M.Sc. Food Science and Nutrition

Syllabus

(with effect from June 2015)

DEPARTMENT OF HOME SCIENCE
The Gandhigram Rural Institute – Deemed University
Gandhigram – 624 302 Tamil Nadu

M.Sc. FOOD SCIENCE AND NUTRITION

Category	Subject code	Title of the course	Credits	Contact hours	CFA	ESE	Total marks
I SEMESTER							
Core course	15FSNP0101	Applied physiology	4	4	40	60	100
	15FSNP0102	Advanced Food Science	3	3	40	60	100
	15FSNP0103	Advanced Nutrition – I	3	3	40	60	100
	15FSNP0104	Advanced Food Science & Advanced Nutrition - Practical	2	4	60	40	100
	15FSNP0105	Food Microbiology	3	3	40	60	100
	15FSNP0106	Nutritional Biochemistry	3	3	40	60	100
	15FSNP0107	Nutritional Biochemistry Practical	2	4	60	40	100
Compulsory non-credit course	15GTPS0001	Gandhi in Every Day Life	-	2	50		50
		Total	**20**	**26**			
II SEMESTER							
Core course	15APRP0001	Research Methods	4	4	40	60	100
	15APRP0002	Applied Statistics	4	4	40	60	100
	15FSNP0208	Food Product Development and Marketing	3	3	40	60	100
	15FSNP0209	Food Product Development and Marketing -Practical	2	4	60	40	100
	15FSNP0210	Advanced Nutrition-II	3	3	40	60	100
Non-Major Elective			4	4	40	60	100
Compulsory non-credit course	15ENGP00C1	Communication/ Soft skills		2	50		50
		Total	**20**	**24**			
III SEMESTER							
Core course	15FSNP0311	Therapeutic Nutrition	4	4	40	60	100
	15FSNP0312	Therapeutic Nutrition Practical	2	4	60	40	100
	15FSNP0313	Nutrition Through Lifecycle	3	3	40	60	100
	15FSNP0314	Nutrition in Critical Care	3	3	40	60	100
Major Elective	15FSNP03EX		4	4	40	60	100
Modular Course	15FSNP03MX		2	2	50		50
Compulsory Non-credit Course	15FSNP03F1	Extension/Field visit		2	50	-	50
	15EXNP03V1	Village Placement Programme (VPP)	2	-	50	-	50
		Total	**20**	**22**			

IV SEMESTER							
Core Course	15FSNP0415	Community Nutrition	4	4	40	60	100
	15FSNP0416	Food Safety and Quality Control	4	4	40	60	100
	15FSNP0417	Internship	4	8	100		100
	15FSNP0418	Dissertation	6	12	75	75+50	100
Modular Course	15FSNP04MX		2	2	50	-	50
Compulsory Non-credit Course	15FSNP04F2	Extension/Field visit	-	2	50	-	50
		Total	**20**	**32**			
		Grand Total	**78**	**100**			

MAJOR ELECTIVE COURSES

Course Code	Title of the course	Credits	Contact Hours	CFA	ESE	Total
15FSNP03E1	Scientific Writing	4	4	40	60	100
15FSNP03E2	Food Service Management	4	4	40	60	100
15FSNP03E3	Family and Community Science	4	4	40	60	100
15FSNP03E4	Food Processing and Technology	4	4	40	60	100

MODULAR COURSES

Modular	Course Code	Title of the course	Credits	Contact Hours	CFA	ESE	Total
MX	15FSNP03M1	Functional Foods and Nutraceuticals	2	2	50	-	50
	15FSNP03M2	Geriatric Care	2	2	50	-	50
MY	15FSNP04M1	Nutrition for Health and Fitness	2	2	50	-	50
	15FSNP04M2	Nutritional Assessment	2	2	50	-	50.

CORE PAPER- APPLIED PHYSIOLOGY

Code: 15FSNP0101 Credits: T4 + P0 Hours/week: 4 Marks: 100

Objectives:

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

Specific Objectives of Learning:

- The students will be knowing the structure and functions of systems in human body.
- The students will be able to integrate the functions of all the systems and disease conditions.

UNITI

Cell structure and function: Levels of cellular organization and function – organelles, tissues, organs and systems – brief review. Cell membrane, transport across cell membrane and intercellular communication. Regulation of cell multiplication.Structure and function of bone, cartilage and connective tissue.Osteoporosis. The musculo – skeletal system: types of muscles, structure and function

Digestive system: Review of structure and function. Secretory, Digestive and Absorptive functions.Structure and functions of liver, pancreas and gall bladder and their dysfunction.Hormones of GIT.

UNIT II

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

Excretory system: Structure and functions of nephron. Urine formation.Role of kidney in maintaining PH of blood. Water - acid base balance, diuretics.

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. Physiology of Circulation.Lymphatic system.

Immune system: Cell mediated and humoral immunity. Activation of WBC and production of antibodies.Role in inflammation and defense.

UNIT IV

Endocrine system: Endocrine glands – Pitiutary, 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 .

UNIT V

Nervous system: Review of structure and function of neuron, conduction of nerve impulse, synapse, role of neurotransmitters. Central nervous system, structure and function of brain and spinal cord, Autonomic nervous system, afferent and efferent nerves, blood brain barrier, CSF. Hypothalamus and its role in various body functions – sleep, memory and obesity.

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

References :

1. Ganong, W. F. (1985): Review of Medical Physiology, 12th Edition, Lange Medical Publication.

2. Moran Campell E.J., Dickinson, C.J., Slater, J.D., Edwards, C.R.W. and sikora, k.(1984): Clinical Physiology, 5th Edition, ELBS, Blackwell Scientific Publications.

3. Guyton, A.C,(1985): Function of the Human body, 4th Edition , W.B. Sanders Company, Philadephia.

4. Guyton, A.C, and Hall, J. B. (1996): Text Book of Medical Physiology, 9th Edition ,W.B. Sanders company, Prime Books (Pvt.) Ltd., Bangalore.

5. Wilson, K.J.W. and Waugh, A. (1996): Ross and Wilson Anatomy and Physiology in Health and Illness, 8th Edition, Churchill Livingstone.

6. McArdle, W.D., Katch, F.I. and Katch, V.L. (1996): Exercise Physiology. Energy, Nutrition and Human performance, 4th Edition, Williams and wilkins, Baltimore.

