safety hazards.
2. Analyze hazards that might contaminate foods and causes of foodborne illnesses.
3. Apply the Hazards Critical Control Point (HACCP) system as part of food safety and quality management.

Learning outcomes: Students will be able to: a) be familiar with food safety hazards; b) analyze hazards that might contaminate foods and causes of foodborne illnesses; c) apply the Hazards Critical Control Point (HACCP) system as part of food safety and quality management.

Unit 1: Concept of food safety and quality **8hrs**

1.1 Meaning, objectives, quality dimensions of food
1.2 Assurance of food safety
1.3 International food regulatory systems
1.4 National food regulation
1.5 Food safety management tools
1.6 Food hazards

Unit 2: Food hygiene and sanitation **8hrs**

2.1 General principles of food hygiene, ,
2.2 personal hygiene and food handling habits
2.3 sanitary aspects of water supply,
2.4 Cleaning agents and waste disposal.

Unit 3: Food packaging **8hrs**

3.1 Principles and importance of packaging
3.2 food packaging materials and forms
3.3 food and nutritional labeling
3.4 packaging materials hygiene and safety

Unit 4: Food laws and standards **8hrs**

4.1 Need for food laws
4.2 Indian food laws
4.3 integrated food law
4.4 International food laws.

References:

1. Mahindra SN (2000) Food Safety-A techno-legal analysis. Tata McGraw New Publishing Company Limited, New Delhi.
2. Prevention of Food Adulteration Act, 1954 (1998). Law Publishers (India) Pvt Ltd New Delhi.
3. Heijden KVD., Younes M., Fishbein I and Miller S (1999). International Food Safety Handbook. Marcel Dekker, New York.
4. Omaye ST (2004) Food and Nutrition toxicology.CRSPress, New York.
5. http//www.fssai.gov.in

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DSE (For 5th & 6th Semesters)
Title: NUTRITION EDUCATION
CLASS DURATION – 02 HOURS PER WEEK- 32 hours

MARKS-Theory - 30 + Internal Assessment -20= 50

Subject Description: This course covers a range of topics related to providing evidence-based nutrition information to individuals as well as population-level health. It is designed to be an introductory course in nutrition education and theory within the Nutritional Sciences major. Students will explore the tenets of communication, education, and behavioural theories and models pertinent to the development and dissemination of nutrition information.

Goals: The course aims to build healthy food-related practices and outlooks, as well as understanding, in communities, groups and individuals.

Learning outcomes: Students will be able to demonstrate a variety of communication strategies in nutrition and food education emphasizing information technology.

- Produce oral and written communications for a group education session
- Interview individuals for diet histories
- Counsel individuals

Unit 1: Communication in nutrition counselling **8hrs**

1.1 Definition and significance of communication
1.2 Communication skills
1.3 Organizational communication and training
1.4 Professional communication and team collaboration

Unit 2: Designing and counselling plans **8hrs**

2.1 Assessment component
2.2 Data analysis
2.3 Writing goals and objectives
2.4 planning learning experience

Unit 3: Counseling approaches and counselling application **8hrs**

3.1 Approaches to counseling
3.2 Counseling therapies
3.3 Models for learning
3.4 Evaluation of learning and self-management

Unit 4: Implementation and evaluation aspects of counselling **8hrs**

4.1 Nutrition counseling for diabetes mellitus
4.2 Nutrition counseling for cardiac problems and hypertension
4.3 Nutrition counseling for obesity
4.4 Ending counselling sessions

References

1. Dick, L. (2013) Nutrition Counseling and Education Skill Development, Second Edition, Journal of Nutrition Education and Behavior, 45: 383-388.
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3. Monk, A., Barry, B., McClain, K., Weaver, T., Cooper, N., Franz, M.J. Practice guidelines for medical nutrition therapy provided by dietitians for persons with non-insulin-dependent diabetes mellitus. J Am Diet Assoc. 1995;95:999–1006
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5. Milkererr, J., Graves, J.S. Follow-up dietary counselling benefits attainment of intake goals for total fat, saturated fat, and fibre. J Am Diet Assoc. 1992;92:603–605.
6. Weese, N., Jones, J., Miller, M.A. Successful strategies for reimbursement of outpatient nutrition services. J Am Diet Assoc. 1993;93:458–459.
7. Walker, B.H., Beman, M.K.M., Tomazic, T.J., Sawicki, M.A., Sawicki, M.A. (2000).Provision of Nutrition Counseling, Referrals to Registered Dietitians, and Sources of Nutrition Information Among Practicing Chiropractors in the United States. Journal of Academy of Nutrition and Dietetics, 100 (8): 928-933.

