THE GANDHIGRAM RURAL INSTITUTE - DEEMED TO BE UNIVERSITY
GANDHIGRAM - 624302, DINDIGUL DISTRICT, TAMIL NADU
(MINISTRY OF EDUCATION, GOVERNMENT OF INDIA)

DEPARTMENT OF HOME SCIENCE

M.Sc. FOOD SCIENCE AND NUTRITION

SYLLABUS

(With effect from July 2024)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 1	Create knowledgeable, skilful and competent workforce to manage available resources at family/community to establish holistic society.
PEO 2	Equip the learners with scientific knowledge in food handling, processing, quality control and assurance
PEO 3	Acquire skills required for menu planning, preparation of normal and therapeutic diet
PEO 4	Practice the profession with a set code of ethics and values

PROGRAMME OUTCOME (PO)

PO 1	Acquire in depth knowledge in areas of food science, biochemistry and food microbiology
PO 2	Gain analytical skills in the field of Food Science and Nutrition
PO 3	Enable the students to learn the methods of assessing human nutritional requirements, nutritional assessment and diet planning
PO 4	Analyse and evaluate the quality of food ingredient (s) and processed products in compliance with food laws and standards
PO 5	Formulate diet to meet the nutrient requirements of the individuals at normal, ill, critical and emergency conditions.
PO 6	Disseminate food and nutrition information effectively to the general public
PO 7	Acquire skills to undertake systematic research in the area of food science and nutrition
PO 8	Understand the applications of nutritional sciences in clinical interventions, communication for health promotion, food service management, food science and processing
PO 9	Conduct awareness programmes to address nutrition related health issues and devise strategies to combat nutritional disorders/diseases.
PO 10	Practice nutrition care in collaboration with other health-care providers in interdisciplinary settings within the bounds of ethical, legal, and professional practice standards.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO 1	Apply the basic principles of food science and nutritional sciences for the welfare of the community
PSO 2	Critically evaluate the problems prevailing in community and food industry
PSO 3	Extend the knowledge gained in Food Science, Food Processing, Dietetics and Nutrition to address the problems
PSO 4	Design projects in formulation of new food products of therapeutic importance and supplements for well being
PSO 5	Enable to pursue Higher education and Research in the area of Food Science and Nutrition
PSO 6	Acquire skills to establish startups related to food products, diet kitchens and Food Business Organizations
PSO 7	Apply the knowledge gained from the domain areas for clinical intervention, diet planning and communication for health promotion, food service management and food processing and preservation

M.Sc.FoodScienceandNutritionDe

greeProgrammeOutline

S.No	Category	No.ofcredits	
1.	GandhiinEverydayLife	02	**10**
2.	CommunicationandSoftSkills	02	
3.	Village Placement Programme	02	
4.	Ethics in Food and Nutrition Research	04	
3.	**Core Courses**		**85**
	i) Dissertation	06	
	ii) Modular Course: (2 Courses)	04	
	iii) Electives: a) Discipline Centric (1course) b) Generic (1courses)	03 03	
	iv) Major Course:	61	
	v) Internship/FieldVisit	08	
	Total		**95**

M.Sc. FOOD SCIENCE AND NUTRITION
SCHEME OF INSTRUCTION AND EVALUATION

S.NO	Course Code	Title of the Paper	Credits	Contact Hours			Max. Marks		
				T	P	Total	CFA	ESE	Total
I SEMESTER									
1.1	24FSNP0101	Applied Physiology	4	4	0	4	40	60	100
1.2	24FSNP0102	Nutritional Biochemistry	4	4	0	4	40	60	100
1.3	24FSNP0103	Applied Physiology and Nutritional Biochemistry practical	2	0	4	4	60	40	100
1.4	24FSNP0104	Advanced Food Science	4	4	0	4	40	60	100
1.5	24FSNP0105	Advanced Nutrition	4	4	0	4	40	60	100
1.6	24FSNP0106	Advanced Food Science and Nutrition practical	2	0	4	4	60	40	100
1.7	24FSNP0107	Field visit/Industrial visit	2	0	0	2	50	-	50
1.8		Gandhi in Everyday Life	2	2	0	2	50	-	50
		Total	**24**	**18**	**8**	**28**			700
II SEMESTER									
2.1		Research Methods and Statistics	4	4	0	4	40	60	100
2.2	24FSNP0208	Food Microbiology and Safety	4	4	0	4	40	60	100
2.3	24FSNP0209	Food Processing Technology	4	4	0	4	40	60	100
2.5	24FSNP0210	Food Processing Technology Practical	2	0	4	4	60	40	100
2.4	24FSNP0211	Nutrition Through Life Cycle	3	3	0	3	40	60	100
2.6	24FSNP02GX	Generic Electives	3	3	0	3	40	60	100
2.7		Communication & Soft skills	2	2	0	2	50	-	50
2.8	24FSNP0212	Summer Internship/Mini Project*	2	0	2	2	50	-	50
		Total	**24**	**20**	**6**	**26**			700
III SEMESTER									
3.1	24FSNP0313	Therapeutic Nutrition	4	4	0	4	40	60	100
3.2	24FSNP0314	Therapeutic Nutrition Practical	2	0	4	4	60	40	100
3.3	24FSNP0315	Food Product Development and marketing	4	4	0	4	40	60	100
3.4	24FSNP0316	Food Product Development and marketing Practical	2	0	4	4	60	40	100
3.5	24FSNP0317	Nutrition in Critical Care	4	4	0	4	40	60	100
3.6	24FSNP03DX	Discipline Centric Electives	3	3	0	3	40	60	100
3.7	24FSNP03MX	Modular Course	2	2	0	2	50	-	50
3.8	24EXNP03V1	Village Placement Programme	2	0	2	2	50	-	50
		Total	**23**	**17**	**10**	27			700
IV SEMESTER									
4.1	24FSNP03MY	Modular Course	2	2	0	2	50	-	50
4.2	24FSNP0418	Ethics in Food and Nutrition Research	4	4	0	4	40	60	100
4.3	24FSNP0419	Public Health Nutrition	4	4	0	4	40	60	100
4.4	24FSNP0420	Functional Foods and Nutraceuticals	4	4	0	4	40	60	100
4.5	24FSNP0421	Internship –II**	4	0	4	4	100	-	100
4.6	24FSNP0422	Dissertation	6	0	12	12	75	75+50	200
		Total	**24**	**14**	**12**	**30**			650

***II Semester Break, **IV Semester Break**

Gross Total of I +II + III+ IV Semester credits= 24+24+23+24=95

ii. Modular Courses

S.No	Course Code	Course Title	Credits		
			T	P	Total
1	24FSNP03M1	Food Dehydration	2	-	2
2	24FSNP03M2	Computer Applications in Nutritional Sciences	2	-	2
3	24FSNP03M3	Food Quality Evaluation	2	-	2
4	24FSNP04M1	Fitness Nutrition	2	-	2
5	24FSNP04M2	Nutritional Assessment	2	-	2
6	24FSNP04M3	Nutrition Counselling	2	-	2

iii. a. Discipline Specific Elective Courses

S.No	Course Code	Course Title	Credits		
			T	P	Total
1	24FSNP03D1	Instruments for Food Analysis	3	-	3
2	24FSNP03D2	Nutrigenomics and Nutrigenetics	3	-	3
3	24FSNP03D3	Family and Community Science	3	-	3
4	24FSNP03D4	Nutrition Through Life Cycle	3	-	3
5	24FSNP03D5	Food Toxicology	3	-	3
6	24FSNP03D6	Food Quality Control and Assurance	3	-	3

iii. b. Generic Elective Courses

S.No	Course Code	Course Title	Credits		
			T	P	Total
1	24FSNP02G1	Culinary Nutrition	3	-	3
2	24FSNP02G2	Nutrition for Health	3	-	3
3	24FSNP02G3	Food Preservation and Packaging	3	-	3
4	24FSNP02G4	Nutrition Therapy in Non-Communicable Diseases	3	-	3

VALUE ADDED COURSES

S.No	Course Code	Course Title	Credits		
			T	P	Total
1	24FSNP0VA1	Designing of Diet	-	-	2
2	24FSNP0VA2	Art of Baking	-	-	2
3	24FSNP0VA3	Food Preservation	-	-	2
4	24FSNP0VA4	Food Laws and Adulteration	-	-	2

iv) Major Courses

S. No.	Course code	Course Title	Credits		Total
			T	P	
1.	24FSNP0101	Applied Physiology	4	0	4
2.	24FSNP0102	Nutritional Biochemistry	4	0	4
3.	24FSNP0103	Applied Physiology and Nutritional Biochemistry Practical	0	2	2
4.	24FSNP0104	Advanced Food Science	4	0	4
5.	24FSNP0105	Advanced Nutrition	4	0	4
6.	24FSNP0106	Advanced Food Science and Nutrition Practical	0	2	2
7.	24FSNP0208	Food Microbiology and Safety	4	0	4
8.	24FSNP0209	Food Processing Technology	4	0	4
9.	24FSNP0210	Food Processing Technology Practical	0	2	2
10.	24FSNP0211	Food Business Operations	3	0	3
11.	24FSNP0313	Therapeutic Nutrition	4	0	4
12.	24FSNP0314	Therapeutic Nutrition Practical	0	2	2
13.	24FSNP0315	Food Product Development and Marketing	4	0	4
14.	24FSNP0316	Food Product Development and Marketing Practical	0	2	2
15.	24FSNP0317	Nutrition in Critical Care	4	0	4
16.	24FSNP0418	Ethics in Food and Nutrition Research	4	0	4
17.	24FSNP0419	Public Health Nutrition	4	0	4
18.	24FSNP0420	FunctionalFoodsandNutraceuticals	4	0	4
19.		Research Methods and Statistics	4	0	4
20.	24FSNP0107	Field visit/Industrial visit	-	2	2
21.	24FSNP0212	Summer Internship-I/Mini Project*	-	2	2
22.	24FSNP0421	Internship–II**	-	4	4
23.	24FSNP0422	Dissertation	-	6	6
		Total=	**55**	**24**	**79**

I SEMESTER

Core Paper- Applied Physiology

Course Code: 24FSNP0101 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand the structure and functions of systems in human body.
2. acquire knowledge on the integrated function of all systems and disease conditions.

Course Outcomes:

On successful completion of this course the student will be able to:

- address the structure and functions of systems in human body.
- integrate the functions of all the systems and disease conditions.

Course content

UNIT I

Cell structure and function: A review of levels of cellular organization and functions: organelles, tissues, organs and systems. Cell membrane, transport across cell membrane and intercellular communication. Structure and function of bone, cartilage and connective tissue.

Digestive system: Review of structure and function (brief).Role of liver, gall bladder pancreas and their functions in absorption. Regulation of nutrient intake and food selection. Meal related gastric secretion- Cephalic, Gastric, Inhibitory, Gastric emptying and regulation.

UNIT II

Respiratory system: Review of structure and functions. Role of lungs in the exchange and transport of gases. Respiratory volumes.

Excretory system:Review of structure and functions. Nephron-Structure and functions Urine formation. Role of kidney in maintaining pH of blood. Water - acid base balance, diuretics. Skin and its structure, regulation of body temperature.

UNIT III

Circulatory system: Structure and functions of heart and blood vessels. Blood: Composition- plasma, blood cells, haemoglobin, blood clotting process. Heart: Beat initiation, conduction and regulation. Cardiac cycle E.C.G. & its interpretation, Heart rate & regulation, physiology of circulation. Lymphatic system.

Erythropoesis: Role of various hormones in controlling Erythropoesis. Pathophysiology-Anaemia, Iron deficiency anaemia, etiology and classification. Castle's experiment-

Pernicious anaemia, causative factors, extrinsic, intrinsic factors. Folic acid and B12 deficiency methylation, megaloblasticanemia, clinical features, prevention of B12 deficiency. Patho-physiology of Jaundice

Immune system:Cell mediated and humoral immunity. Activation of WBC and production of antibodies. Role in inflammation and defense. Effects of Vitamins on immune response. Cell mediated and humoral immunity – impact of malnourishment and auto immune disease.

UNIT IV

Endocrine system: Endocrine glands – Pituitary, thyroid, adrenals, pancreas- hormones of endocrine glands-its functions and role. Disorders of endocrine glands.

Reproductive system: General anatomy of female and male reproductive system. Menstrual cycle, spermatogenesis, Oogenesis, process of reproduction, Pregnancy and parturition.)Mammary glands- structure and lactation. Physiological changes in Menopause. Role of hormones, home based nutrition to combat menopause.

UNIT V

Nervous system: Review of CNS & ANS, function of neuron, conduction of nerve impulse, synapse, role of neurotransmitters. Blood brain barrier, CSF. Hypothalamus and its role in various body functions –sleep, memory and obesity.

Sense organs: Review of structure and function skin, eye, ear, nose and tongue in perception of stimuli.

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1. Sarada Subramanyam, Madhavankutty. K and Singh.H.D (2001). Textbook of Human Physiology, S. Chand & company Ltd, New Delhi.
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8. Guyton, A.C, (1985): Function of the Human Body, 4th Edition, W.B. Sanders Company, Philadephia.
9. Guyton, A.C, and Hall, J.B. (2020). Text Book of Medical Physiology, 3rd edition; Elsevier Health Science.
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11. McArdle, W.D., Katch, F.I. and Katch, V.L. (1996). Exercise Physiology. Energy, Nutrition and Human performance, 4th Edition, Williams and Wilkins, Baltimore.
12. Jain A. K (2014) Human Physiology for BDS (5th Edition), Publisher: Avichal Publishing Company; ISBN: 9788177394337.