7. Jain, A.K., Textbook of physiology. Vol I and II. Avichal publishing co., New Delhi.

Journals

1. European Journal of Applied Physiology
2. Journal of Comparative Physiology A · Neuroethology, Sensory, Neural, and Behavioral Physiology
3. Journal of Comparative Physiology B · Biochemical, Systems, and Environmental Physiology , Journal of Membrane Biology

Lecture Schedule

Units	Topics to be covered	Hours
I	**Cell structure and function:** Levels of cellular organization and function – organelles, tissues, organs and systems – brief review	**2**
	Cell membrane, transport across cell membrane and intercellular communication	**1**
	Regulation of cell multiplication	**1**
	Structure and function of bone	**2**
	Structure and function cartilage and connective tissue. Osteoporosis	**2**
	Musco skeletal system-types,structure and function	**2**
	Digestive System	
	Review of structure and function.	**2**
	Secretory	**2**
	Digestive& Absorptive functions	**2**
	Structure and functions of liver	**1**
	Pancreas and gall bladder and their dysfunction.	**1**
	Hormones of GIT	**2**
	Total	**20**
II	**Respiratory system:** Review of structure and functions	**1**
	Role of lungs in the exchange **and** Transport of gases.	**2**
	Excretory system Structure and functions of nephron.	**1**
	Urine formation.	**2**
	Role of kidney in maintaining PH of blood.	**2**

	Water - acid base balance, diuretics	**2**
	Total	**10**
III	**Circulatory system:** Structure and functions of heart and blood vessels.	**2**
	Blood: Composition- plasma, blood cells, haemoglobin, blood clotting process	**2**
	Heart: beat, initiation , conduction and regulation.	**2**
	Physiology of Circulation. Lymphatic system.	**2**
	Immune system: Cell mediated and humoral immunity. Activation of WBC and production of antibodies. Role in inflammation and defense.	**3**
	Total	**11**
IV	**Endocrine system:** Endocrine glands – Pitiutary, thyroid, adrenals, pancreas- hormones of endocrine glands-Functions and role , Disorders of endocrine glands.	**2**
	Reproductive system: General anatomy of female and malereproductive system	**2**
	Menstrual cycle, spermatogenesis, Oogenesis, Process of reproduction, Pregnancy and parturition	**3**
	Mammary glands-structure and lactation. Physiological changes in Menopause	**2**
	Total	**9**
V	**Nervous system:** Review of structure and function of neuron, conduction of nerve impulse, synapse,role of neurotransmitters.	**3**
	Central nervous system, structure and function of brain and spinal cord,	**2**
	Autonomic nervous system, afferent blood brain barrier, CSF. Hypothalamus and its role in various body functions –sleep, memory and obesity.	**3**
	Sense organs: Review of structure and function. Role of skin, eye, ear, Nose and tongue in perception of stimuli.	**2**
	Total	**10**
	Seminar	**4**
	Unit I to V Total hours	**64**

CORE PAPER- ADVANCED FOOD SCIENCE

Code: 15FSNP0102 Credits: T3 +P0 Hours/Week: 3 Marks: 100

Objectives:

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

Specific Objectives of Learning:

After studying this paper, the students would know

- The characteristics and behaviour of food constituents during processing
- The changes in physiochemical and functional properties of food constituents due to processing
- The applications and uses of ingredients in food product development

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; Method of oil extraction; Oil composition and the properties; Refining of oil and winterization; Methods to determine the quality of fat/oil; Effect of processing on physico-chemical properties of fat/oil; Sources of fat and its shelf life; Quality changes in fat/oil during storage and prevention of fat spoilage; Role of fat/oil in food products; Fat substitutes.

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; Flavours produced from fermentation and volatiles on foods; Effect of processing on food flavours; Role of flavours in food products.

References

1. Srilakshmi, B. 2005. Food Science, New Age International (P) Ltd., Publishers, New Delhi.
2. Potter, N. and Hotch Kiss, J.H. (1996): Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi
3. Julians, B.O. (1985). Rice Chemistry and Technology, 2nd edition, American Association Chemists, St. Paul Mimesota, USA.
4. Charley, H. (1982). Food Science, 2nd edition, John Wiley & Sons, New York.
5. Arthey, D. and Ashurst, P.R. (1996). Fruit Processing, Blackie Academic & Professional, London
6. Desrosier, N.W. and James N. (2007). Technology of food preservation. AVI Publishers.
7. Meyer, L.H. 1974. Food Chemistry, AVI Publishing Co. Inc,
8. Manay, S. and Shadaksharamasamy, Food: Facts and Principles, New Age International (P) Publishers, New Delhi.

Lecture Schedule

Units	Topics to be covered	Hours
I	**Constituents of food** Water: structure and properties; types of waterWater: sorption phenomena; water solution interactions	**2**
	Phase transition of foods containing water, ice formation and structure Heat transfer during processing, relationship between viscosity and temperature	**2**
	Water activity and food spoilage Food dispersion meaning, concept of colloidal system and rheology Structure, formation and stability of gelsStructure, formation and stability of sols, Structure, formation and stability of emulsion Structure, formation and stability of foams.	**2**
	Total	**6**
II	**Polysaccharides, sugars and sweeteners** Review on polysaccharides, structure and composition of starch Properties and characteristics of food starches	**2**
	Effect of heat on food starch properties – gelatinization, retrogradation, dextrinization Factors influencing gelatinization and dextrinisation process	**2**
	Modified food starches meaning, preparation methods and the properties Structure, composition and characteristics of non-starch polysaccharides such as cellulose and hemicellulose,	**3**
	Structure, composition and characteristics of non-starch polysaccharides such as pectin and gums	**2**
	Role of starch and non-starch polysaccharides in food and industrial applications .Properties of sugars and sweeteners, role of sweetener in food products.	**2**
	Total	**11**
III	**Proteins and Enzymes** Review on amino acid structure and composition, classification of amino acids,	**2**
	Amino acid properties, meaning of peptide bond and polypeptides Review on structure of proteins, Classification and properties of proteins	**2**
	Effect of heat on physiochemical properties of proteins – denaturation, gelation . Role of proteins in food products and the industrial applications of proteins Texturized vegetable protein meaning and the preparation method	**2**

	Protein concentrate and isolates meaning and the preparation methods Review on enzymes, classification and its nature Mechanism of enzyme action, Factors influencing enzyme activity	**2**
	Role of enzymes in food products; Immobilized enzymes and its application in food industries.	**2**
	Total	**10**
IV	**Fat and Oil** Structure and composition of fat, properties of fat. Oil structure, composition and the properties Method of oil extraction – rendering, solvent extraction and mechanical pressing	**3**
	Refining of oil and winterization Methods to determine the quality of fat/oil – Acid value, peroxide value, TBA etc	**2**
	Effect of processing on physico-chemical properties of fat/oil; Sources of fat and its shelf life	**2**
	Quality changes in fat/oil during storage and prevention of fat spoilage Role of fat/oil in food products and the industrial applications of fat Fat substitutes meaning and the preparation of margarine	**2**
	Total	**9**
V	**Food colours and flavours** Natural: Pigments meaning, composition and the properties; Classification of pigments – fat and water soluble Effects of processing on stability of fat soluble pigments present in foods	**2**
	Effect of processing condition on stability of water soluble pigments present in foods.Factors influencing stability of food colours. Method of extraction of natural colours and its feasibility.	**2**
	Artificial colour meaning, composition and the properties Effect of processing on stability of artificial colours and the factors influencing it food and industrial applications of natural and artificial colours	**3**
	Flavors: Taste and nonspecific saporous sensations, Flavour compounds in foods such as vegetables, fruits and spices	**1**
	Flavours produced from fermentation and volatiles on foods Effect of processing on food flavours and the concept of microencapsulation Role of flavours in food and industrial usage	**1**
	Total	**9**
	Seminar	**3**
	Unit I to V Total hours	**48**

CORE PAPER- ADVANCED NUTRITION - I

Code: 15FSNP0103 Credits: T3 +P0 Hours/Week: 3 Marks: 100

Objectives:

1) To highlight the physiological and metabolic role of nutrients and their relationship to human health and wellbeing.
2) To understand the health problems associated with nutrient deficiency or toxicity

Specific Objectives of Learning:

After studying this paper, the students would know

- the essential of nutrients in growth and development of humans
- the importance of diet in maintaining human health and leading active lifestyle
- The concept of diet therapy in treatment and management of nutritional disorders

UNIT I

Energy: Energy definition; unit of measurements – Calorie & Joule; Concept of energy balance – energy intake and expenditure; Energy sources: Carbohydrate, protein & fat; Measurement of energy value of foods by Bomb Calorimeter; Energy expenditure components: basal and resting metabolic rate, thermic effect of food and physical activity; Factors influencing energy expenditure; Methods for determination of energy expenditure – direct and indirect calorimetry; Estimation of energy requirements of individuals and groups: RDA, principles and the methods used for RDA measurement.