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FOOD SCIENCE AND NUTRITION DSE (For 5th & 6th Semesters)
Title: ENTREPRENEURSHIP
CLASS DURATION – 03 HOURS PER WEEK
MARKS-Theory - 30 + Internal Assessment -20= 50

Subject Description: Food and nutrition entrepreneurship addresses significant and ongoing changes in the food industry by preparing students with sound nutrition principles and business acumen that will allow them to competitively participate in a growing field. It encompasses key topics for future nutrition entrepreneurs, whether they may be innovating within a company or organization or launching a food or nutrition-related business.

Goals: Entrepreneurship Development in Food Processing incorporates specialized modules to cover recent trends and advances in the food process, global food business, policy transitions, trade investments and safety regulations in the food business

Learning outcomes: Students will be able to:

- Starting and managing a food processing organization by exploring the market.
- Identifying opportunities in food processing
- Innovating and giving a different dimension to products.

Unit 1: Introduction **8hrs**

1.1 Importance of entrepreneurship and its relevance in career growth

1.2 entrepreneurship and enterprise

1.3 Types of enterprise

1.4 Charms of being an entrepreneur

1.5 Creativity and innovation and Problem-solving

Unit 2: Business Plan **7hrs**

2.1 Importance, Content, Preparing a business plan.

2.2 Business Communication – the importance

2.3 Oral and written communication

2.4 Improvement exercises.

Unit 3: Accounting **2 hrs**

3.1 Books of accounts – Importance of accounting assessment

3.2 Different books

3.3 Accounting Stationery, Operating mechanism

3.4 Financial Statements - Importance and interpret action

3.5 Profit and loss account

3.6 Balance Sheet, Cash – flow and fund flow

Unit 4: Marketing Management **10hrs**

4.1 Marketing for small business

4.1.1 Sales promotion – Strategies

4.1.2 Tools and techniques

4.1.3 Pricing policy

4.2 Export marketing

4.2.1 Understanding international business environment,

4.2.2 Do's and don'ts for exports

4.3 Legal implication

4.3.1 Income tax, Sales, excise, ,

4.3.2 Labour laws

4.3.3 factory act, etc

4.4 Supporting Entrepreneurship

4.4.1 IDBI, KSFC, KSSIDC

4.4.2 Small scale trades

4.4.3 Rozgar Yojana

4.4.4 Self-employment programme for woman.

References:

1. Small Scale Industries and Entrepreneurial Development by C.S.V. Murthy.
2. Entrepreneurship and Small Business Management by C.B. Gupta and Khanka.
3. Entrepreneurial Development by S.Anil Kumar, S.C.Poornima, M.K.Abraham and K. Jayashree
4. Small Business Management and entrepreneurship by Vasant Desai.

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BLUE PRINT OF QUESTION PAPER-FSN

Time – 03 hours Max marks- 60

SEMESTER- I, II, III and IV.

Part A			
1.	Define/Answer any **TEN** of the following:		10×2=20
	a.		2
	b.		2
	c.		2
	d.		2
	e.		2
	f.		2
	g.		2
	h.		2
	i.		2
	j.		2
	k.		2
	l.		2
Part B			
Write notes on any FOUR of the following:			4×4=16
2			4
3			4
4			4
5			4
6			4
7			4
PART C			
Give a detailed account of any THREE of the following:			3×8=24
8			8
9			8
10			8
11			8
12			8

BLUE PRINT OF QUESTION PAPER-FSN
Time – 03 hours Max marks- 70
SEMESTER- V and VI

Part A		
1	Define/Answer any **TEN** of the following:	10×2=20

.	a.		2
	b.		2
	c.		2
	d.		2
	e.		2
	f.		2
	g.		2
	h.		2
	i.		2
	j.		2
	k.		2
	l.		2
Part B			
Write notes on any **SIX** of the following:			6×5=30
2			5
3			5
4			5
5			5
6			5
7			5
8			5
PART C			
Give a detailed account of any **TWO** of the following:			2×10=20
9			10
10			10
11			10

Blue Print of question paper - DSE
Time-02Hrs Max Marks-30

Part-A		
1.	**Define /Explain any five of the following:**	**5x2=10M**

	a		**2**
	b		**2**
	c		**2**
	d		**2**
	e		**2**
	f		**2**
Part-B			
	Write a note on any Four of the following:		**4x5=20M**
2			**5**
3			**5**
4			**5**
5			**5**
6			**5**

Internal assessment =20Marks
1. Seminar-10M
2. Test/Quiz-10M