APPLIED PHYSIOLOGY

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO I	Address the structure and Functions of systems in human body	3	2	1	2	3	2	3
CO2	Integrate the functions of all the Systems and disease conditions	1	1	2	3	3	3	3

Core Paper - Nutritional Biochemistry

Course Code: 24FSNP0102 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand the mechanisms adopted by human body for regulation of metabolic pathways
2. gain an insight into interrelationships between various nutrients metabolic path ways.

Learning Outcomes

On successful completion of these units, students are expected to:

- describe the concepts and chemistry of major nutrients
- explain the macronutrient and nucleic metabolism and its bioenergetics
- understand the role of antioxidants in prevention of degenerative diseases

Course content

UNIT I

An overview of bio-macromolecules:carbohydrates, lipids, amino acids, proteins andnucleic acids.Definition, classification, structure and properties of glycoproteins and proteoglycans. Disorders of carbohydrate, lipid and amino acid metabolism.

Plasma proteins: classification, types,nature, properties and functions.

Enzymes: General properties, classification, co-enzymes and co-factors, kinetics of enzymes. Enzyme activation, inhibition, regulation, enzyme specificity, mechanism of action, multi enzyme systems, isoenzymes, allosteric enzymes, and purification of enzymes .Application of enzymes in diagnostics (SGPT, SGOT, Creatine kinase & Alkaline phosphatase)

UNIT II

Metabolism of major nutrients and its bioenergetics: carbohydrates– glycolysis, gluconeogenesis, citric acid cycle, hexose monophosphate pathway and their regulation and electron transport chain

Fat: Synthesis of fatty acids, phospholipids and cholesterol and β-oxidation of fatty acids, ketogenesis.

Protein metabolism- protein biosynthesis

UNIT III

Nucleic acids chemistry and metabolism of nucleic acids: definition, components, nucleosides, nucleotides, structure of DNA and RNA, types of RNA, replication, transcription, Review of structure and composition of nucleic acids.

Purine and pyrimidine: synthesis and breakdown. Nucleic acids: DNA replication and

transcription, DNA repair systems, Genetic mutation, regulation of gene expression.

UNIT IV

Hormones: Regulation of endocrine system, classification of hormones according to their mechanism of action, mechanism of action of hormones Insulin and thyroxine.

Minerals: Biological role of minerals-Iron, Iodine, copper, cobalt, molybdenum, zinc, calcium, phosphorus and selenium. Detoxification and xenobiotics: metabolism of foreign compounds

UNIT V

Free Radicals and Antioxidants: Definition, classification of antioxidants, generation of free radicals and role of antioxidants in prevention of degenerative disorders (Cancer, CVD and Diabetes Mellitus).

REFERENCES

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6. Voet, D. Voet, J.G and Pratt, C.W. (1999): Fundamentals of Biochemistry Oser, B.L., (1965) 14th ed. Hawk's Physiological Chemistry. Tata McGraw Hill Publishing Co.Ltd
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NUTRITIONAL BIOCHEMISTRY

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO1	**PSO2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO I	To describe the concepts and chemistry of major nutrients	2	1	2	2	3	1	2
CO2	To explain the macro nutrient and nucleic metabolism and its bio energetic	2	1	1	2	2	1	2
CO3	To understand the role of antioxidants in prevention of degenerative diseases	1	1	2	2	1	1	2

Core Paper - Applied Physiology and Nutritional Biochemistry Practical

Course Code: 24FSNP0103 Credits: T0+P2 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand the methods used for studying the physiological functions of the body
2. impart knowledge on analyses of selected constituent in blood and urine sample

Course Outcomes:

On successful completion of these units, students are expected to:

- comprehend the structure and function of the various organs of the body
- acquire the skill in collection of blood and urine samples for testing
- develop the skill in handling analytical equipments
- perform blood and urine analysis and also interpret the condition of the individuals based on the biochemical changes**.**

Experiment-I

1. Measurement of Pulse, BP and Oxygen Saturation
2. Study of permanent slides of GI organs
3. Estimation of Total Red Blood Cell count, White Blood Cell count
4. Blood grouping
5. Determination of Bleeding time
6. Determination of bleeding time
7. Estimation of haemoglobin
8. Recording of BP at rest and after exercise
9. Reading and interpretation of ECG

Experiment- II

1. Methods of collection of blood. Separation of serum and plasma
2. Estimation of glucose
3. Estimation of serum creatinine
4. Estimation of serum bilirubin
5. Estimation of serum albumin
6. Estimation of serum cholesterol
7. Estimation of serum urea
8. Estimation of total protein, AG Ratio,
9. Estimation of SGPT /SGOT
10. Estimation of serum alkaline phosphatase or acid phosphatises

Experiment - III

1. Qualitative analysis of urine sugar, albumin, ketone bodies and bile salts
2. Determination of Urine PH, Specific gravity
3. Estimation of Urine–Sugar, Albumin, Bile salts, Calcium, Creatinine, Urea and Uric acid

REFERENCES

1. Ganong W.F. (2003).Review of Medical Physiology (24th ed). McGraw Hill.
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APPLIED PHYSIOLOGY AND NUTRITIONAL BIOCHEMISTRY PRACTICAL

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO I	Comprehend the structure and function of the various organs of the body	1	1	2	1	1	1	1
CO2	Acquire the skill in collection of blood and urine samples for testing.	2	2	2	1	3	1	1
CO3	To develop the skill in handling analytical equipments	1	1	1	1	3	3	1
CO4	To perform blood and urine analysis and also interpret the condition of the individuals based on the bio chemical changes.	1	1	1	1	3	2	2

Core Paper - Advanced Food Science

Course Code: 24FSNP0104 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. familiarize the students with changes occurring in various foodstuffs as a result of processing and cooking
2. enable the students to use the theoretical knowledge in various applications and food preparations.

Course Outcomes:

On successful completion of this course the student will be able to apply:

- the characteristics and behaviour of food constituents during processing
- the changes in physiochemical and functional properties of food constituents due to processing

Course content

UNIT I

Constituents of Foods: Structure and properties of water and ice; Types of water; Sorption phenomena; Water solution interactions; Phase transition of foods containing water; heat transfer during processing; relationship between viscosity and temperature; Water activity and food spoilage; Food dispersion: Colloidal system, and rheology of food dispersions; Structure, formation and stability of gels, sols, emulsion and foams.

UNIT II

Polysaccharides, Sugars and Sweeteners: Structure and composition of starch; Properties and characteristics of food starches; Effect of heat on food starch properties and the factors influencing gelatinization and dextrinisation changes; Modified food starches; Structure, composition and characteristics of non-starch polysaccharides such as cellulose, hemicellulose, pectin and gums; Role of starch and non-starch polysaccharides in food and industrial applications; Properties of sugars and sweeteners: Sugars, syrups, sugar alcohols, potent sweeteners, sugar products; Role of sweetener in food products.

UNIT III

Proteins and Enzymes: Amino acid - types and their properties; Structure and composition of proteins; Classification and properties of proteins; Effect of heat on physio-chemical properties of proteins; Role of proteins in food products; Texturized vegetable protein, protein concentrate and isolates preparation methods; Enzymes: Classification and its nature; Mechanism of action; Factors influencing enzyme

activity; Role of enzymes in food products; Immobilized enzymes and its application in food industries.

UNIT IV

Fat/Oil: Structure and composition of fat; properties of fat, Oil composition and the properties; Methods to determine the quality of fat/oil; Quality changes in fat/oil during storage and prevention of fat spoilage; Role of fat/oil in food products; Fat substitutes. Role of food lipids in flavor, physiological effects of Lipids.

UNIT V

Food Colours and Flavours: Pigments classification, structure and properties; Effects of processing on stability of pigments in foods and the factors influencing stability of colours in foods; Role of colours in food products; Flavors: Taste and nonspecific saporous sensations, Flavour compounds in vegetables, fruits and spices; role of flavours in food. Effect of processing on food flavours and the concept of microencapsulation

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ADVANCED FOOD SCIENCE

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
COI	The characteristics and behaviour of food constituents during processing	3	2	2	1	3	3	3
CO2	The changes in physiochemical and functional properties of food constituents due to processing	3	2	2	1	3	3	3

Core Paper- Advanced Nutrition

Course Code: 24FSNP0105 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. highlight the physiological and metabolic role of nutrients and their relationship to human health and wellbeing.
2. understand the health problems associated with nutrients deficiency or toxicity
3. plan and prepare the nutritional challenges during travel to extreme conditions such as hot, cold, high altitude and space.

Course Outcomes:

On successful completion of the course, the student would know

- acute and chronic nutritional problems
- physiological changes in human body during exposure to extreme climatic conditions
- the role and importance of nutrition management in exercise and sport performance
- the coping mechanism of human body during high altitude and sea travel
- the preparedness and nutrition management during emergencies

Course content

UNIT I Macro nutrients

Energy: Energy requirements of individuals and groups: RDA, principles and the methods used for RDA measurement. Concept of energy balance, energy input and expenditure; Measurement of energy input and expenditure; factors influencing energy expenditure.

Carbohydrate, Protein, Lipid& Dietary fibre: Physiological functions, digestion, absorption, metabolism and utilization, food sources, requirements.

Water: Physiological functions, digestion, absorption, metabolism and utilization, food sources, requirements.

UNIT II Micronutrients

Vitamins: Physiological functions, digestion, absorption, metabolism and utilization, food sources, requirements, deficiency and toxicity.

Minerals: Physiological functions, digestion, absorption, metabolism and utilization, food sources, requirements, deficiency and toxicity.

UNIT III Exercise and Sports Nutrition

Meaning of exercise and physical activity, type of activities, effect of physical activity and exercise on body system; energy systems during exercise; Energy cost of exercise; Nutrition management during exercise.

Sports Nutrition: Need and scope of sports nutrition; Preparation for competition such as pregame meal, meal during game and post game meal; Concept of carbohydrate loading and the methods of carbohydrate loading; Nutrition management during sports/game; Ergogenic aids in sports.

UNIT IV High altitude and space nutrition

Physiological changes due to high altitude; Acclimatization process; Altitude sickness and related health problems; Nutrient requirements and dietary management of mountaineers.

Space Nutrition: Need and scope for space travel; History of space travel; Physiological changes in astronauts; Nutrient requirement and dietary management during space travel.

UNIT V Emergency nutrition

Nutrition in Emergencies: Need and importance; Types of emergency situations such as natural and manmade; Nutritional and health problems in emergencies; Control of communicable diseases through sanitation and immunization; Food distribution strategies; Nutrient requirement and dietary management during emergencies.

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ADVANCED NUTRITION

Course Outcomes		**Programme Specific Outcome (PSO)**						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO I	Acute and chronic nutritional problems	3	2	2	1	1	2	2
CO2	Physiological changes in human body during exposure to extreme climatic conditions	3	2	2	1	1	2	2
CO3	The role and importance of nutrition management in exercise and sport performance	3	2	2	1	1	2	2
CO4	The coping mechanism of human body during high altitude and sea travel	3	2	2	1	1	2	2
CO5	The preparedness and nutrition management during emergencies	2	2	2	1	1	2	3

Core Paper- Advanced Food Science & Nutrition - Practical

Course Code: 24FSNP0106 Credits: T0+P2 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand the science behind cookery
2. explore the concept of food analysis

Course Outcomes:

On successful completion of this course the student will be able to:

- do various testing methods for determination of food constituents
- know the influence of processing conditions on physiochemical properties of food constituents

Course content

Advanced Food Science

1. Effect of solutes on boiling point and freezing point of water
2. Effects of types of water on characteristics of cooked vegetables, pulses and cereals
3. Microscopic examination of plant starches and study the gelatinization on starch
4. Sugar cookery and the factors influencing the stages of sugar cookery
5. Physiochemical and functional properties of proteins
6. Preparation of protein concentrate/isolate
7. Role of fats in cookery as shortening agents in bakery products
8. Influence of heat on physicochemical properties of oil
9. Effect of acid, salt, alkali, heat and enzymes on pigments
10. Prevention of enzymatic browning reactions in cut fruits and vegetables

Advanced Nutrition

1. Determination of energy value of foods by using bomb calorimeter
2. Estimation of energy requirements of an individual by factorial approach
3. Qualitative tests for determination of carbohydrate
4. Estimation of crude and dietary fibre content of the foods
5. Qualitative tests for protein
6. Estimation of protein content of foods by kjeldhal method
7. Estimation of crude fat content of foods by soxhlet method
8. Determination of vitamin C content of the foods
9. Estimation of dry matter content of the foods
10. Qualitative tests for determination of phytochemicals
11. Determination of antioxidant activity of foods

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ADVANCED FOOD SCIENCE & NUTRITION –PRACTICAL

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO I	Do various testing methods for determination of food constituents	3	3	2	1	3	2	3
CO2	Know the influence of processing conditions on physiochemical properties of food constituents	3	2	2	1	3	3	3

II SEMESTER

Core Paper- Food Microbiology and Safety

Course Code: 24FSNP0208 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. gain deeper knowledge of role of microorganism in humans and environment
2. understand the role of microbes in food, health and disease.
3. study the Microbes in relation to food spoilage, food borne diseases and food preservation.
4. understand the concept microbiological safety in various food operations.

Course Outcomes:

On successful completion of this course the student will be able to:

- explain the interactions between microorganisms and food environment, and factors influencing their growth and survival.
- describe the characteristics of food borne, water borne and spoilage microorganisms, and methods for their isolation, detection and identification.
- explain the effects of fermentation in food production and how it influences the microbiological quality and status of the food product.
- correlate the importance of microbial safety in various foods operations.

Course content

UNIT I

Introduction to Microbes in Foods: Bacteria, fungi, algae and yeast-their primary source in foods, morphology, cultural characteristics and biochemical activities. Factors affecting the growth of microorganisms in food: intrinsic and extrinsic parameters that affect microbial growth. Biochemical changes caused by microorganisms in food.