UNIT II

Carbohydrates: Classification and functions; Digestion and absorption process; Metabolism and regulation; dietary fibre meaning and types; Physiological role and health benefits of dietary fibre, Resistant starch meaning and its physiological benefits; Requirements and food sources; Glycemic index of foods.

Proteins: Classification and functions; Digestion and absorption; Metabolism and regulation of proteins; Requirements and food sources; Factors influencing protein quality: Amino acid composition and digestibility; Protein quality evaluation methods: *in vitro* and *in vivo* methods; Therapeutic application of specific proteins and amino acids.

UNIT III

Lipids: Classification and functions; Digestion and absorption process; Metabolism and regulation; Requirements and food sources; Fatty acids types: Saturated and unsaturated difference; Essential Fatty Acids (EFA): Definition and functions; Role of n-3, n-6 fatty acids in health and disease; Trans fatty acids and its association to cardiovascular diseases.

Vitamins: Classification – fat and water soluble; Fat soluble vitamins (A,D,E and K): Functions, Requirements and food sources; Physiological, pharmacological and therapeutic effects, toxicity and deficiency of fat soluble vitamins; Water soluble vitamins: Thiamine, riboflavin, niacin, biotin, pyridoxine, folic acid, pantothenic acid, ascorbic acid, cyano-cobalamin, choline, inositol functions, requirements, food sources; Deficiency and toxicity of water soluble vitamins.

UNIT IV

Minerals: Macro minerals: Calcium, phosphorus, Magnesium, sodium, potassium and chloride functions, requirements, food sources, deficiency and toxicity; Microminerals: Iron, copper, zinc, manganese, iodine, fluoride. Trace Minerals: Selenium, cobalt, chromium, vanadium, silicon, boron, nickel functions, requirements, food sources, deficiency and toxicity. Interrelationship between vitamins and minerals in metabolism

UNIT V

Water: Body composition – extra- and intra- cellular fluid; Physiological functions; water balance and its regulation; Requirement and the sources; Nutritional and health problems due to deficiency or excess of water intake. **Phytochemicals:**Non nutritive food components and their potential health benefits: polyphenols, tannins, phytate, phytoestrogens, cyanogenic compounds, lectins and saponins.

References

1. Srilakshmi, B. 2005. Food Science, New Age International (P) Ltd., Publishers, New Delhi.
2. Potter, N. and Hotch Kiss, J.H. (1996): Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi
3. Julians, B.O. (1985). Rice Chemistry and Technology, 2nd edition, American Association Chemists, St. Paul Mimesota, USA.
4. Charley, H. (1982). Food Science, 2nd edition, John Wiley & Sons, New York.
5. Srilakshmi (2008). Nutrition Science. New Age International Pvt. Ltd, New Delhi.
6. Mahan L K and Escott – Stump S (2000). Krause's Food Nutrition and Diet Therapy 10th Ed WB Saunders Ltd
7. Shills, M.E., Olson, J., Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9th Edition .Williams and Williams. A. Beverly Co. London.
8. SreeDevi.V. (1997). Nutrition Education. Discovery Publishing House, New Delhi.
9. Bamji, M.S., Rao, P.N. and Reddy, V. (1996). Textbook of Human Nutrition, Oxford & IBH Publishing Co. Pvt. Ltd.
10. Gopalan, C. (1995). Recent Trends in Nutrition, Oxford University Press, London.

Lecture Schedule – Theory

Units	Topics to be covered	Hours
I	**Energy**	
	Meaning of energy, unit of measurements – Calorie & Joule definition, Concept of energy balance – energy intake and expenditure;	1
	Energy sources of food: Carbohydrate, protein & fat; energy metabolism of carbohydrate, protein and fat, Measurement of energy value of foods by Bomb Calorimeter – principle and process;	1
	Energy expenditure components: basal and resting metabolic rate meaning and the concept, factors influencing BMR	1
	Energy expenditure components: thermic effect of food and physical activity, factors influencing thermic effect of food and physical activity	1
	Determination of energy expenditure – direct method	1
	Determination of energy expenditure - indirect method	1
	Estimation of energy requirements of individuals and groups: factoral, computation and others	1
	Meaning of RDA and nutritional status, principles and the methods used for RDA measurement	1
	ICMR RDA of energy for different age groups, definition of reference- men and women	1
	Total	9

II	**Carbohydrates**	
	Carbohydrate meaning, classification of carbohydrate – mono-, oligo- and poly-saccharide	1
	Physiological functions of carbohydrate, digestion and absorption process Review of metabolism and regulation, deficiency and toxicity of carbohydrate,	1
	Dietary fibre meaning and types, physiological role and health benefits of dietary fibre, Resistant starch meaning and its physiological benefits Carbohydrate requirements and food sources, Glycemic index of foods	2
	Protein, polypeptide and amino acid meaning, classification of proteins Functions of proteins, digestion and absorption	1
	Review of protein metabolism and regulation, requirements and foods sources Factors influencing protein quality – antinutritional factors and digestibility	1
	Protein quality evaluation methods - PER, DC, NPU, BV, AAS, PDCAAS In vitro and vivo method for protein quality evaluation – Amino acid score, PER, BV details Deficiency and toxicity of proteins, therapeutic applications of proteins and amino acids	3
	Total	9
	Lipids	
	Lipid definition, classification of lipid Lipid functions, digestion and absorption process	1

III	Review of metabolism and regulation, deficiency or toxicity, requirements and food sources Fatty acids meaning and the types, essential Fatty Acids (EFA): Definition and functions	1
	Role of n-3, n-6 fatty acids in health and disease, trans fatty acids and its association to cardiovascular diseases	1
	Vitamins definition, classification of vitamins, functions of vitamin A, absorption, requirement and food sources, deficiency/toxicity Vitamin D and E functions, absorption, requirement and food sources, deficiency or toxicity Vitamin K functions, absorption, requirement and food sources, deficiency or toxicity	2 1
	Vitamin B1 and B2 functions, absorption, requirement and food sources, deficiency or toxicity Niacin, vitamin B6, biotin functions, absorption, requirement and food sources, deficiency or toxicity Folic acid, vitamin B12, vitamin C functions, absorption, requirement and food sources, deficiency or toxicity	2
	Pantothenic acid, choline, inositol functions, absorption, requirement and food sources, deficiency or toxicity	1
	Total	9

IV	**Minerals**	
	Minerals meaning, classification of minerals, calcium functions, absorption, Calcium requirement and food sources, deficiency or toxicity Phosphorus and magnesium functions, absorption, requirement and food sources, deficiency or toxicity	2
	Sodium, potassium and chloride functions, absorption, requirement and food sources, deficiency or toxicity	1
	Iron and iodine functions, absorption, requirement and food sources, deficiency or toxicity	1
	Zinc and copper functions, absorption, requirement and food sources, deficiency or toxicity Manganese and fluoride functions, absorption, requirement and food sources, deficiency or toxicity Selenium and chromium functions, absorption, requirement and food sources, deficiency or toxicity	2 2
	Cobalt and vanadium functions, absorption, requirement and food sources, deficiency or toxicity Silicon, boron and nickel functions, absorption, requirement and food sources, deficiency or toxicity	2
	Inter relationship between vitamins and minerals	1
	Total	11
	Water and phytochemicals	
	Body fluid and water - composition of human body, water and electrolyte balance	1

V	Functions of water, absorption requirement and sources Nutritional and health problems associated to deficiency or excess of water intake	2
	Non-nutritive compounds meaning and its function Health benefits of polyphenols and tannin phytate and phytoestrogen consumption	2
	Health benefits of lectin and saponin consumption	2
	Total	**7**
	seminar	**3**
	Total hours for Unit I - V	**48**

CORE PAPER- ADVANCED FOOD SCIENCE & ADVANCED NUTRITION - PRACTICAL

Code: 15FSNP0104 Credits: T0+P2 Hours/Week: 4 Marks: 100

Objectives:

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

Specific Objectives of Learning :

After studying this paper, the students would know

- the testing methods used for determination of food constituents
- the influence of processing conditions on physiochemical properties of food constituents

Contents:

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 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

References

1. Srilakshmi (2008). Nutrition Science. New Age International Pvt. Ltd, New Delhi.
2. Mahan L K and Escott – Stump S (2000). Krause's Food Nutrition and Diet Therapy 10th Ed WB Saunders Ltd
3. Shills, M.E., Olson, J., Shike, M. and Roos, C. (1998): Modern Nutrition in Health and Disease. 9th Edition .Williams and Williams. A. Beverly Co. London.
4. SreeDevi.V. (1997). Nutrition Education. Discovery Publishing House, New Delhi.
5. Bamji, M.S., Rao, P.N. and Reddy, V. (1996). Textbook of Human Nutrition, Oxford & IBH Publishing Co. Pvt. Ltd.

CORE PAPER- FOOD MICROBIOLOGY

Code: 15FSNP0105 Credits: T3 +P0 Hours/Week: 3 Marks: 100

Objectives:

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

Specific Objectives of Learning :

Completion of the syllabus 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.
- Discuss the rationale for the use of standard methods and procedures for the microbiolical analysis of food.
- Explain the effects of fermentation in food production and how it influences the microbilogical quality and status of the food product.

UNIT I

Microbiology of importance 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. Method of isolation and detection of microorganisms in food - conventional method, rapid method (newer techniques);Immunological methods: fluoroscent, antibody, radio Immunoassay, ELISA etc. Chemical methods:Thermostablenuclear,ATP measurement and PCR(Polymer chain reaction)-only principles in brief.

UNIT II

Perishable and non-perishable foods- Contamination,preservation and spoilage of cereal and cereal products-flour, bread,pasta and prepared dough**Vegetables and fruit products**-contamination,preservation and spoilage of dehydrated ,canned fruits and vegetables.

UNIT III

Meat and meat products- Contamination,preservation and spoilage of meat and meat products-sausages and dried beef,ham,poultry,meatpickles,sea foods(pickling of fish). Milk and milk products-butter,cheese,evaporated and condensed milk,curd.Eggs-dried eggs.

UNIT IV

Production of fermented foods-production of wine,vinegar,beer,soy based products and cereal based fermentedproducts-idli,dhokla,bread.Genetically modified foods-definition,technique involved in genetically modified foods,role of genetically modified foods.Merits and demerits-of golden rice,brinjal,tomato,potato and concept of probiotics,prebiotics and symbiotics.

UNITV

Food borne illness-bacterial,food borne poisoning,infections and intoxications-non – bacterial-mycotoxins,foodparasites,sea food intoxications.

References:

1. Frazier W.C and Westhoff D.C.(1992), Food Microbiology, Tata McGraw Hill Publishing Co., Ltd. New Delhi.

2. Annak.Joshua, (2001). Microbiology, Popular Book Depot.Chennai-15.

3. Ray, B. (2001) Fundamental Food Microbiology, 2nd Ed, CRC press, Boca raton F.

4. JoshiVK&Pandey(2004).Biotechnology:food,fermentation,microbiology,biochemistryand technology,vol I &II,Educational publishers and distributors,New Delhi.

5. Crueger W and Crueger A (2003) Biotechnology: A textbook of Industrial Microbiology 2nd Edition,Panima Publishing Corpoartion,New Delhi.

6. Guttierrez-Lopez GF and Barbosa-Canovas GV (Eds) (2003) Food Science and Food Biotechmolgy CRC press,USA.

7. Halford NG (2003) 'Genetically Modified Crops' Imperial College Press, UK

Modern Food Micro-Biology by James M. Jay, (2000), 6th edition, An Aspen Publication,Maryland, USA.

8. Food Microbiology: Fundamentals and frontiers by M.P. Doyle, L.R. Beuchat and Thoma J. Montville, (2001), 2nd edition, ASM press, USA.

Lecture Schedule

Units	Topics to be covered	Hours
I	Bacteria, morphology Bacteria cultural characteristics and biochemical activities, primary source in foods	**2**
	Fungi: morphology Fungi: cultural characteristics and biochemical activities, primary source in foods	**2**
	Algae : morphology, cultural characteristics Algae : Biochemical activities, primary source in foods Yeast- morphology, cultural characteristics	**3**
	Biochemical activities, primary source in foods Factors affecting the growth of microorganisms in food; intrinsic parameters that affect microbial growth. Extrinsic parameters that affect microbial growth.	**3**
	(Only principles in brief) Method of isolation and detection of microorganisms in food -conventional method, rapid method Newer techniques;Immunological methods: fluoroscent, antibody, Radio Immunoassay, ELISA. Chemical methods:Thermostablenuclear,ATP measurement PCR (Polymer chain reaction)	**3**
	Total	**13**
II	Cereal and cereal products Contamination, Preservation Spoilage –flour, bread Spoilage –pasta and prepared dough	**4**
	Vegetables and fruit products-contamination Preservation Spoilage of dehydrated &canned fruits Spoilage of vegetables.	**4**
	Total	**8**
	Meat and meat products- Contamination, Preservation Spoilage of meat and meat products-sausages Dried beef,ham, Poultry, meat pickles,	**4**
	Sea foods(pickling of fish).	**1**

III	Milk and milk products- Contamination Preservation Spoilage of butter, cheese,evaporated	**4**
	Condensed milk,curd Eggs- contamination Preservation Spoilage of dried eggs.	**3**
	Total	**12**
IV	**Production of fermented foods**-production of wine Vinegar and beer, Soy based products Cereal based fermented products-idli,dhokla,bread.	**3**
	Genetically modified foods-definition,technique involved in genetically modified foods Role of genetically modified foods. Merits and demerits-of golden rice,brinjal, Tomato and potato Concept of probiotics,prebiotics and symbiotics.	**4**
	Total	**7**
V	**Food borne illness**-bacterial,food borne poisoning, Infections and intoxications-mycotoxins	**3**
	Food parasites Sea food intoxications.	**3**
	Total	**6**
	Seminar	**2**
	Total hours for Unit I - V	**48**

CORE PAPER- NUTRITIONAL BIOCHEMISTRY

Code: 15FSNP0106 Credits: T3 +P0 Hours/Week: 3 Marks: 100

Objectives :

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

Specific Objectives of Learning

on successful completion of these units, students are expected :

- To describe the concepts and chemistry of major nutrients
- To explain the macronutrient metabolism and its bioenergetics
- To describe protein synthesis and nucleic acid metabolism
- To gain basic knowledge on the concepts of nutrigenomics.
- To understand the role of antioxidants in prevention of degenerative diseases.