UNIT II

Microbes in foods- Contamination, preservation and spoilage of cereal and cereal products-flour, bread, pasta and Ready to use batters and doughs

Vegetables and fruit products-contamination, preservation and spoilage of dehydrated, canned fruits and vegetables

Meat and meat products- Contamination, preservation and spoilage of meat and meat products-sausages and dried beef, ham, poultry, meat pickles, sea foods (pickling of fish)

Milk and Egg products-butter, cheese, evaporated and condensed milk, curd. Eggs-dried eggs

UNIT III

Beneficial role of food microbes: Fermentation meaning, classification, Starter culture, advantages and limitations of fermentation; Importance of microbes in food industry, prebiotics, probiotics and synbiotics and Single cell proteins. Fermented food products from cereals, pulses, fruits and vegetables, milk and meat products, egg, fish and poultry and industrially important microorganisms.

UNIT IV

Food Borne Microbial Diseases: Public health hazards, Food borne infections and intoxications, symptoms, mode of transmission and methods of prevention, emerging food pathogens.

Method of isolation and detection of microorganisms in food- Conventional methods, Rapid methods and Immunological methods, Microbiological evaluation criteria for various food products, Sampling plans and reporting procedures of risk.

UNITV

Food Safety: Need and importance of food safety in food industries; Factors affecting food safety; Role of kitchen-hygiene, employee health and food plant hygiene in prevention of food spoilage and contamination; Regulatory authorities at local, district and national levels ensuring food safety in food industries. Indicator micro-organisms for food spoilage, concept of Food Safety Management System, GHP and GMP, HACCP, ISO 22000, Food Laws, Regulations and Standards.

Related Experience

1. Sterilization and Disinfection
2. Simple staining and Differential staining
3. Pure Culture Technique and Standard Plate Count Method
4. Microbiological Analysis for Water (Most Probable Number), Milk (Methylene Blue Reduction Test), Curd and probiotic count.
5. Zone of Inhibition technique
6. Visit to a food microbiology laboratory

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FOOD MICROBIOLOGY AND SAFETY

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
Co I	Explain the interactions between microorganisms and food environment, and factors influencing their growth and survival.	1	1	2	1	3	2	3
CO2	Describe the characteristics of food borne, water borne and spoilage microorganisms, and methods for their isolation, detection and identification.	2	2	2	1	3	1	3
CO3	Explain the effects of fermentation in food production and how it influences the microbiological quality and status of the food product	1	1	1	1	3	1	3
CO4	Correlate the importance of microbial safety in various foods operations	1	1	1	1	3	1	3

Core Paper- Food Processing Technology

Course Code: 24FSNP0209 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand the science behind processing of foods and its impact on nutritive value of foods
2. provide in-depth knowledge on production of processed food products and the waste utilization techniques
3. understand the changes in physiocochemical properties of foods due to processing conditions.

Course Outcomes:

On successful completion of the course, the student would know

- the concepts and principles of food processing
- the processed food products from plant and animal sources and the production method
- the by-products from food processing and its utilization

Course content

UNIT I Cereal Processing and Technology:

Structure, composition and nutritive value of cereal grains such as rice, wheat, maize, barley, oats and rye; Processing and milling of rice, wheat, maize, barley, oats and rye.

Millets: Structure, composition and nutritive value and processing of millets; Cereal Products of rice, wheat and maize; By products utilization; breakfast cereals and extrusion; Effect of processing on nutritive value of cereals; changes in physiochemical properties of cereal starch and protein due to processing.

UNIT II Pulse Processing and Technology:

Structure, composition and nutritive value of pulses; processing of pulses; Pulse products: Dals, flours, texturized vegetable protein, protein concentrates, isolates and hydrolysates; Byproducts utilization; Effect of processing on nutritive value and physiochemical properties of pulses.

Nuts and Oil Seeds Processing and Technology: Structure, composition and nutritive value of nuts and oilseeds; Oil extraction methods and refining process; byproducts utilization; Refined vegetable oil quality; Effect of processing on nutritive value and physiochemical properties of vegetable oils

UNIT IIIVegetables Processing and Technology:

Structure, composition and nutritive value of vegetables; post harvest changes in vegetables and storage; Preliminary processing of vegetables; Vegetable products: Fermented and non-fermented and its shelf life; Vegetable waste utilization; Effect of processing on nutritive value and physiochemical properties of vegetables.

Fruits Processing and Technology: Structure, composition and nutritive value of fruits; post harvest changes in fruits and its storage; Concept of maturity, ripening and senescence; Fruit products: fermented and non-fermented; Effect of processing on nutritive value and physiochemical properties of fruits; Fruit waste utilization.

UNIT IV Milk Processing and Technology:

Milk types, composition, physiochemical properties; Milk processing and its storage; Effects of processing on nutritive value and physicochemical properties of milk; Milk products: Fermented and non-fermented.

Egg Processing and Technology: Structure, composition and nutritive value of eggs; Egg quality evaluation methods; Egg processing and storage; Effect of processing on nutritive value and physiochemical properties of eggs; Egg products and its functionality.

UNIT V Meat Processing and Technology:

Meat types, structure, composition and nutritive value; Post mortem changes in meat; Meat processing and storage; Ageing and tenderization of meat;

Poultry: Muscle composition and nutritive value; Processing and storage of poultry meat; Preservation methods for poultry;

Fish composition and nutritive value; Selection criteria for fish; Processing and storage;

Meat products: Fermented and non-fermented; Byproducts utilization; Effect of processing on nutritive value and physiochemical properties of meat, poultry and fish.

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FOOD PROCESSING TECHNOLOGY

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
COI	The concepts and principles of food processing	3	2	2	1	3	3	3
CO2	The processed food products from plant and animal sources and the production method	3	2	2	1	3	3	3
CO3	The by-products from food processing and its utilization	3	2	2	1	3	2	2

Core Paper- Food Processing Technology Practical

Course Code: 24FSNP0210 Credits: T0+P2 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand the processing techniques of various food groups
2. develop skill in processing of different foods

Course Outcomes:

On successful completion of the course, the student would know

- the principles of food processing
- how to process various foods from plant and animal sources
- the utilization methods of by-products

Course content

1. Market survey on processed foods available in the market
2. Preparation of cereal flours and determine its quality
3. Testing of wheat flour quality
4. Preparation of cereal based bakery products
5. Malting of cereals and pulses and evaluation of its quality
6. Extraction of vegetable pigment by solvent method
7. Minimal processing of fruits and vegetables
8. Drying of fruits and vegetables
9. Preparation of jam, squash, jelly
10. Preparation of flavoured milk
11. Preparation of paneer
12. Preparation of ice creams
13. Evaluation of Egg quality
14. Visit to food processing industries

REFERENCES

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2. Potter, N. and Hotch Kiss, J.H. (1996): Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi
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FOOD PROCESSING TECHNOLOGY PRACTICAL

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO I	The principles of food processing	3	2	1	3	2	1	1
CO2	How to process various foods from plant and animal sources	2	2	2	1	3	2	1
CO3	The utilization methods of by-products	2	1	1	2	2	1	2

Core Paper- Food Business Operations

Course Code: 24FSNP0211 Credits: T3+P0 Hours/Week: 3 Marks: 100

Learning Objectives: To

1. establish a solid foundation in essential aspects of food service management.
2. understand diverse management theories and principles.
3. gain knowledge in the management of human resources and marketing strategies.

Course Outcomes:

On successful completion of the course, the student would know

- the management theories to effectively administer food-based operations.
- use suitable management tools for efficient administration.
- execute procedures for effective manpower planning.
- describe current trends in food marketing.
- oversee financial management in food service operations.

Course content

UNIT I

Theories and Approaches to Management- Evolution of Management Thoughts: Overview of classical/traditional theory and neoclassical approaches. Management Approaches: Quantitative, MBO (Management by Objectives), Systems, Behavioral and Human Relations, Contingency, Just-in-Time (JIT), Total Quality Management (TQM), and Management Science or Operations Research.

UNIT II

Principles and Tools of Management, Principles of Management: Definition, core principles, and functions of management. Managerial Roles & Responsibilities: Characteristics of a manager and leadership qualities. Organizational Structure: Definition and steps in organizing. Tangible Tools of Management: Organizational charts, job descriptions, job specifications, job analysis, pathway charts, process charts, work schedules, production schedules, staff and service analysis, budgeting. Intangible Tools of Management: Communication, leadership, decision-making, and motivation.

UNIT III

Manpower Management: Recruitment: Processes and sources (internal and external). Selection: Interview process, testing, orientation, and the importance of orientation programs. Training: Importance, types (on-the-job, group, continuous training), and development of training programs. Contract Negotiation: Appointment letters, wage establishment, components of wages, rules and regulations, duties, services, and benefits, vendor contacts. Performance Appraisal: Importance, methods, limitations. Managing organizational behavior, absenteeism, labor turnover, and conflict. Trade Unions and Collective Bargaining: Labor laws and policies.

UNIT IV

Marketing Management: Definition and functions, marketing mix (6 P's). Product Management: Introduction, life cycles, new product development. Place: Distribution channels, types of distribution. Price: Strategies and types. Promotion Mix: Sales promotion, personal selling, advertising, publicity. E-Business: Telemarketing, automatic vending, e-business, e-commerce, electronic data interchange, e-mail, internet. Food Delivery Systems: Evolution, online food delivery platforms, concept of cloud kitchen, managing partnerships with delivery services, ensuring food safety and quality during delivery.

UNIT V

Financial Management and FSSAI mandates: Financial Concepts: Food budgeting, steps in budget planning. Costing and Food Cost Control: Objectives of food costing, daily food cost reports, cumulative food cost reports, daily cumulative food cost reports,food cost pricing.Computer Aided Record Maintenance and Management.

FSSAI Regulations: Overview, importance of FSSAI in food business operations. FSSAI Registration and Licensing: Process, types (basic, state, central), and compliance requirements and rules for franchising.

REFERENCES

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FOOD BUSINESS OPERATIONS

Course Outcomes		**Programme Specific Outcome (PSO)**						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO I	The management theories to effectively administer food-based operations.	1	2	2	1	1	2	1
CO2	Use suitable management tools for efficient administration.	1	1	3	1	1	3	1
CO3	Execute procedures for effective manpower planning.	1	2	3	2	2	3	2
CO4	Describe current trends in food marketing.	1	1	3	3	3	3	3
CO5	Oversee financial management in food service operations.	1	1	3	3	3	3	3

Summer Internship/Mini Project

Course Code: 24FSNP0212 Credits: 2 +0 Hours/Week: Marks: 50

Learning Objectives: To

1. acquire skills required to work in a food industry/hospital dietary department/fitness centres and others
2. develop skills to conduct mini research and learn to document and report the findings

Course content

Students will be given an option of doing either A) Summer internship at a hospital /fitness centers/ food industry

(or)

Mini Project work in a chosen area of their discipline/ field of study. The research will be an original work with plagiarism check and ethical clearance if required.

Students will undergo the project or internship in the semester break. The students should prepare a report to be presented in the department after the completion of the placement period /project.

III SEMESTER

Core Paper - Therapeutic Nutrition

Course Code: 24FSNP0313 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand the etiology, physiology and metabolic anomalies of acute and chronic diseases and patient needs
2. learn the effect of the various diseases on nutritional status and nutrient and dietary requirements

Course Outcomes:

On successful completion of this course the student will be able:

- To intervene the metabolic anomalies of acute and chronic diseases.
- To plan menu for various diseases based on their nutritional status and dietary needs.

Course content

UNIT I

Nutrition Care Process: Assessment of patient needs based on interpretation of patient data – clinical, biochemical, biophysical and personal. Definition and history of dietetics, Dietetics in modern health care management. Classification of a dietitian; Role of dietitian- functions and Team approach in patient care.

Modification of normal diets to therapeutic diets, Understanding of routine hospital diets and enteral and parenteral feeding methods and formulas.

UNIT II

Dietary Management in Gastrointestinal tract Disorders: Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment and diet therapy in GERD, peptic ulcer, dyspepsia, flatulence, inflammatory bowel disease, dumping syndrome, diverticular disease, hernia, hemorrhoids, intestinal failure, short bowl syndrome, bariatric surgery, ERAS guidelines. Perioperative nutrition, Recent ASPEN and ESPEN guidelines.

UNIT III

Dietary Management in Liver, Pancreas and Gall bladder Disease- Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment and diet therapy in Jaundice, Hepatitis, Fatty liver and Cirrohosis- Alcoholic and Non-alcoholic liver diseases ,Pancreas- Pancreatitis and Gall Bladder– Cholelithiasis, cholecystitis.

Dietary Management in Metabolic Diseases : Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment and diet therapy in Diabetes Mellitus – Type 1,

Type 2 and Gestational diabetes and Endocrine disorders – Polycystic ovary disease, thyroid imbalances.

Dietary Management in Coronary Heart Diseases: Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment and diet therapy in Atherosclerosis and Hypertension.

UNIT IV

Dietary Management in Infections: Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment and diet therapy in Fevers and respiratory problems–Asthma, Bronchitis and Covid -19.

Dietary Management in Weight imbalances: Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment, and diet therapy in Weight optimisation.

Dietary Management in Renal diseases: Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment and diet therapy in Acute and chronic glomerular nephritis, nephrotic syndrome, renal stones, ESRD and Dialysis. Recent KDOQI guidelines.

Dietary Management in Neurological disorders – Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment, and diet therapy in Parkinsons, Multiple Sclerosis and Alzheimer's disease.

UNIT V

Dietary Management in Pulmonary Disorders and Cancer : Etiology, metabolic & clinical aberrations, diagnosis, complications, treatment and diet therapy in Chronic obstructive pulmonary disease and Recent ESPEN ONCO guidelines.