UNIT - I

Review of structure, chemistry and functions of carbohydrate, protein and lipids

Heteropolysaccharides: Definition, classification, structure and properties of glycoprotein and proteoglycans**.**

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

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 cholestrol and β-oxidation of fatty acids, ketogenesis.

Protein metabolism- protein biosynthesis

UNIT- III

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.Basic concepts of nutregenomics,definition,scope,transcriptomics,epigenomics and proteomics.

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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

1. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W.(2000): 25th Ed. Harpers Biochemistry.Macmillan worth publishers.
2. Nelson, D.L. and Cox, M.M.(2000): 3rd Ed. Lehninger's principles of Biochemistry, Macmillan worth publishers.
3. Delvin, T.M.(1997): 4th Ed. Text Book of Biochemistry with clinical correlations, Wiley Liss Inc.
4. Stryer, L. (1998): 4th Ed. Biochemistry, WH Freeman and Co.
5. Conn, E.E., Stumpf, P.K., Bruening, G. NS Doi, R.H.(2001): 5th Ed. Outlines of Biochemistry, John Wiley and Sons.
6. Voet, D. Voet, J.G and pratt, C.W.(1999): Fundamentals of Biochemistry
7. Oser, B.L.,(1965) 14th ed. Hawk's Physiological Chemistry.Tata McGraw Hill Publishing Co. Ltd
8. Tietz, N.W. (1976) Fundamentals of Clinical Chemistry. WB Saunders Co.
9. U. Satyanarayan(2006). Biochemistry, New Central Book Agency (pvt) ltd, Edition 3.
10.J.L. Jain(2004).Fundamentals Of Biochemistry (Multi Colour Ed), S Chand publisher, 6th Edition.
11. Murray, R K., Granner, D K., Mayes, P A and Rodwell, V W (2012) : 29th Ed Harper's illustrated Bio-Chemistry. Lange Medical book.

JOURNALS

1. Current Science
2. Indian Journal of Biochemistry and Biophysics
3. Bioscience,Biotechnology and Biochemistry
4. Trends in biochemical and experimental
5. Metabolism-clinical and experimental
6. The keio journal of medicine

WEBSITES

1. www.kosmix.com/Health/Nutrition-s - 81k
3. simple.wikipedia.org/wiki/Riboflavin - 30k
3.en.wikipedia.org/wiki/Vitamin_D - 162k

Lecture Schedule:

Units	Topics to be covered	Hours
I	Review of structure,chemistry and functions of carbohydrate	1
	Review of structure,chemistry and functions protein	1
	Review of structure,chemistry and functions of lipids	1
	Heteropolysaccharides: Definition, classification, structure and properties of glycoprotein.	2
	Definition, classification, structure and properties of proteoglycans.	2
	Plasma proteins – classification,types, Plasma proteins, nature, Plasma proteins properties and functions.	2
	Total	**9**
II	carbohydrates – glycolysis and their regulation	1
	Gluconeogenesis and their regulation	2
	Citric acid cycle and their regulation,	2
	Hexose monophosphate pathway and their regulation	1
	Electron transport chain	2
	Fat:Synthesis of fatty acids,	2

	Synthesis of phospholipids , Synthesis of cholesterol, β-oxidation of fatty acids, ketogenesis.	2
	Protein metabolism- protein biosynthesis Steps involved in protein biosynthesis	3
	Total	**15**
III	Review of structure and composition of nucleic acids. Purine and pyrimidine – synthesis and breakdown.	1
	pyrimidine – synthesis and breakdown	1
	nucleic acids – DNA replication	1
	Transcription,	1
	DNA repair systems, Genetic mutation,	1
	Regulation of gene expression.	1
	Basic concepts of nutregenomics,definition,scope,	1
	Transcriptomics,Epigenomics and proteomics.	3
	Total	**10**
IV	Hormones – regulation of endocrine system,	2
	Classification of hormones according to their mechanism of action,	2
	Mechanism of action of hormones Insulin	2
	Mechanism of action of hormones thyroxine	1
	Minerals – biological role of minerals.-Iron, Iodine, Copper,cobalt,molybdenum, zinc Calcium,phosphorus and selenium. Detoxification and xenobiotics– metabolism of foreign compounds	3
	Total	**10**
V	Free Radicals and Antioxidants– Definition, classification of antioxidants,	1
	Generation of free radicals	1
	Role of antioxidants in prevention of degenerative disorders cancer CVD and Diabetes Mellitus).	1
	Total	**3**
	Seminar	**1**
	Total hours for Unit I - V	**48**

CORE PAPER- NUTRITIONAL BIOCHEMISTRY PRACTICAL

Code: 15FSNP0107 Credits: T0+P2 Hours/Week:4 Marks: 50

Objectives:

To impart knowledge on analyses of selected constituent in blood and urine sample

Specific Objectives of Learning:

On successful completion of these units, students are expected :

- To acquire the skill in collection of blood and urine samples for testing
- To develop the skill in handling analytical equiments
- To perform blood and urine analysis and also interpret the condition of the individuals based on the biochemical changes**.**

Contents

I Blood Analysis

- Methods of collection of blood. Separation of serum and plasma
- Estimation of Heamoglobin.
- Estimation of glucose
- Estimation of serum creatinine
- Estimation of serum bilirubin
- Estimation of serum albumin
- Estimation of serum cholesterol
- Estimation of serum urea
- Estimation of total protein, AG Ratio,
- Estimation of SGPT / SGOT
- Estimation of serum alkaline phosphatase or acid phosphatases

II Urine Analysis

- Qualitative analysis of urine sugar,albumin,ketone bodies and bile salts
- Estimation of Urine sugar
- Estimation of Urine Albumin
- Estimation of Urine Bile salts
- Estimation of Urine Calcium
- Estimation of Urine Creatinine
- Estimation of urine urea.

References

1. H. Varley,GowenLock.A.H, willian Heinemann :Practical Clinical Biochemistry , Medical books CBS publishers and Distributors Ltd, 5th Edition

2. Raphel : Lynch's medical laboratory technology :, W B Saunders Co publication

3. Wootten: Micro analysis in Medical Biochemistry –Outline of Biochemistry - Coon and stump

4. J.Ochei and A. Kolhatkar:Medical laboratory science theory and practice, Tata MC Graw Hill publication, 4th Edition, 2008.

5. Medical Laboratory Technology, , Tata MC Graw Hill Publishers,1988.

6. Ramniksood :Text book of medical Laboratory technology, JAYPEE publisher, 2006.

7. Manual of Medical Laboratory Techniques, , JAYPEE Publisher, 1st Edition, 2008.

8. Ramakrishnan S, Sulochana K.N, Shankara S, M.K Ganesh, A Hemavathi: Laboratory Manual for practical Biochemistry, , JAYPEE publisher, 1st Edition, 2008.

9. V.H. Talib: Handbook Medical Laboratory Technology, CBS Publishers & Distributors (Dec 1 2008)

II SEMESTER

CORE PAPER - FOOD PRODUCT DEVELOPMENT AND MARKETING

Code: 15FSNP0208 Credits:T3 +P0 Hours/Week: 3 Marks: 100

Objectives:

1) To understand various aspects of development of a food product
2) To acquire knowledge on the importance of Consumer Research, Finance and Communication

Specific Objectives of Learning:

on successful completion of these units, students are expected:

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

Contents:

UNIT- I

New Food Products development, Phases in Food Product Development

Definition, classification, characterization, factors influencing new product development – social concerns, health concerns, impact of technology and market place influence.

UNIT- II

Generation of New Product Ideas: Internal sources of idea, External sources of ideas and market place analysis.

UNIT - III

Screening of the ideas:Team approach and involvement of various departments, objectives of screening, criteria for screening ideas . Phases in Food Product Development-prototype, standardization, Sensory Evaluation: Descriptive, thershold and acceptance test. Shelf life testing- types of shelf life testing mode of food deterioration. Technical development – recipe development and scale up. Product integrity and conformance to standards.

UNIT - IV

Newer food stabilizing systems : Thermal processing, ohmic heating, stabilizing with high pressure, other non-thermal stabilizing systems, controlled / modified atmosphere packaging, irradiation, hurdle technology, low temperature stabilization -Use of various new ingredients to suit product functions, Packaging, graphic designing and labeling. Food safety and food Spoilage **.**Market Sector perspective and market research**.**

UNIT - V

Test Marketing: Evaluating results and analyzing.

Entrepreneurship: Plant location, investment, financing the project

References:

1. Fuller G W (1994) New Food Product Development : From Concept to Market place CRC Press, New York
2. Man C M D and Jomes A A (1994) Shelf life Evaluation of Foods. Blackie Academic and Professional, London
3. Olickle, J K (1990) New Product Development and value added. Food Development Division, Agriculture, Canada
4. Graf E and Saguy I S (1991), Food Product Development : From concept to the Market Place, Van Nostrand Reinhold New York

JOURNALS:

1. International Journal of Food Science and Technology
2. Food Technology
3. Journal of Food Technology
4. Trends in Food Science and Technology
5. Critical Reviews is Food Science and Nutrition

WEBSITES

1. en.wikipedia.org/wiki/Marketing - 91k –
2. www.educationforadults.com/career/food-science.html - 21k
3. www.aripaparo.com/ - 50k –
4. www.linkedin.com/in/gailbarnes - 37

Lecture Schedule:

Units	Topics to be covered	Hours
I	New Food Products development,	1
	Phases in Food Product Development	1
	Definition, classification, characterization, Factors influencing new product development – social concerns, health concerns,	3
	Impact of technology and market place influence.	1
	Total	**6**
II	Generation of New Product Ideas	2
	Internal sources of ideas	1
	External sources of ideas	1
	Market place analysis	2
	Total	**6**
III	Screening and refining the screening procedure for the product	3
	Team approach and involvement of various Departments	2
	Objectives of screening Criteria of screening	2
	Sensory Evaluation :Descriptive,thershold	1
	Acceptance test	1
	Shelf life testing-mode of food deterioration Types of shelflife testing	1
	Product integrity and conformance to standards .	1
	Development Process	2
	Technical development – Recipe development and scale up,	1
	Food safety, Food spoilage	**14**
	Market Sector perspective Market research	1
	Food safety, Food spoilage	1
	Newer food stabilizing systems : Thermal processing, ohmic heating,	2
	Stabilizing with high pressure, Other non-thermal stabilizing systems, controlled / modified atmosphere packaging, Irradiation, Hurdle technology, Low temperature stabilization	3
	Use of various new ingredients to suit product functions, Packaging, design graphic and labeling	2
	Total	**9**
V	Test Marketing;Evaluating results Analyzing**.**	2
	Entrepreneurship:Plant location,	2
	Investment,	1
	Financing the project	4
	Total	**9**
	Seminar	**4**
	Total hours for Unit I - V	**48**

CORE PAPER -FOOD PRODUCT DEVELOPMENT AND MARKETING PRACTICAL

Code: 15FSNP0209 Credits: T0+P2 Hours/Week: 4 Marks: 100

Objectives:

1. To understand the process of development of food products
2. To learn the skill of product marketing.

Specific Objectives of Learning :

on successful completion of these units, students are expected :

- To assess the development cycle of a food product and review relavant principles of marketing theory.
- To develop a prototype of a new food product in the laboratory.
- To develop and justify technical specifications for the new product
- To understand the requirements for commercialization of the developed product

Contents:

1. Market survey consumer survey to identify new products in terms of Line extension, Repositioning existing products, New form/reformulation, New packaging of existing products, Innovative products, Creative products.
2. Product development, Concept and market research of the concern product
3. Development process – Idea generation, screening the ideas, developing the product, scaling up –sensory, quality analysis and test marketing. Food packaging and labeling and costing.
4. Project writing

References:

1. Fuller G W (1994) New Food Product Development : From Concept to Market place CRC Press, New York
2. Man C M D and Jomes A (1994) Shelf life Evaluation of Foods. Blackie Academic and Professional, London
3. Olickle, J K (1990) New Product Development and value added. Food Development Division, Agriculture, Canada
4. Graf E and Saguy I S (1991), Food Product Development : From concept to the Market Place, Van Nostrand Reinhold New York

JOURNALS

1 International Journal of Food Science and Technology

2 Food Technology.

CORE PAPER - ADVANCED NUTRITION – II

Code: 15FSNP0210 Credits:T3+P0 Hours/Week:3 Marks: 100

Objectives:

1. To familiarize students with changes occurring in the physiology and metabolism of human body as a result of change in altitude, gravity and exercise.
2. To provide in-depth knowledge of nutrients requirement and management during various conditions.

Specific Objectives of Learning :

- After studying this paper, the students would know
- 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

Contents:

UNIT I

Exercise Physiology: Concept of energy, work and power; Effect of exercise on muscular, nervous, cardiovascular and respiratory system; Energy metabolism; energy systems during exercise; Components of energy expenditure such as BMR, thermogenic effect of food and physical activity; Energy cost of exercise; Nutrition management during exercise.

UNIT II

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 III

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 IV

Sea and Air Travel Nutrition: Physiological changes in human body during sea and air travel;Psychological preparedness for sea and air travel; Health and nutritional problems encountered during sea and air travel; Nutrient requirements and dietary management during sea and air travel.

UNIT V

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.