Dietary Management in Musculo– Skeletal disorders: Etiology, metabolic & clinical aberrations, diagnosis, complications and diet therapy in Osteoporosis, Arthritis and Rheumatic Heart Disease.

Dietary Management in Inborn errors of metabolism: Etiology, metabolic and clinical aberrations and complications,and diet therapy in PKU, Maple syrup disease, Glycogen storage disease, Lactose intolerance, Neiman-pick disease and Fabry disease.

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THERAPEUTIC NUTRITION

Learning Outcome (LO)	Programme Specific Outcome (PSO)						
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1: To intervene the metabolic anomalies of acute and chronic diseases	3	2	2	3	3	3	3
CO2: To plan menu for various disease based on their nutritional status and dietary needs	3	3	3	3	3	3	3

Core Paper - Therapeutic Nutrition Practical

Course Code: 24FSNP0314 Credits: T0+P2 Hours/Week: 4 Marks: 100

Learning Objectives:

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

Course Outcomes:

- The students will be able to plan a day's menu based on the person/ patients disease condition.
- The students will be able to prepare nutritious/ hospital/ paediatric diet.

Course content

1. Practical experience in weighing and measuring food items
2. Preparation of clear and full liquid diets and soft diet.
3. Planning and preparing diet for:
    - Febrile condition
    - Surgical condition
    - Gastrointestinal disorders
    - Liver and Gall bladder disorders
    - Diabetes and Cancer
    - Cardio Vascular Disorders
    - Renal Disorders
    - Obesity and Underweight
    - Lactose free diet
    - Juvenile diabetes
    - Diet for inborn errors of metabolism
    - Cancer

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THERAPEUTIC NUTRITION PRACTICAL

Learning Outcome (LO)		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1:	To plan a day's menu based on the person/patients disease condition	3	3	3	3	3	3	3
CO2:	To prepare nutritious/ hospital diet.	3	3	3	3	3	3	3

Core Paper -Food Product Development and Marketing

Course Code: 24FSNP0315 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand various aspects of development of a food product
2. acquire knowledge on the importance of Consumer, Research, finance and communication

Course Outcomes:

On successful completion of this course the student will be able to:

- appraise the main features and trends of a specific food product within an appropriate market setting
- understand the development cycle of the food product.
- develop and justify technical specifications for the new product

Course content

UNIT I

New Food Products development: Definition, classification, characteristics, factors influencing new product development social concerns, health concerns, impact of technology and market influence. Consumer Behaviour: Factors influencing food purchases, product acceptance, purchasing trends. Changing food trends

UNIT II

Phases in new food product development: Generation of New Product Ideas: Internal sources of idea, External sources of ideas and market place analysis. Screening of the ideas: Team approach and involvement of various departments, objectives of screening, criteria for screening ideas. Market Sector perspective and market research**.**

UNIT III

Prototype development, standardization, statistical modeling for product formulation. Sensory Evaluation: Descriptive, threshold and acceptance test. Shelf life testing- types of shelf life testing mode of food deterioration. Technical development – recipe development and scale up. Product life cycle, product integrity and conformance to Food safety standards. Test Marketing: Evaluating results and analyzing.

UNIT IV

Use of various new ingredients to suit product functions, Use of stabilizers, flavors, colorant and their standards. Packaging- types, new trends in packaging materials and methods. Graphic designing and nutritional labelling recent guidelines.

Costing and Marketing of food products: Cost benefit analysis, Marketing strategies,

promotional methods for marketing

UNIT V

Entrepreneurship – definition and qualities of an entrepreneur, starting and managing a food based enterprise; steps in preparing a business plan- plant location, investment, financing the project; government schemes and policies for startups and angel investors and venture capital- meaning, types and advantages.

REFERENCES

1. Fuller, Gordon W. 2004. New Product Development- From Concept to Marketplace, CRC Press. 2.
2. Anil Kumar, S., Poornima, S.C., Abraham, M.K.& Jayashree, K. (2004). Entrepreneurship Development. New Age International Publishers.
3. Moskowitz, Howard and Saguy, R. I. Sam 2009. An Integrated Approach to New Food Product, CRC Press.
4. Man C M D and Jomes A A (1994) Shelf life Evaluation of Foods. Blackie Academic and Professional, London
5. Olickle, J K (1990) New Product Development and value added. Food Development Division, Agriculture, Canada
6. Graf E and Saguy I S (1991), Food Product Development: From concept to the Market Place, Van Nostrand Reinhold NewYork.
7. Awasthi D, Jaggi R and Padmanand V. A. (2006). Manual for Entrepreneurs: Food Processing Industry. Tata McGraw-Hill Publishing Limited.
8. HalMacfie, (2007) Consumer- led food product development, CRC.
9. Mary Earle &Richard Earle., (2001). Food Product Development: Maximizing Success., CRC, Woodhead Publishing Ltd.
10. Madhavi P., Satyanarayana G. (2018). Entrepreneurship, Make in India and Jobs Creation, New Century Publications, New Delhi.

FOOD PRODUCT DEVELOPMENT AND MARKETING

Learning Outcome (LO)		Programme Specific Outcome (PSO)								
		PO 1	**PO 2**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1:	To appraise the main features and trends of a specific food product within an appropriate market setting	2	2	2	3	3	3	3	3	3
CO2:	To understand the development cycle of the food product	3	2	3	2	3	3	3	3	3
CO3:	To develop and justify technical specifications for the new product	3	2	3	2	3	3	3	3	3

Core Paper- Food Product Development Marketing Practical

Course Code: 24FSNP0316 Credits: T0+P2Hours/Week:4 Marks: 100

Learning Objectives: To

1. understand the concept of development of a new product and prepare new products
2. acquire skills to develop special dietary foods, convenience foods and improvise existing ethnic Indian foods.

Course Outcomes:

On successful completion of this course the student will be able:

- design, develop and justify technical specifications for the new product

Course Content

1. Market and literature survey to identify the concepts of new products based on special dietary requirements, functionality, convenience and improvisation of existing traditional Indian foods.
2. Screening of product concept on the basis of techno-economic feasibility.
3. Development of prototype product and standardization of formulation process.
4. Proximate analysis of the product and product specific nutrient analysis
5. Packaging, labelling and shelf life studies (Total microbial count, isolation of microbes and other keeping quality tests specific to the new products developed)
6. Cost analysis and final project report

REFERENCES

1. Fuller,Gordon W.(2004).New Product Development-From Concept to Marketplace, CRC Press.USA.
2. Anil Kumar, S.,Poornima, S.C.,Abraham, M.K.& Jayashree,K.(2004). Entrepreneurship development. New Age International Publishers.
3. Moskowitz, HowardandSaguy, & Sam, R.I. (2009).An Integrated Approach to New Food Product, CRCPress.USA.
4. Manual of Methods of Analysis of Foods-Microbiological Testing (2012). LabManual14.FSSAI, GoI, New Delhi.
5. Sadasivam.S and Manickam.A. (2018). Biochemical Methods, third edition, New Age International Publishers, New Delhi.

FOOD PRODUCT DEVELOPMENT MARKETING PRACTICALS

Learning Outcome (LO)		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1:	Design, develop and justify technical specifications for the new product	3	3	3	3	3	3	3

Core Paper –Nutrition in Critical Care

Course Code: 24FSNP0317 Credits: T4+P0 Hours/Week:4 Marks:100

Learning Objectives: To

1. understand the physiology, metabolism and special nutritional requirements of the critically ill.
2. familiarisewiththespecialnutritionalsupporttechniques and feeding formulations to meet their nutritional needs.

Course Outcomes:

On successful completion of this course the student will be able:

- to know the feeding therapy's to be followed in hospitalized/critically ill patients
- apply nutrition support systems during emergency.

Course content

UNIT I

Nutritional screening and assessment of nutritional status of critically ill, using malnutrition risk assessment tools- MUST, NRS 2002, Nutric sore Glim criteria, MNA tool, SGA, NRI, SNAQ and MST.

Nutrition care process for critically ill- nutrition assessment, diagnosis, intervention, monitoring and evaluation; documentation of nutrition care process- SOAP and ADIME.

UNIT II

Nutritional support systems and other life-saving measures for the critically ill-immunonutrition- meaning, advantages, types, and immunosuppressant; special diets in critical care,complications of nutritional support system, refeeding syndrome and rehabilitation diets; diet related ethical issues in terminally ill

UNIT III

Enteral nutrition: types, routes, composition of feeds, commercial formulas, home based formulas, calculation of enteral nutrition feed requirement, care and maintenance during feeding, complications.

Parenteral nutrition: types, routes, composition, commercial formulas, administration, care and maintenance, calculation of parenteral nutrition feed requirement, complications.

UNIT IV

Management of high risk conditions: patho-physiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals and monitoring in sepsis, burns, trauma and organ transplantation.

UNIT V

Management of high risk conditions: patho-physiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals and monitoring in MODF, ESRD, ESLD and cancer.

Palliative care and home care for critically ill and elderly requiring long term nutrition support.

REFERENCES

1. Zaloga,G.P.(1994). Nutritional in critical care, Times Mirror/Mosby..
2. Shikora, S.A. and Blackburn, G.L. (Ed) (1999). Nutritional support-Theory and Therapeutics, Chapman and Hall, ITP (International Thomoson Publishing).
3. Mahan,L.K. and Escott-Stump,S. (2000). Krause's Food Nutrition and Diet Therapy, 10thEd.W.B. Saundaers Ltd.
4. Phillips, G.D. and Lodgers. C.L. (1986). Parenteral and Enteral Nutrition. A Practical Guide.ChurchillLivingstone.
5. Kinney,J.M.and Borum,P.R.(editors) (1989). Perspectives in Clinical Nutrition. Urban and Schwarzenberg. Torosian,M.H. (editor) (1995). Nutrition for the Hospitalized Patient. Basic Science & Principle of Practice.
6. Keynes,W.M. and Flower, P.B.S. (1984). Clinical Endocrinology. Willam Heinemann Medical Books, London.
7. Galambos,J.P.(1979). Cirrohsis in the series major problems in Internal Medicine,W.B.Saunders company Philadelphia
8. Shills,M.E., Olson,J.,Shike,M., and Roos,C. (2005). Modern Nutrition in Health and Disease. 10thEdition .Williams and Williams. A. BeverlyCo. London.
9. Cresci, P. D. (Ed.). (2015). Nutrition support for the critically ill patient:A guide to practice. CRC Press. 4. Escott-Stump, S. (2008). Nutrition and diagnosis-related care. Lippincott Williams & Wilkins.

NUTRITION IN CRITICAL CARE

Learning Outcome (LO)		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	To know the feeding therapy's to be followed in hospitalized/critically ill patients	3	2	3	3	3	3	3
CO 2:	Apply nutrition support systems during emergency and understand palliative care of terminally ill person	3	2	3	3	3	3	3

IV SEMESTER

Core Paper- Ethics in Food and Nutrition Research

Course Code: 24FSNP0418 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. understand the aspect of nutrition research
2. acquire the knowledge about the significance of nutrition research

Course Outcomes:

On successful completion of this course the student will be able to:

- collect the scientific literature in nutrition research
- execute the paper publications in nutrition related journals
- make the research design for their research
- prepare the report for their research

Course content

UNIT I

Nutrition Research: Definition, Classification, Purposes of Nutrition Research, Major types of Nutrition Research Studies – Intervention Research, Outcomes Research, Epidemiological Research, Translational Research. Sources of Scientific Literature.Differences between Magazine/ Newspapers, Trade Publications and Scholarly/ Academic Journals. Introduction to Scientific Journals, Types of Research Articles, Nutrition Related Journals. Checklist for Selecting Articles.

UNIT II

Important Science databases for nutrition (MEDLINE/Pubmed, Web of Science, Scopus, Science Direct). Ethics in Nutrition Research – Introduction, History of Research Ethics, Responsible conduct of Research, Ethics and Human Subjects Research, Institutional Review Boards.

UNIT III

Quantitative research – key concepts, foundation, reliability and validity, error and bios, sampling, instruments and measurements, anatomy of a research article. research design-experimental study design, quasi-experimental designs, descriptive quantitative design and additional types of design.

Qualitative nutrition research – introduction, thematic analysis, phenomenology, grounded theory, case studies. Evaluation of qualitative research - statement of

theproblem, literature review, research design, subject selection, data collection, data analysis, results and discussion.

UNIT IV

Systematic Reviews and Evidence-Based Nutrition practice guidelines - Introduction, Systematic reviews, Systematic Review process for the evidence analysis library – Using the Evidence analysis library of the Academy of Nutrition and Dietetics and Additional systematic Reviews and Guidelines.

UNIT V

Survey Basics, Sampling, Construct and Refine the cover Latter and Questionnaire, Test the Reliability and Validity of a Survey, Collect and Analyze Survey Data.

Writing and Disseminating a Research Proposal and Paper – Title and Abstract Introduction, Methods, Use a style manual to format the paper. Dissemination: Posters, Presentations and Publications.

Securing Grants for Nutrition Research – Government Funding and Non Government Funding.

REFERENCES

1. Bandarkar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of Social Research, Himalaya Publishing House, Mumbai.
2. Copper, H.M. (2002). Intergrating Research: A guide for literature reviews (2nd Edition). California: Sage
3. Harman, E & Montages, I. (Eds.) (2007). The thesis and the book, New Delhi: Vistar.
4. Mukherjee, R. (1989): The Quality of Life: Valuation in School Research, Sage Publications, New Delhi.
5. Stranss, A and Corbin, J. (1990): Basis of Qualitative Research: Grounded Theory
6. Karen Eich Drummond and Alison Murphy (2018). Nutrition Research Concepts and Application, Navigate Companion Website.