References

1. Mahan, L.K. and Ecott-Stump, S. (2000). Krause's Food, Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. Sizer, F. and Whitney, E. (2000). Nutrition – Concepts and Controversies, 8th Edition, West Wadsworth, An International Thomson Publishing Co.
3. Whitney, E.N. and Rolfes, S.R. (2003). Understanding Nutrition, 8th Edition, West Wadsworth, An International Thomson Publishing Co.
4. Ira Wolinsky (Ed) (2003): Nutrition in Exercise and Sports, 3rd Edition, CRC Press
5. Parizkova, J. Nutrition, physical activity and health in early life, Ed. Wolinsky, I. CRC Pres
6. Goyet Fish, V., Seaman, J. and Geijer, U. (2008): The Management of Nutritional Emergencies in Large Populations, World Health Organisation, Geneva
7. Shills, M.E., Olson, J., Shike, M. and Roos, C. (1998). Modern Nutrition in Health and Disease. 9th Edition, Williams and Williams. A. Beverly Co. London.
8. WHO. (1997). Applied health research priorities in complex emergencies, Geneva
9. Young, H. and Jaspars, S. (1995). Nutrition matters: People, food and famine, Intermediate Technology Publications, London.
10. UNHCR. (1999). UNHCR Handbook of emergencies, 2nd edition, Geneva. UNHCR

Lecture Schedule

Units	Topics to be covered	Hours
I	**Exercise Physiology**	
	Definition for energy, work, power, physical activity and exercise, types of exercise/physical activity Energy metabolism – Glycolysis, TCA cyce, ETC, energy currency	2
	Energy balance, energy expenditure, components of energy expenditure – BMR. Components of energy expenditure – thermic effect of food and physical activity	2
	Factors influencing energy expenditure Measurement of energy expenditure – direct and indirect method Energy cost of activity and its measurement, MET	2
	Effect of exercise on muscular and nervous system Effect of exercise on cardiovascular and respiratory system Nutrition management during exercise	2
	Total	**8**
II	Need and scope of sports nutrition; types of sport	2
	Preparation for competition: pregame meal, factors influencing pregame meal Carbohydrate loading meaning and its need, methods of carbohydrate loading	2
	The concept of meal during game, function and the factors influencing it Post game meal meaning, function and the factors influencing it	2
	Nutrient management during sports/game Ergogenic aids meaning and its uses in sports, types of ergogenic aids	2
	Nutrients as ergogenic aids in sports Dietary supplements used as ergogenic aids in sports	2
	Total	**10**
	High Altitude and Space Nutrition	
	High altitude meaning, changes in air composition and pressure at high altitude. Physiological changes in human body due to high altitude travel, acclimatization process	3
	Altitude sickness meaning, types and the symptoms The signs and symptoms of HAPE, HACE	2
	Nutrient requirements of high altitude travellers Dietary management of high altitude travellers	2

III	Meaning of space nutrition, need and scope for space travel History of space travel – Mercury, Apollo, Gemini, skylab, ISS Physiological changes in astronauts body during space expedition	2
	Food systems used in space travel Health problems associated to space travellers and the control measures Nutrient requirement of astronauts and dietary management during space travel	3
	Total	**12**
IV	**Sea and Air Travel Nutrition**	
	Need and scope of sea travel, physiological changes in human body during sea travel Nutrient requirement during sea travel and dietary management	2
	Need and scope of air travel, physiological changes in human body during air travel Health and nutritional problems encountered during air travel	2
	Control and management of health problems during sea travel Nutrient requirements and dietary management during air travel Psychological preparedness for sea and air travel	2
	Total	**6**
V	**Nutrition in Emergencies**	
	Emergency situation or disaster meaning, types of disaster Need and importance of disaster management and the principles	1
	Natural disaster– earth quake, tsunami, famine, flood etc meaning and the impact on human survival, Man-made disaster – nuclear, fire, accidents meaning, the impact on human survival	2
	Role of national organization in disaster management Role of international organization in disaster management	2
	Nutritional and health problems in natural emergencies, Nutritional and health problems in man-made emergencies Control and management of communicable diseases - sanitation and immunization; Food distribution strategies	3
	Nutrient requirements and dietary management during natural disaster Nutrient requirements and dietary management during manmade disaster	1
	Total	**9**
	Seminar	**3**
	Total hours for Unit I – V	**48**

III SEMESTER

CORE PAPER - THERAPEUTIC NUTRITION

Code: 15FSNP0311 Credits: T4 +P0 Hours/week: 4 Marks: 100

Objectives:

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

Specific Objectives of Learning :

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

Contents:

UNIT I

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. Role of dietitian- functions and classification of a dietitian.Team approach in patient care.

UNIT II

Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of Weight imbalances, Cardio vascular disorders – Atherosclerosis, Arteriosclerosis, Heart attack, Hypertension and Myocardial infraction.

UNIT III

Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of Diabetes mellitus Renal disorders – Acute and chronic glomerular nephritis, Nephrotic syndrome, Renal stones, ESRD and Dialysis. Neurological disorders – Parkinsons, Epilepsy, Alzheimer's syndrome.

UNIT IV

Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of Musculo – skeletal disorders – Bone fractures, Osteoporosis, Arthritis and Rheumatic arthritis. GI Tract disorders – Gastritis Peptic ulcer, stomach cancer, IBS (Irritable bowel syndrome), Diverticulosis, Tropical sprue and Ulcerative colitis. Liver and gall bladder, pancreatic disorders – Jaundice, cirrhosis, Hepatic coma, gall bladder stones, Acute and chronic pancreatitis.

UNIT V

Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of Infections – Fever and AIDS, Respiratory problems – Asthma, Bronchitis, Inborn errors of metabolism – PKU, maple syrup disease, Glycogen storage disease, neiman-pick disease and fabers disease.

References

1. Shils M E, Olson J A, Shike M and Ross A C (Ed) 1999: Modern Nutrition in Health and Diseases 9th Edition, Williams and Wilkins

2. Mahan L K and Escott – Stump S (2000); Krause's Food Nutrition and Diet Therapy 10th Ed W B Saunders Ltd

3. Escott – Stump, S (1998): Nutrition and diagnosis related care 4th Edition, Williams and Wikins

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

5. Shils M E, Olson J A, Shike M and Ross A C (Ed) 1999: Modern Nutrition in Health and Diseases 9th Edition, Williams and Wilkins

6. Mahan L K and Escott – Stump S (2000); Krause's Food Nutrition and Diet Therapy 10th Ed W B Saunders Ltd

7. Escott – Stump, S (1998): Nutrition and diagnosis related care 4th Edition, Williams and Wikins

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

Lecture Schedule

Units	Topics to be covered	Hours
I	Assessment of patient needs based on interpretation of patient data	1
	Clinical,	1
	Biochemical,	1
	Biophysical	1
	Personal.	1
	Definition and	1
	History of dietetics,	1
	Dietetics in modern health care management.	1
	Role of dietitian- functions	1
	Classification of a dietitian.	1
	Team approach in patient care.	1
	Total	**11**
II	Weight imbalances -Etiopathophysiology, metabolic and clinical aberrations, complications,	3
	Prevention and recent advances in the medical nutritional management	2
	Cardio vascular disorders – Atherosclerosis,	1
	Arteriosclerosis,	1
	Heart attack, Hypertension and Myocardial infraction.	3
	Total	**10**
III	Diabetes mellitus -Etiopathophysiology, metabolic aberrations,	2
	Clinical aberrations,Complications,	2
	Prevention and	1
	Recent advances in the medical nutritional management	1
	Renal disorders – Acute and chronic glomerular nephritis, Nephrotic syndrome,	3
	Renal stones, ESRD and Dialysis.	2
	Neurological disorders – Parkinsons, Epilepsy, Alzheimer's syndrome.	3
	Total	**14**