ETHICS IN FOOD AND NUTRITION RESEARCH

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	To collect the scientific literature in nutrition research	3	2	2	3	3	2	3
CO 2:	To execute the paper publications in nutrition related journals	3	2	2	3	3	2	3
CO 3:	To make there search design for their research	3	2	2	3	3	2	3
CO 4:	To prepare the report for their research	3	2	2	3	3	2	3

Core Paper – Public Health Nutrition

Course Code: 24FSNP0419 Credits: T4+P0 Hours/Week: 4 Marks:100

Learning Objectives: To

1. enable students to learn the concepts of public health nutrition
2. enable the students to understand the health status of the community

Course Outcomes:

On successful completion of this course the student will be able to:

- assess the health status of the community
- know the various organizations related with food and nutrition with its functions

Course content

UNIT I

Concept of public nutrition - Relationship between health and nutrition, role of public nutritionists in the health care delivery system, nutrition and quality of life interrelationship; determinants of health status and indicators of health and nutritional status.

UNIT II

Health care facility- primary health care of the community, health care delivery system

Population Dynamics-Demographic transition Population structure: Implications on quality of life, Population Policy

Health Economics-Concept, Economic consequences of Malnutrition, indicators of malnutrition, Interventions in nutrition and its expenditures, Economic evaluation of malnutrition.

UNIT III

Food and Nutrition Security- food production, access, distribution availability, losses, consumption, food security; Social-cultural aspects and dietary patterns; their implications for nutrition and health; National nutritional policy and intervention programme – Aim, objectives, guidelines and thrust areas, PDS - Public distribution system and Agricultural planning.

Nutrition intervention Programmes- Objectives, Operation of feeding programmes - ICDS, Anganwadi; National organizations - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCCD and Pradhan Mantri Gramodaya Yojana (PMGY); Recent Government programmes related to nutrition, International organizations - FAO, WHO, UNICEF, UNESCO and World Bank.

UNIT IV

Health based interventions and immunization: provision of safe drinking water/ sanitation, prevention and management of diarrhoeal diseases, immunization schedule. Food based interventions: food fortification, dietary diversification; supplementary feeding and biotechnological approaches.

Introduction to IEC: Aims and objectives, importance of IEC, relevance to programmes - nutrition education for behaviour change – Rationale, Planning Execution and evaluation of Intervention Programmes - Different Media, their characteristics and use- IEC for different target groups.

UNIT V

Nutritional Epidemiology: concept and definitions; Basic measurements in epidemiology; Types of epidemiology- descriptive epidemiology - Defining the population, describing the diseases, measurement of diseases and comparing with known indices, analytical epidemiology- Observational studies cohort, case control and cross sectional analytic study; Experimental epidemiology – Randomized controlled; Design and planning of nutritional epidemiology studies; Evaluation of epidemiological studies; Uses of epidemiology.

REFERENCES

1. Owen, A.Y. and Frackle, R.T., (2002): Nutrition in the Community. The Art of Delivering Services, 2nd Edition Times Mirror/Mosby.
2. Park, K. (2000): Part's Textbook of Preventive and Social Medicine, 18th Edition, M/s. BanarasidasBhanot,Jablpur.
3. Beaton, G.H. and Bengoa, J.M. (Eds) (2000): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., NewDelhi.
4. Bamji, M.S., Rao, P.N., Reddy, V (Eds) (2003): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., NewDelhi.
5. Anisa Basheer (1995): Environmental Epidemiology, Rawat Publications,Jaipur.
6. Beghin I. Cap, M. and Dujardan, B. (1988), A guide to nutritional status assessment, WHO,Geneva.
7. Sheila ChanderVir. Public Health Nutrition in developing countries (Part I & II). Woodhead Publishing India Pvt. Ltd.
8. Mark Lawrence & Tony Worsley. Public Health Nutrition- From principles to practice. Allen & Unwin.

9. Mishra RC. Health & Nutrition Education. APH Publication Corporation.

10. Mahtab, S, Bamji, Kamala Krishnasamy, Brahmam, G.N.V. (2019).*Text Book of Human Nutrition*, FourthEdition,OxfordandIBHPublishingCo. P. Ltd.,

PUBLIC HEALTH NUTRITION

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Assess the health status of the community	2	2	3	3	2	2	2
CO 2:	Know the various organizations related with food and nutrition with its functions	1	1	3	2	3	3	3

Core Paper- Functional Foods and Nutraceuticals

Course Code: 24FSNP0420 Credits: T4+P0 Hours/Week: 4 Marks: 100

Learning Objectives: To

1. enable students to understand the relation between functional foods and nutraceuticals
2. impart knowledge on the role of functional foods and nutraceuticals in the areas of prevent dietetics

Course Outcomes:

On successful completion of this course the student will be able be:

- knowledgeable about specific issues concerning functional foodsand nutraceuticals
- understanding the use of various functional foods in therapeutic conditions
- to develop diet supplements incorporating functional foods

Course content

UNIT I

Nutraceuticals: Definition, Classification, food and non food sources, mechanism of action. Role of omega 3, fattyacids, carotenoids, dietary fiber, phytoestrogens; glucosinates; organosulphur compounds as nutraceuticals. Use of nutraceuticals in health sciences. Their role in prevention and control of diseases

UNIT II

Functional foods: Definition, development of functional foods, benefits and sources of functional foods in Indian diet. Effects of processing conditions and storage; development of biomarkers to indicate efficacy of functional ingredients; Research frontiers in functional foods.

UNIT III

Prebiotics, probiotics and synbiotics: Definition, characteristics, types, sources, their effects on gut microbes. Role in health promotion and in chronic diseases. Production, application in health foods and safety issues.

UNIT IV

Functional foods and Nutraceuticals in health and disease: Sources and role of functional foods and nutraceuticals in diseases; Concept of dietary supplements, phytochemicals, phytosterols, dietary fiber; Regulation of dietary supplements in –in born errors of metabolism, obesity, neurological disorder, diabetes mellitus, hypertension, CVD, cancer, arthritis, and AIDS; Role of nutraceuticals in sports

nutrition.

UNIT V

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

REFERENCES

1. Mahtab,S, Bamji, Kamala Krishnasamy, Brahmam, G.N.V.(2019).Text Book of Human Nutrition, Fourth Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi.
2. Schmidl, M.K.,&Labuza,T.P.(2000).Essentials of Functional Foods. Maryland: AnASPEN Publication, AspePublishers,Inc.
3. Srilakshmi, B. (2017). Nutrition Science.6th edition, New Age International Pvt. Ltd, NewDelhi.
4. Tamine,A.(2005).ProbioticDairyProducts.UnitedKingdom:BlackwellPublishingLtd.
5. USFDA regulations on functional foods.
6. Webb, G.P.(2006).Dietary Supplements and Functional Foods. NewYork: Black well Publishing Ltd.
7. Wildman,R.E.C.(2007).Handbook of Nutraceuticals and Functional Foods.London:CRC Press,Taylor and Francis, BocoRaton.
8. Gibson. G.R. &William.C.M. (2000). Functional Foods-Concept to Product.
9. Goldberg, I. (2004). Functional Foods: Designer Foods, Pharma Foods.
10. DebasisBagchi. (2014). Nutraceutical & Functional Food Regulation in the US and around the world. 2nd Ed. Academic Press,Elsevier.
11. YashaJahu Pomeranz. (1991). Functional Properties of Food Components. 2nd Ed. Academic Press Elsevier
12. Geoffrey P.Webb. (2011). Dietary Supplements & Functional Foods.2nd Ed. Wiley Blackwell.

FUNCTIONAL FOODS AND NUTRACEUTICALS

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Knowledgeable about specific issues concerning function foods and nutraceuticals	3	2	2	3	3	3	3
CO 2:	Understanding the use of various functional foods in therapeutic conditions	3	2	2	3	3	3	3
CO 3:	To develop diet supplements incorporating functional foods	3	2	2	3	3	3	3

Internship

Course Code: 24FSNP0421 Credits:0 +4 Period/Week: Marks: 100

Learning Objectives

1. To gain hands on experience of working in various institutions related to the area of Food and Nutrition.

The students could work with Hospitals / Food Industries etc. They would be required to present a report and a viva voce of their Internship in their Department.

MODULAR COURSES

Food Dehydration

Course Code:24FSNP03M1 Credits:T2+P0 Hours/Week: 2 Marks:50

Learning Objectives:

1. learn the concept and principle of drying
2. know the process and mechanism of drying
3. gain knowledge on drying of various foods
4. analyse the quality of dried food products

Course Outcomes:

On successful completion, the students will be able to:

- understand about moisture content, moisture removal and its requirement.
- know drying mechanism and types of mechanical driers.
- select suitable drying method and drier meeting the requirement.
- judge quality of dried product.

Course content

UNIT IIntroduction to Drying/Dehydration

Drying definition, Moisture removal and its need, Dehydration of food, Drying process and methods, Types of dryers and their applications

UNIT II Grain Drying

Concept of grain drying, Methods of grain drying, Grain dryers- Unheated and heated air dryers - Batch and continuous type - Flat bed type - PHTC type - Columnar type - LSU type - Baffle type - Rotary type.

UNIT III Fruit and Vegetable drying

Concept of fruit and vegetable drying, process and the methods, Various dries for fruit and vegetable drying, solar, cabinet, tunnel tray etc. and their advantages and limitations.

UNIT IV Milk and Meat drying

Concept of milk drying, process and methods- spray, drum, rotary, freeze driers and their advantages and limitations. Meat drying methods and the type of driers used, Advantages and limitations.

UNIT V Quality of dried products

Physical, Chemical and Microbiological characteristics of dehydrated foods, Re-hydration ratio, size and density, shelf-life, water activity, Microbial stability of selected foods.

REFERENCES

1. Potter, N.N., and Hotchkiss, J.H. (2013). Food Science. Springer Science & Business Media, ISBN: 9401572623.
2. Desrosier, N.W. and James N. (2007). Technology of food preservation. AVI Publishers.
3. Shafiur Rahman M. (2007). Handbook of Food Preservation. CRC Press, ISBN: 9781420017373.
4. Brennan J.G. (2012). Food Processing Handbook. John Wiley & Sons, ISBN: 9783527634378.
5. Srilakshmi, B. (2005). Food Science, New Age International (P) Ltd., Publishers, New Delhi.
6. Girdharilal, G.S. et.al., (1986). Preservation of Fruits and Vegetables. New Delhi: Publications and Information Division, ICAR.
7. Julians, B.O. (1985). Rice Chemistry and Technology, 2nd edition, American Association Chemists, St. Paul Mimesota, USA.

MODULAR COURSE FOOD DEHYDRATION

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Understand about moisture content, moisture removal and its requirement	3	3	2	1	3	3	3
CO 2:	Know drying mechanism and type so mechanical driers	3	3	3	3	3	3	3
CO 3:	Can select suitable drying method and drier meeting the requirement	3	3	2	1	3	3	3
CO 4:	Can judge quality of dried product	3	3	2	1	3	3	3

Computer Applications in Nutritional Sciences

Course Code:24FSNP03M2 Credits: T2+P0 Hours/Week: 2Marks:50

Learning Objective:

1. To impart knowledge on use of computers in the field of nutritional science

Course Outcomes:

On successful completion of this course the student will be able:

- know the use of computers in food industries,diet counseling
- To gain knowledge on computer applications used for communicating information to the community

Course content

UNIT I

Introduction to various software for their application in food technology, diet counseling and nutrition research.

UNIT II

Familiarization with the application of computer in some common food industries like, milk plant, bakery units & fruits vegetable plants, stating from the receiving of raw material up to the storage & dispatch of finished product.

UNIT III

Basic Introduction to computer Application of computers in dietary units, online diet counseling and record maintenance.

REFERENCES

1. Computer Applications in Food Technology: Use of Spreadsheets in Graphical, Statistical and Process Analysis by R. Paul Singh, AP.
2. Manuals of MS Office
3. Diet Softwares

MODULAR COURSE COMPUTER APPLICATIONS IN NUTRITIONAL SCIENCES

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1:	Know the use of computers in food industries, diet counseling	2	2	2	1	3	3	2
CO 2:	To gain knowledge on computer applications used for communicating information's to the community	2	2	2	1	3	3	2

Food Quality Evaluation

Course Code: 24FSNP03M3 Credits: T2+P0 Hours/Week: 2 Marks: 50

Learning Objectives: To

1. illustrate the concepts and principles of food quality evaluation
2. provide basic knowledge about sensory evaluation
3. know the instruments/tools available for objective evaluation

Course Outcomes:

On successful completion of the course, the students will be able to

- know with the basics of food quality evaluation
- suggest a suitable technique for food quality evaluation
- address the controlling factors in sensory and objective evaluation

Course content

UNIT I Introduction to Food quality

Food quality meaning, quality traits: sensory, chemical, microbial and toxicological aspects.

UNIT II Sensory evaluation

Definition of sensory evaluation; sensory attributes; human senses and sensory perception; factors influencing measurements: psychological and physiological errors.

UNIT III Sensory Evaluation methods

Classification of test methods; comparison: paired-comparison, duo-trio and triangle tests, ranking: numeric scoring test, hedonic scale, sensitivity and descriptive tests.

UNIT IV Objective methods for evaluation

Instruments/tools for evaluation of sensory attributes such as colour, flavour, texture and taste, advantages and limitations.Food Rheology meaning, concept, component.

UNIT V Applications of Sensory Analysis in the Food Industry

Quality control; storage stability testing; product development and consumer acceptance testing

REFERENCES

1. Herbert Stone, Joel L. Sidel, (2012), “Sensory Evaluation Practices”, Academic Press Publishers.
2. Harry T. Lawless, Hildegarde Heymann, (2010), “Sensory Evaluation of Food: Principles and Practices”, Springer Science & Business Media.
3. Meilgard (1999). Sensory Evaluation Techniques, 3rd ed. CRC Press LLC.

FOOD QUALITY EVALUATION

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Know with the basics of food quality evaluation	2	2	2	3	2	3	3
CO 2:	Suggest a suitable technique for food quality evaluation	2	1	2	2	2	2	2
CO 3:	Address the controlling factors in sensory and objective evaluation	1	1	1	2	1	3	2

Fitness Nutrition

Course Code:24FSNP04M1 Credits:T2+P0 Hours/Week:2Marks:50

Learning Objectives:To

1. enable students understand the interaction between exercise and nutrient metabolism.
2. enlighten students on common nutritional problems experienced by persons following exercise programmes for fitness.
3. plan age specific diet and physical fitness schedules based on activity levels.

Course Outcomes:

On successful completion of this course the student will be able to:

- identify factors affecting fitness and health status
- recommend suitable dietary and physical fitness plan for disease conditions.

Course content

UNIT I

Introduction to Fitness:Definition of Fitness and Wellness and their importance in the maintenance of health; fitness component and factors effecting fitness and health status**.**

Energy: Release of energy from macronutrients- A review -Energy metabolism during exercise -Energy requirements for physically active persons.

UNIT II

Carbohydrates: Effect of exercise on carbohydrate metabolism -Pre exercise diet & carbohydrate loading. Post exercise carbohydrate intake - Carbohydrate requirements-quality concerns.

Protein and lipids:Amino acid metabolism during exercise -Effect of protein on exercise performance.

Fat metabolism during exercise with special reference to the type &intensity of exercise.

Minerals,Vitamins and water-Effect on these nutrients and exercise performance

UNIT III

Screening for Fitness Level Kinanthropometric assessment techniques -size, shape, proportion, composition, maturation, and gross function .Cardiac screening-heart rate, blood pressure and lung function.Assessment of Cardio-respiratory fitness using Maximum aerobic capacity (VO_2 max).Assessment of cardiac risk profile for fitness and exercise.

REFERENCES

1. Fred and Brouns (2002). Essentials of sports Nutrition, 2nd ed., John Wiley & Sons pub.
2. W.D. Mc Ardle &Katch (2005). Sports & Exercise Nutrition, 4thed.,Williams& Wilkins, A Waverly Company.
3. Burke L & Deakin V (2006). Clinical Sports Nutrition. 3rded., Tata McGraw Hill Pub.
4. Melvin H. Williams, Eric S. Rawson, J. David Branch, (2016).Nutrition for health, fitness and sport, McGraw Hill.
5. Corbin, Charkes. Gregory Welk, William Corbin,(2015). Concepts of Fitness and Wellness: A Comprehensive Lifestyle Approach; 9th edition, McGraw HillHigher Education Publication, USA.

FITNESS NUTRITION

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Identify factors affecting fitness and health status	2	2	2	2	3	3	3
CO 2:	Recommend suitable dietary and physical fitness plan for disease conditions.	2	2	2	2	3	3	3

Nutrition Assessment

Course Code:24FSNP04M2 Credits:T2+P0 Hours/Week:2 Marks:50

Learning Objectives:

1. Tounderstand the concept and methods of nutritional status assessment of an individual and community

Course Outcomes:

On successful completion of this course the student will be able to:

- Explain nutritional concerns among vulnerable sections of the community
- Gain knowledge with regard to standard methods and techniques for assessing nutritional status.
- familiarise with the use of indices and indicators for screening and consequent identification of malnutrition

Course content

UNIT I

Introduction to Nutritional status assessment, Definition of nutritional status; Purpose of nutritional status assessment in community setting, Significance of standardised methods and techniques for assessing nutritional status

UNIT II

Methods of community nutritional assessment Clinical examination, Anthropometry, Biochemical and Biophysical methods, Measurement tool techniques and errors , Standardization of methods, Data recording, analysis and interpretation, Use, plotting and interpretation of growth chart

Dietary methods: 24 hour recall, Food Frequency Questionnaire Ecological variables, Vital health statistics: IMR, MMR, Under 5 Mortality rates, National/ regional nutrition and health surveys

UNIT III

Screening for identification of Malnutrition in the community indices, indicators and their interpretation

REFERENCES

1. Jelliffe, D. B. (1966). The Assessment of the Nutritional Status of the Community. WHO Monograph.World Health Organization, Geneva; 53.
2. Jelliffe, D. B &Jelliffe, E. F. P. (1989). Community nutritional assessment with special reference to less technically developed countries. Oxford Medical Publications. Oxford University Press, Oxford, UK.
3. WHO. (2009).WHO Child growth standards: Length/height for age, weight for age, weight forelength, weight for height and body massindex.

Nutrition Assessment

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Explain nutritional concerns among vulnerable sections of the community	2	2	3	3	2	2	3
CO 2:	Gain knowledge with regard to standard methods and techniques for assessing nutritional status.	1	1	3	3	3	3	2
CO 3:	Familiarise with the use of indices and indicators for screening and consequent identification of malnutrition	1	2	3	3	3	3	3

Nutrition Counseling

Course code:24FSNP04M3 Credits:T2+P0 Hours/Week:3 Marks:100

Learning Objective: To

1. help individuals to manage their disease condition effectively through counseling\
2. relate dietary management and lifestyle counseling

Course Outcomes:

On successful completion of this course the student will be able to:

- correlate the importance and principles of dietetics in the management of diseases
- practice the role of dietitian an effective manner

Course content

UNIT I

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

UNIT II

Counselling and educating patient Introduction to nutrition counselling. Determining the role of nutrition counseller. Responsibilities of the nutrition counseller. Practitioner v/s client managed care behavior. Communication and negotiation skills.

UNIT III

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

Life Style Counselling: Weight management – exercise, yoga Stress management – positive therapy

REFERENCES

1. Marcia Nahikian Nelms, (2016). Medical Nutrition Therapy: A Case-Study Cengage Learning Boston,USA.
2. Tripathi,K., Maheshwari,A., (2016). Fundamentals Of Diabetes, Jaypee Brothers Medical Publishers.
3. Defronzo, R. A., Ferrannani, Ele., (2015). International Textbook of Diabetes Mellitus, 4thedition, ISBN:9780470658611, John Wiley & Sons, Ltd.

4. Mahan, L.K. and Stump, S.E., (2010). Krause's Food, Nutrition and Diet Therapy 11th edition, W.B. Sunders Co. 9.
5. Richard I H., (2010). Text Book of Diabetes, 4thedition,A John Wiley & Sons, Ltd.,Publishers.

NUTRITION COUNSELING

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Correlate the importance and principles of dietetics in the management of diseases	3	3	3	3	3	3	3
CO 2:	Practice the role of dietitian an effective manner	2	2	3	1	3	2	3

DISCIPLINE CENTRIC ELECTIVES

Instruments for Food Analysis

Course Code:24FSNP03D1 Credits: T3+P0 Hours/Week:3 Marks: 100

Learning Objectives: To

1. understand the principles and applications of food analysis techniques used in the field of foods and nutrition.

Course Outcomes:

On successful completion of this course the student will be able to:

- choose appropriate strategies and instrumentation for analysis of different sample types.
- get familiarity with the analytical instruments through an understanding of the working principles and applications.
- demonstrate a comprehensive understanding of the theory and usage of radio isotope techniques and their application in biological sciences and food preservation.

Course content

UNIT I

Spectrometric methods Principles and applications of UV and visible spectrophotometry, flame photometry-Atomic Absorption Spectrophotometry (AAS) and Atomic Emission Spectrophotometry (AES), Spectrofluorimetry and brief mention (principle and applications) of Nuclear Magnetic Resonance (NMR), Electron Spin Resonance (ESR) spectrometry, Mass spectrometry (MS), Fourier Transform Infrared Spectrometry (FTIR) and Electron microscopy.

UNIT II

Chromatographic techniques Principle and applications of paper, thin layer, adsorption, gel, gas, ion exchange, affinity chromatography, HPLC and HPTLC techniques.

UNIT III

Electrophoretic techniques Principle and applications of paper, starch gel, agar gel and polyacrylamide gel electrophoresis. Isoelectric focusing, Immuno-electrophoresis, Enzyme linked immunosorbant assay (ELISA), Radio-immuno assay (RIA).

UNIT IV

Centrifugation techniques Basic principles, preparative centrifugation techniques, analytical ultracentrifugation techniques, application-determination of molecular weight and purity of macromolecules.

UNIT V

Radioisotope techniques Radioactive isotopes, units of radioactivity, Geiger and Scintillation counting techniques, Cerenkov counting, autoradiography, applications of radioisotopes in biological sciences and food preservation. Hazards of ionizing radiations.

REFERENCES

1. Nielsen S. Suzanne. (2010). Food Analysis, Springer, U.S.A.
2. AOAC. (1985). Official methods of analysis, Association of Official Chemists, 14thedn, Washington DC.
3. Plummer, T. D. (1999). An Introduction to Practical Biochemistry, Tata McGraw Hill Publishing Company Ltd.
4. Winton,L. A., and Winton, B. K. (1999). Techniques of Food Analysis, Allied Scientific Publishers, New Delhi.
5. Raghuramulu, N., Nair, K.M., and Kalyanasundaram, S. (2010). A Manual of Laboratory Techniques, NIN Press, National Institute of Nutrition, Hyderabad.
6. Sadasivam, S. (1992). Biochemical Methods, Wiley Eastern Ltd, New Delhi.
7. Jayaraman, J. (1985). Laboratory Manual in Biochemistry, Wiley Eastern Ltd. 1985.

INSTRUMENTS FOR FOOD ANALYSIS

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Choose appropriate strategies and instrumentation for analysis of different sample types.	1	2	1	3	2	1	3
CO 2:	Get familiarity with the analytical instruments through an understanding of the working principles and applications.	3	2	3	3	2	3	3
CO 3:	Demonstrate a comprehensive understanding of the theory and usage of radio isotope techniques and their application in biological sciences and food preservation.	3	2	3	3	2	3	3

Nutrigenomics and Nutrigenetics

Course Code:24FSNP03D2 Credits: T3+P0 Hours/Week:3 Marks: 100

Learning Objectives:To

1. familiarize students with the basic concepts of Nutrigenomics and Nutrigenetics
2. develop an understanding of gene interaction and diet and its importance in prevention of disease.

Course Outcomes:

On successful completion of this course the student will be able to:

- discuss how nutrition may affect gene expression
- gain knowledge on concepts of nutrigenomics and design diets for prevention of disease
- applications of nutrigenomics in future nutrition research

Course content

UNIT 1

Introduction Concept of functional genomics, systems biology, nutrigenomics, nutrigenetics, personalised nutrition.

UNIT II

Diet and gene expression Short-term gene expression regulation by nutritional factors.Diet and epigenetics.Perinatal programming.Diet in early life and metabolic programming.

UNIT III

Gene polymorphisms and responses to diet, diet as a risk or preventive factor of pathologies. Experimental designs in human nutrigenetics studies. Nutrigenetics of cancer, osteoporosis, cardiovascular disease and obesity.

UNIT 1V

Intestinal microbiota - role in nutrigenomics. Computational approaches: Introduction to different types of public domain databases, data mining strategies, primer designing.

UNIT V

Technologies in Nutrigenomics Genomics Techniques: Different sequencing approaches, Microarray, Massarray, SNP genotyping, PCR and RT-PCR techniques.

Discovery and validation of biomarkers for important diseases and disorders.

Modulating the risk of inflammatory bowel diseases,obesity,cancer, and malnutrition through nutrigenomics.

REFRENCES

1. Journal Nutrients 2012, 4, 1898-1944; Molecular Nutrition Research—The Modern Way of Performing Nutritional Science. Journal Nutrients, 2013, 5, 32-57.
2. Nutrigenetics and Metabolic Disease: Current Status and Implications for Personalized Nutrition. JNutrigenetics Nutrigenomics 2011;4: 69–89.
3. Nutrigenetics and Nutrigenomics: Viewpoints on the Current Status and Applications in Nutrition Research and Practice. J Am Diet Assoc. 2006;106:569-576.
4. Nutrigenomics: From Molecular Nutrition to Prevention of Disease.

NUTRIGENOMICS AND NUTRIGENETICS

Learning Outcome (LO)		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1:	Discuss how nutrition may affect gene expression	3	3	2	3	3	3	3
CO2:	Gain knowledge on concepts of nutrigenomics and design diets for prevention of disease	3	2	2	3	3	2	2
CO3:	Applications of nutrigenomics in future nutrition research	3	2	2	2	3	2	2

Family and Community Science

Course Code: 24FSNP03D3 Credits: T3+P0 Hours/Week: 3 Marks: 100

Learning Objectives:

1. To have a sound knowledge in various branches of Home Science for strengthening the extension and research base.

Course Outcomes:

On successful completion of these units, students are expected to

- describe the importance of each branch of Home Science
- understand the essence of each subject
- prepare them for UGC NET, SLET and ASRB

Course content

UNIT I

Food Science and Nutrition: Food groups, Cooking Methods, Principles and Methods of Preservation, Composition of Food, Food Additives, Food Adulteration, Food Laws, Food Processing; Concept of nutrition, Nutrients, Malnutrition digestion, absorption and metabolism of macro and micro nutrients, deficiencies and sources. Food Hygiene and sanitation. Food borne infections, Nutrition through life cycle – RDA, Diet modifications for Diabetes, Cardio Vascular Disease, Obesity, Anaemia and Renal Disorders.

UNIT II

Institution Management – Management, principles and functions, Food Service- types and styles-personnel management, record maintenance in food service institutions, standardization of recipe, portion control and cost control.

UNIT III

Textiles and Clothing: General properties and structure of all textile fibers. Processing and manufacture of natural and man-made fibers. Definition and classification of yarns: Identification of yarns and their use in various fabrics. Fabric construction, definition and types of woven, non-woven and knitted fabric .Testing of fibers, yarns and fabric.

Clothing: Principles of clothing-Socio-Psychological aspects of clothing, selection of fabrics for the family. Clothing construction – basic principles of drafting, flat pattern and draping methods .Textile design-principles and concepts. Care and maintenance of textiles materials and garments; Laundry agents-methods and equipments.

UNIT IV

Resource Management – Concept of Home Management and steps – Management of

Human Resources; Classification of Resources; Basics characteristics of Resources, Decision making in family, Steps in decision making; Methods of resolving conflicts. Work simplification; Importance of work simplification in home; Mundel's classes of change; Housing, Interior design. Principles of Interior design, Various colours and colour schemes. Household equipment-selection and Care.

UNIT V

Human Development – Child development- Principles and Stag. Life Span Development – Theories of Human Development and Behaviour. Child rearing, Socialization practices and Dynamics, Early Childhood Care and Education – Emerging trends. Development problems and disabilities during childhood and adolescence. Advanced child study methods and assessment.

REFERENCES

1. Corbman.P.B. (1985). Fibre to Fabric. New York: Macraw Hill Book Company.
2. Dantyagi. S. (1996). Fundamentals of Textiles and their Care New Delhi: Orient Longman Limited. Education Planning Group. (1987). Home Management, New Delhi: Arya Publishing House.
3. Jha, J.K. (2002). Encyclopaedia of Teaching of Home Science, Vol. I, II and III. New Delhi: Anmol Publications.
4. Srilakshmi.B. (1997). Food Science. New Delhi. New Age International Pvt. Ltd.
5. Suriakanthi.A., (2002). Child Development - An Introduction Gandhigram: Kavitha Publications.
6. Varghese, M.A.et al., (1994). Home Management, New Delhi: Viley Eastern Limited.

FAMILY AND COMMUNITY SCIENCE

Course Outcomes (CO)		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Describe the importance of each branch of Home Science	3	2	2	1	3	2	2
CO 2:	Understand theses sence of each subject	3	2	2	1	3	2	2
CO 3:	Prepare them for UGC NET,SLET and ASRB	3	2	2	1	3	2	2

Nutrition through Life Cycle

Course Code: 24FSNP03D4 Credits: T3 +P0 Hours/Week: 3 Marks: 100

Learning Objectives: To

1. understand the nutrition requirements
2. understand the role of nutrition in difference stages of life cycle and meal planning

Course Outcomes:

On successful completion of these units, students are able to

- determine nutrient requirements/needs of individuals at different stages of life.
- discuss the major nutrition related concerns at each stage of life.

Course content

UNIT I Nutrient in Pregnancy and Lactation

Nutritional status and general health, Physiological changes in pregnancy, Foetal under nutrition and consequences, Energy and calorie relationship in pregnancy weight gain, protein, vitamins and mineral nutrition in pregnancy ,Physiological adjustments during lactation, Diet of lactating women and nutritional requirements.

UNIT II Nutrition during for infancy

Physiologic development, nutrient requirements composition of human milk and cows milk, Anti infective factors, formula preparation, weaning, supplementary and complementary feeding, growth monitoring, feeding and BW and premature infants.

UNIT III Nutrition during preschool, children

Growth and development during preschool, children, adolescent, nutritional requirements, factors influencing food intake, nutritional concerns – PEM, Anemia, Dental caries, obesity, anorexia and bulimia

UNIT IV Nutrition in adolescent and adult

Nutrition requirements during adolescent and adult age, physical activity and energy relationship, factors influencing food intake, nutritional concerns – Anemia, obesity, anorexia and bulimia.

UNIT V Nutrition in old age

Nutrition requirements during old age, physical activity and energy relationship, theories of aging, physiologic changes, nutritional needs, nutrition concerns – dysphagia and senility disorders, community nutrition programme for oldage.

REFERENCES

1. Mahtab, S, Bamji, Kamala Krishnasamy, Brahmam, G.N.V. (2019).Text Book of Human Nutrition, Fourth Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi.
2. Srilakshmi, B., (2014). Dietetics, 7th edition,New Age international Private Ltd
3. Antia .P. (1989) Clinical Nutrition and Dietetics, Oxford University, Mumbai.
4. Mahan, L.K. and Escott-Stump, S. (2007). Krause's Food Nutrition and Diet Therapy,12th Edition, W.B. Saunders Ltd.
5. Mayrice. E. Shills, James, A.Olsen, Moshe Shihe, (2012) Modern Nutrition on Health and Disease, Vol.1 & 2, 11th edition, Lea and Pediger, Philadelphia.
6. Davidson. S.S. Passmore,Martin A. Eastwood. F. (1989). Human Nutrition and Dietetics, 9th Edition F & S Lingstons Edinburgh and London
7. Longvah, T, Ananthan, R, Bhaskarachary, K, Venkaiah, K. (2017). Indian Food Composition Tables (IFCT), Indian Council of Medical Research, National Institute of Nutrition, Hyderabad.
8. Recommended Dietary Allowances and Estimated Average Requirements Nutrient Requirements for Indians – 2020. A Report of the Expert Group Indian Council of Medical Research National Institute of Nutrition.NIN, Hyderabad.

NUTRITION THROUGH LIFE CYCLE

Course Outcomes (CO)	Programme Specific Outcome (PSO)						
	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO1: Determine nutrient requirement/needs of individuals at different stage of life	3	3	2	3	3	3	3
CO2: Discuss the major nutrition related concerns at each stage of life	3	3	3	3	3	3	3

Food Toxicology

Course Code: 24FSNP03D5 Credits: T3+P0 Hours/Week: 3 Marks: 100

Learning Objectives: To

1. know the principles of foodtoxicology
2. encompass the awareness about natural food toxicants there infood
3. to appraise the toxicology substances in foodadditives

Learning Outcomes:

On successful completion of this course the student will be able to

- evaluate the toxicity infood
- understand the mechanism oftoxicity
- create awareness about Food allergies andsensitivities

Course content

UNIT I

Principles of Toxicology: Classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity. Evaluation of toxicity: Risk vs. benefit: Experimental design and evaluation: Prospective and retrospective studies: Controls :Statistics (descriptive, inferential): Animal models as predictors of human toxicity: Legal requirements and specific screening methods: LD50 and TD50: In vitro and in vitro studies; Clinical trials.

UNIT II

Natural Toxins in Food: Natural toxins of importance in food- Toxins of plant and animal origin; Microbial toxins (e.g. Algal toxins, bacterial toxins and fungal toxins). Natural occurrence, toxicity and significance.Food poisoning; Mycotoxicoses of significance.Determination of toxicants in foods and theirmanagement.

UNIT III

Food allergies and sensitivities: Natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions); Safety of Genetically Modified food: potential toxicity and allergenisity of GM foods. Safety of toys and children consumables.

UNIT IV

Environmental Contaminants and Drug Residues in Food: Fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g. Malachite Green in fish and β- agonists in pork); other contaminants in food. Radioactive contamination of food, Food adultration and potential toxicity of food adulterants.

UNIT V

Food Additives and toxicants added or formed during Food Processing: Safety of food additives; toxicological evaluation of food additives; food processing generated toxicants: nitroso compounds, heterocyclic amines, Dietary Supplements and Toxicity related to Dose: Common dietary supplements; relevance of the dose; possible toxic effects.

REFERENCES

1. Helferich, W., and Winter, C.K. (2001). Food Toxicology; CRC Press.
2. Shibamoto, T. and Bjeldanes,L. (2009).IntroductiontoFoodToxicology,2nd Ed.ElsevierInc.,Burlington.
3. Duffus, J.H. and Worth, H.G. J. (2006). Fundamental Toxicology; The Royal Society of Chemistry.
4. Stine, K.E. and Brown, T.M. (2006). Principles of Toxicology (2nd ed.), CRC Press.
5. Tönu, P. (2007). Principles of Food Toxicology. CRC Press, LLC. Boca Raton, FL.

FOOD TOXICOLOGY

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	To evaluate the toxicity in food	2	2	2	1	1	1	2
CO 2:	To understand the mechanism of toxicity	2	2	2	1	3	1	2
CO 3:	To create awareness about Food allergies and sensitivities	2	2	2	1	1	1	2

Food Quality Control and Assurance

Course Code: 24FSNP03D6 Credits: T3+P0 Hours/Week: 3 Marks: 100

LearningObjectives:To

1. know the importance of quality assurance in food industry
2. know the test sand standards for quality assessment and food safety
3. know the laws and standards ensuring food quality and safety

Course Outcomes:

On successful completion of this course the student will be able to apply:

- the importance and functions of quality control unit in food industries
- the methods used for evaluation of food quality
- thenationalandinternationalorganizationenforcingfoodqualityandsafety

Course content

UNI I

Food Spoilage: Food spoilage definition; factors influencing food spoilage; Types of food spoilage such as microbes, enzymes and insects; Changes in food quality due to spoilage; Methods for detection of food spoilage; Concept of food preservation and the principles.

UNITII

Food Additives and Adulterants: Food additives definition; Common food additives and its function and usage; Permissible limits of additives in foods; Implications of additives on consumers health; Food adulteration: Meaning and definition; Types of food adulterants; Methods used for detection of food adulterants.

UNIT III

Testing of Food Quality: Quality meaning and need of food quality testing; Types ofevaluation–subjectiveandobjective;Subjectiveevaluationmethodsbasedondifference, rate, sensitivity etc.; Objective evaluation methods – tools and instruments used; quality standards for cereal, pulses and legumes, vegetables and fruits, milk, egg and flesh foods, fat and sugar and related products.

UNIT IV

FoodQualityControlandAssurance:Currentconcepts of quality control and assurance; Need and importance of quality control programmes such as quality plan, documentation of records, product standards Product and purchase specifications and process control; Principles of HACCP and its role in total quality process; Duties and responsibilities of food quality controller.

UNIT V

Food Laws and Standards: Need and importance; National food legislation such as FSSA, Essential Commodities Act, ISIor BIS,AGMARK,FPO and PFA; International Organization such as FAO, WHO, Codex Alimentarius and APEDA.

REFERENCES

1. Early, R. (1995). Guide to Quality Management Systems for the Food Industry, Blackie, Academic and Professional, London**.**
2. Gould,W.A. and Gould,R.W. (1988).Total Quality Assurance for the Food Industries, CTI Publications Inc, Baltimore
3. Pomeranz,Y.and Meloan,C.E.(1996). Food Analysis: Theory and Practice, CBS Publishers and Distributor, New Delhi.
4. Askar,A. And Treptow, H. (1993). Quality Assurance in Tropical Fruit Processing, Springer– Verlag, Berlin
5. Ranganna,S.(1986).Hand book of Analysis and Quality Control for Fruit and Vegetable Products, 2nd Edition, Tata Mc Graw hill Publishing Co Ltd.,NewDelhi.
6. Hagstad,H.V.and Hubbert, W.T.(1986). Food Quality Control, Foods of Animal Origin, Low a State University Press, AMES.
7. Srilakshmi,B. (2005). Food Science, New Age International (P) Ltd., Publishers, NewDelhi.

FOOD QUALITY CONTROL AND ASSURANCE

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	The importance and functions of quality control unit in food in dustries	2	2	2	1	3	2	2
CO 2:	The methods used for evaluation of food quality	2	2	2	1	3	2	2
CO 3:	The national and international organization for food quality and safety	2	2	2	1	1	2	2

GENERIC ELECTIVES

Culinary Nutrition

Course Code: 24FSNP02G1 Credits: T3+P0 Hours/Week: 3 Marks: 100

Learning Objectives:To

1. acquire knowledge about the requirement of nutrients across age groups
2. learn about the Importance of vegetarian diet, meatless cooking, sustainable food systems
3. understand the various diets and their significance

Course Outcomes:

On successful completion of this course the student will be able to:

- practice and communicate evidence based nutrition

Course content

UNIT I

Life cycle nutrition: Nutrient requirements, Food sources and cooking across for different age groups**.** Food Based Macronutrients; Knife skills and meatless cooking

UNIT II

Vegan and Vegetarian Nutrition: Meaning,scope and benefits of veganism, Vegan and vegetarian cooking techniques

UNIT III

Econutrition: sustainable food systems,root to frond cooking,microgreens and its nutritional benefits and culinary uses

UNIT IV

Food Allergy: Understanding allergy related to food, difference between food allergy and food intolerance Allergy free cooking.

Alternative Diets: Macrobiotic, Paleo, Meditarrean diet,Detox diet,Fruit diet and gluten free diet pros and cons

UNIT V

Gut Health: Meaning, importance of gut health and significance of gut microbiome,Low, FODMAP cooking; Weight management using High fiber/ low Glycemic cooking; Ayush practices for immunity and health

REFERENCES

1. Jacqueline B. Marcus (2013). Culinary Nutrition: The Science and Practice of Healthy Cooking. Academic Press; 1st edition
2. Elana Amsterdam (2013). Paleo Cooking from Elana's Pantry: Gluten-Free, Grain-Free, Dairy-Free Recipes. Ten Speed Press; Illustrated edition
3. Annemarie Colbin (1986). Food and Healing: How What You Eat Determines Your Health, Your Well-Being, and the Quality of Your Life. Ballantine Books; 10thAnniversary ed. edition

CULINARY NUTRITION

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Practice and communicate evidence based nutrition	1	2	3	3	2	3	3

Nutrition for Health

Course Code: 24FSNP02G2 Credits: T3+P0 Hours/week: 3 Marks:100

Learning Objectives:To

1. acquire knowledge about the macro and micronutrients
2. learn about the importance of vegetariandiet
3. understand the various mechanisms of specificfoods

Course Outcomes:

On successful completion of this course the student will be able to:

- know the role of vegetarian diet in preventing the degenerative diseases
- acquire knowledge about the types ofdiet
- improve the life style through physical activity

Course content

UNIT I

Basic Components of Foods and their Functions, Energy producing nutrients: Carbohydrates: Simple and complex carbohydrates and food sources Lipids: triglycerides, cholesterol and phospholipids and food sources Proteins: amino acids, protein quality and food sources Regulatory nutrients: vitamins, minerals and dietary fibres; Human digestion and absorption of food.

UNIT II

Applying Nutrition in Daily Life: Planning a healthy diet:Principles of meal planning, use of food pyramid and nutrition guidelines, Food exchange list, My plate, Dietary diversity score, Nutrition adequacy score and use of nutrition label; Nutrient requirement throughout lifecycle pregnancy, lactation,Infancy to oldage.

UNIT III

Role of Diet in Disease Prevention and Management: Cardiovascular diseases and fat intake, Cancer: risk factors for cancer and role of diet in cancer prevention. Diabetes mellitus: risk factors for Type II diabetes, use of alternative sweeteners and principles of dietary restriction, Osteoporosis: bone health, use of calcium supplement and phytoestrogen.

UNIT IV

Role of Diet in Disease Prevention and Management: etiology, symptoms, diet management and restrictions in fevers, diahorrea,constipation,peptic ulcer, allergy, jaundice, renal stones and post operative conditions; Weight imbalances and dietary modifications.

UNIT V

Nutraceuticals and functional foods for health and disease prevention Nutraceuticals: Meaning, classification and importance in disease prevention. Functional foods – Meaning,classification and importance in disease prevention. Concept of probiotics, prebiotics and synbiotics and gut health, Role of Functional foods in cancer, diabetes, cardiovascular disorders, osteo-arthritis, rheumatoid arthritis, osteoporosis, other inflammatory conditions, and obesity.

REFERENCES

1. Judith E. Brown, (2017). Nutrition Now. 8th edition, Cengage Learning.
2. Janice Thompson & Melinda Manore (2013). Nutrition for Life. 3rd edition, Pearson education.
3. Blake, J.S. (2008). Nutrition & You. San Francisco: Pearson Education.

NUTRITION FOR HEALTH

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Know the role of vegetarian diet in preventing the degenerative diseases	1	2	3	3	2	3	3
CO 2:	Acquire knowledge about the types of diet	2	2	3	3	2	3	3
CO 3:	Improve the life style through physical activity	2	2	3	3	2	3	3

Food Preservation and Packaging

Course Code: 24FSNP02G3 Credits: T3+P0 Hour/Week: 3 Marks: 100

Learning Objectives: To

1. understand concept and principles of food preservation
2. impart knowledge about the various food packaging materials and its importance
3. know the trends in food packaging

Course Outcomes:

On successful completion of this course the student will be able to:

- knowledgeable about the applications of preservation
- make out the different preservation process
- opt for the exact packaging material for food products

Course content

UNITI

Introduction to Food Preservation: Meaning, concept, methods of food preservation, advantages and limitations; Preservation of fresh produces and processed foods.

Thermal Preservation: use of high temperature preservation method-pasteurization and sterilization, canning concept, principal, application, advantages and limitations Low temperature Storage - Refrigeration, Chilling, cryogenic chilling, chill storage, freezing, cryogenic freezing, frozen food storage, freeze drying, changes in food during freezing, various types of freezers (tunnel types, fluidized bed, air blast etc.).

UNIT II

Preservation by drying and using chemical preservatives-concept, principle and method of drying ,dehydration, solar drying, sun drying, dry in osmosis; mechanical driers– spray drying, foam drying, drying by smoking – definition, principles, applications and Factors influencing different drying methods.

Chemical preservatives: preservatives meaning, types and mode of action, advantages and limitations.

UNIT III

Novel Preservation methods -Food Irradiation, High pressure processing, PEF, ozone treatment, membrane filtration, concept, principal, application, advantages and limitations.

UNIT IV

Introduction to food packaging: packaging terminology- definition, functions of food packaging, packaging environment; characteristics of food stuff that influences packaging selection.

Packaging material and their properties: glass, paper and paper board, corrugated fibre board (CFB), metal containers: tin plate and aluminium, composite containers, collapsible tubes ,plasticfilms, laminations, metalizedfilms, co-extruded films, testing of packaging material; concern and safety of packaging materials, recycling and waste disposal.

UNIT V

Packaging systems and methods: vacuum packaging, controlled atmospheric packaging, modified atmospheric packaging, aseptic packaging, retort processing, microwave packaging active packaging, intelligent packaging, edible packaging, shrink and stretch packaging.

Food labelling and printing: Packaging aesthetic and graphicde sign; printing, coding and marking including barcoding; packaging laws and regulations.

REFERENCES

1. Robertson, G.L. (2006). Food Packaging: Principles and Practice (2nded.),Taylor & Francis Aggarwal, Poonam, Sep, 2003, Value added Products from mangoes,Food&Pack.
2. Chevan, J.K. and Katecha, P.M. (2003).Raisins–Pre treatments, drying methods and storage, Food & Pack.
3. Desrosier, N. W., & Desrosier, J. N. The Technology of Food Preservation-AVI Publication.
4. Jood Sudesh and Neelam Kheterpaul, (2002). Food Preservation, Geeta Souraz, Agrotech Publishing Acedemy, Udaipur-313002.
5. NIIR.(2003).Food Packaging Technology Handbook, National Institute of Industrial Research Board, Asia Pacific Business Press Inc.
6. Han,J.H.(Ed.) (2005). Innovations in Food Packaging, Elsevier Academic Press.

FOOD PRESERVATION AND PACKAGING

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Knowledgeable about the applications of preservation	2	2	3	3	2	2	3
CO 2:	Make out the different preservation process	3	3	3	3	3	3	3
CO 3:	Opt for the exact packaging material for food products	3	3	3	2	2	2	3

Nutrition Therapy in Non-Communicable Disease

Course Code: 24FSNP02G4 Credits:T3+P0 Hours /Week:3 Marks: 100

Learning Objectives:To

1. Acquire knowledge about the food and its composition
2. Learn about the role of healthy diet in disease prevention
3. Understand the concepts of nutraceuticals and functional foods

Course Outcomes:

On successful completion of this course the student will be able to:

- Practice and disseminate information to people on healthy diet

Course content

UNITI

Dietary management of metabolic syndrome and associated disorders metabolic syndrome: concept; pathophysiology of insulin resistance; diabetes mellitus – types, etiology, symptoms and diagnosis, aims of dietary treatments, special dietary consideration for type I and II diabetics, complications of diabetes.

UNITII

Diseases of the heart and blood vessels- etiology, symptoms and diagnosis; atherosclerosis,lipids and other dietary factors and coronary heart diseases (CHD). Diet in CHD, congestive heart failure and hyper lipidemia.

UNITIII

Nutritional aspects of disease affecting the skeleton bone architecture and physiology composition of bone, bone metabolism, bone mass development and markers, nutrients related to bone health; rickets, osteomalacia and osteoporosis - etiology, pathophysiology, risk factorsand nutritional care.

UNITIV

Hypertension- Types, etiology, pathophysiology, risk factors, complications and nutritionalcare. Obesity- introduction, etiology, clinical assessment, treatment approaches, consequences of obesity and its prevention.

UNITV

Cancer - etiology, pathophysiology, risk factors, complications and nutritional care.

ChronicObstructive Pulmonary disease (COPD) - etiology, pathophysiology, risk factors, complicationsand nutritional care.

REFERENCES

1. Srilakshmi, B. (2014). Dietetics, 7th edition, New Age International Private Ltd.
2. Antia.P.(1989). Clinical Nutrition and Dietetics, Oxford University, Mumbai.
3. Mahan, L.K. and Escott Stump,S. (2007). Krause's Food Nutrition and Diet Therapy, 12th Edition, W.B.Saunders Ltd.
4. Mayrice. E.Shills, James, A.Olsen, Moshe Shihe,(2012). Modern Nutrition on Health and Disease,Vol.1&2,11thedition, Lea and Pediger, Philadelphia.
5. Davidson.S.S., Passmore, Martin, A., &Eastwood.F.(1989). Human Nutrition and Dietetics, 9th Edition, F&S Lingstons Edinburgh and London.
6. Longvah,T., Ananthan, R.,Bhaskarachary,K., &Venkaiah,K .(2017). Indian Food Composition Tables (IFCT), Indian Council of Medical Research, National Institute of Nutrition, Hyderabad.
7. Recommended Dietary Allowances and Estimated Average Requirements Nutrient Requirements for Indians –2020. A Report of the Expert Group Indian Council of Medical Research National Institute of Nutrition.NIN, Hyderabad.

NUTRITION THERAPY IN NON-COMMUNICABLE DISEASE

Course Outcomes		Programme Specific Outcome (PSO)						
		PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1:	Practice and disseminate information to people on healthy diet	3	2	3	2	3	2	3

VALUE ADDED COURSES

Designing of Diet

Course Code:24FSNP0VA1 **Credits:2**

LearningObjectives:

1. Tolearntoplandietsforhealthyliving

Course content

- ❖ Identification of food sources for various nutrients using food composition table
- ❖ Estimation of BMI and other nutritional status parameters to plan diet
- ❖ Record yourself- diet using 24 hour dietary recall and its nutritional analysis.
- ❖ Introduction to meal planning, concept of food exchange system
- ❖ Planning of meal for adults of different activity levels for various income groups
- ❖ Planning of nutritious snacks for self and preparation of nutritious snacks using various methods of cooking
- ❖ Understanding the nutritional labeling of food products

REFERENCES

1. Longvah,T. ,Ananthan, R., Bhaskarachary,K., & Venkaiah,K. (2017) .Indian Food Composition Tables (IFCT), Indian Council of Medical Research, National Institute of Nutrition, Hyderabad.
2. Recommended Dietary Allowances and Estimated Average Requirements Nutrient Requirements fo rIndians –2020. A Report of the Expert Group Indian Council of Medical Research National Institute of Nutrition. NIN, Hyderabad.
3. Srilakshmi, B. (2014). Dietetics, 7th edition, New Age International Private Ltd.

Art of Baking

Course Code:24FSNP0VA2 **Credits:2**

LearningObjectives:

1. To learntheartofbasicbakingtechniques

Course content

- ❖ Introduction baking and baking techniques
- ❖ Baking ingredients, essential tools and equipment, environmental requirements
- ❖ Fundamentals techniques of making baked products –Biscuits, cookies, breads, buns, rolls, pizza base and pastries
- ❖ Cake making- icing and decorations
- ❖ Making low fat and sugar free baked products
- ❖ Use, handling, packaging and storage of baked products

REFERENCES

1. Radhakrishnan, S.(2015). AGuidetoBakingProcess,Education is a press,ADivisionofWrite&PrintPublications,NewDelhi-110015.
2. Hamlyn.(1984).TheBestofBaking,London.
3. IndiraKakati.(1984).EggLessBaking,Sahibabad:VikasPublishingHouse.

Food Preservation

Course Code:24FSNP0VA3 **Credits:2**

LearningObjectives:

1. Togainknowledgeonhomescalepreservationoffoods

Course content

- Introduction to preservation- meaning, types and importance
- Home scale food preservation techniques- Essential tools and equipments required
- Fundamental techniques of preparing baked products- Sauces and chutneys, Ketchup (tomato), Squashes (lemon squash, orange squash, pineapple squash), Syrups(rose syrup and almond syrup), Jams (apple jam and mixed fruit jam), Pickles (Amla, lemon, mixed vegetable), Preserve (carrot), Murraba (Ginger), Leathers (Guava), Jelly (Pectin), Dehydration of cereal products, fruits and vegetables (Ricefryums, sapota flakes, brinjal fryums).
- Use, handling, packaging and storing of preserved foods.
- Food additives used for food preservation and permissible limits.

REFERENCES

1. FoodSafetyandStandardsAuthorityofIndia.www.fssai.gov.in
2. NationalCentreforHomeFoodPreservation.http://nchfp.uga.edu
3. Siddhapa, G.S. (1998). LalGandTand on Preservationoffruitsandvegetables. IndianCouncilof AgricultureResearch,NewDelhi.
4. Srivastava, S. S.PhalParirakshan.KitabMahal, Lucknow2006.

Food Laws and Adulteration

Course Code:24FSNP0VA4 **Credits:2**

Learning Objectives:

1. Togainbasicknowledgeonvarious foodslawsandaboutadulteration.

Course content

- Highlights of Food Safety and Standards Act 2006 (FSSA) –Food Safety and Standards Authority of India–rules and procedures of local authorities
- Common Foods subjected to Adulteration-definition, types; poisonous substances; foreign matter, cheap substitutes, spoiled parts
- Adulteration through food additives–Intentional and incidental; general impact on human health
- Methods of detection adulterants in the following foods- milk, oil, grain, sugar, spices and condiments, processed food, fruits and vegetables.
- Additives and Sweetening agents (at least three methods of detection for each food item)

REFERENCES

1. Food Safety and Standards Authority of India. Ministry of Health and Family Welfare, Government of India.
2. Mudambi,S.R., and Rajgopal, M. V. (2006).FundamentalsofFoodsandNutrition. Wiley Eastern Ltd.
3. Raheena Begum. (1989). A Textbook of Foods, Nutrition and Dietetics. Sterling Publishers Pvt. Ltd. New Delhi.