IV	Etiopathophysiology, metabolic and clinical aberrations,	1
	Complications, prevention and	1
	Recent advances in the medical nutritional management of Musculo – skeletal disorders – Bone fractures,	2
	Osteoporosis,	1
	Arthritis and	1
	Rheumatic arthritis.	1
	GI Tract disorders – Gastritis Peptic ulcer, stomach cancer,IBS (Irritable bowel syndrome),	4
	Diverticulosis, Tropical sprue and Ulcerative colitis.	2
	Liver disorders – Jaundice, cirrhosis, Hepatic coma,	2
	Gall bladder stones, Acute and chronic pancreatitis.	2
	Total	**17**
V	Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of Infections	2
	Fever and AIDS,	1
	Respiratory problems – Asthma, Bronchitis,	2
	Inborn errors of metabolism – PKU, maple syrup disease, Glycogen storage disease, neiman-pick disease and fabers disease.	3
	Total	**8**
	Seminar	**4**
	Total hours for Unit I – V	**64**

CORE PAPER - THERAPEUTIC NUTRITION PRACTICAL

Code: 15FSNP0312 Credits: T0+P2 Hours/Week: 4 Marks: 100

Objectives :

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

Specific Objectives of Learning :

- 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.

Contents:

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:

    a. Febrile condition

    b. Surgical condition

    c. Gastrointestinal disorders

    d. Liver and Gall bladder disorders

    e. Diabetes and Cancer

    f. Cardio Vascular Disorders

    g. Renal Disorders

    h. Obesity and Underweight

    i. Nutritional Deficiency

    4. Planning and preparing paediatric diets

    a. Lactose free diet

    b. Juvenile diabetes

    c. Diet for inborn errors of metabolism

References :

1. Krause, M.V. Horsnh, M.A (1993): Food Nutrition Diet Therapy, W.B. SaundeersCompny, Philadelphia.

2. Gopalan, C.Ramasastri, B.V and Balasubramaniam, S.C. (1996): Nutritive Value of Indian Foods, National Institute of Nutrition, Hydrabad.

3. Sue Rod Williams, (1986): Nutrition and Diet Therapy, Times Mirror Mosby College Publishing,St.Louis,Toronto,Boston .

4.Mahan. I. K. and Escotte – Stump. S, (2000): Kruse's Food Nutrition and Diet Therapy, 10th edition. W. B. Saunders ltd.

CORE PAPER- NUTRITION THROUGH LIFE CYCLE

Code: 15FSNP0313 Credits:T3 +P0 Hours/Week:3 Marks: 100

Objectives:

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

Specific Objectives of Learning :

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

Contents:

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. Annual Reviews of Nutrition, Annual Review Inc, California, USA.
2. Shills,M.E.; Olson,J.;Shike,M. and Roos,C.(1998): Modern Nutrition in Health and Disease.9th Edition .Williams and Williams.A. Beverly Co. London.
3. Bodwell,C.E. and Erdman,J.W.(1998) Nutrient Interactions.MarcelDekerInc.New York.
4. World Reviews of Nutrition and Dietetics.
5. WHO Technical Report Series.
6. Indian Council of Medical Research. Recommended Dietary intakes for Indians-Latest Recommendations.
7. Indian Council of Medical Research. Nutritive Value of Indian Foods-Latest Publication.
8. Berdanier, C. D. and Hargrove, J.L.(1996):Nutrients and gene expression: Clinical Aspects .Boca Raton ,FL CRC Press.
9. Baeurle, P.A.(1992) Inducible Gene Expression. Part I: Environmental Stresses and Nutrients. Boston. Birkhauser.
10. Chandra,R.K. (1992): Nutrition Immunology.ARTSBiomedical.St John's New Foundland.

JOURNALS

1. Nutrition Reviews
2. Journal of Nutrition.
3. American Journal of Clinical Nutrition.
4. British Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition.
6. International Journal of Vitamin and Nutrition Research.
7. International Journal of Food Science and Nutrition.
8. Nutrition Research.

Websites

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2. users.rcn.com/jkimball.ma.ultranet/BiologyPages/N/Nutrition.html - 25k
3. books.google.co.in/books?isbn=9241546123...
4. www.ars.usda.gov/main/site_main.htm?modecode=12-35-00-00 – 57

Lecture Schedule

Units	Topics to be covered	Hours
I	**Nutrient in Pregnancy and Lactation**Nutritional status and general health	**1**
	Physiological changes in pregnancy	1
	Foetal under nutrition and consequences	1
	Energy and calorie relationship in pregnancy weight gain	1
	Protein, vitamins	1
	Mineral nutrition in pregnancy	1
	Physiological adjustments during lactation,	1
	Diet of lactating women and nutritional requirements	2
	Total	**9**
II	Nutrition during for infancyPhysiologic development,	1
	Nutrient requirements composition of human milk and cows milk,	1
	Anti infective factors,	1
	Formula preparation,	1
	Weaning,	1
	Supplementary and complementary feeding,	2
	Growth monitoring,	1
	Feeding and BW and premature infants.	1
	Total	**9**
III	Nutrition during preschool, childrenGrowth and development during preschool,	1
	Children, adolescent,	2
	Nutritional requirements,	1

	Factors influencing food intake,	1
	Nutritional concerns – PEM,	1
	Anemia,	1
	Dental caries,	1
	Obesity,	1
	Anorexia and bulimia	1
	Total	**10**
IV	Nutrition in adolescent and adult Nutrition requirements during adolescent	2
	Nutrition requirements during adult age,	1
	Physical activity and energy relationship,	1
	Factors influencing food intake,	1
	Nutritional concerns – Anemia,	1
	Obesity, anorexia and bulimia	2
	Total	**8**
V	Nutrition requirements during old age,	1
	Physical activity and energy relationship,	1
	Theories of aging,	1
	Physiologic changes,	1
	Nutritional needs,	1
	Nutrition concerns – dysphagia	1
	Senility disorders,	1
	Community nutrition programme for oldage.	2
	Total	**9**
	Seminar	**3**
	Total hours for unit I - V	**48**

CORE PAPER-NUTRITION IN CRITICAL CARE

Code: 15FSNP0314 Credits: T3+P0 Hours/week: 3 Marks: 100

Objectives:

The course will enable the students are:

1. Understand the physiology, metabolism and special nutritional requirements of the critically ill.
2. Be familiar with the special nutritional support techniques and feeding formulations to meet their nutritional needs.

Specific Objectives of Learning :

- The students will be able to know the feeding therapy's to be flowed in hospitalized/ critically il patients
- The students will be able know nutrition support systems during emergency.

Contents :

UNIT-I

Nutritional screening and assessment of nutritional status of hospitalized and outdoor patients .Nutritional care plan, implementation of nutritional care .

UNIT-II

Nutritional support systems and other life- saving measures for the critically ill. Role of immune enhances, conditionally essential nutrients, immune suppressant's, and special diets in critical care.

UNIT-III

Patho-physiological, clinical and metabolic aspects, understanding of the special nutritional requirements, nutritional goals and monitoring the therapy in critical illnesses like: Stress, trauma, sepsis, burns, CV complications and surgery, ESRD, dialysis, transplant, Multiple organs failure, Cancer, AIDS, GI tract surgery, GERD (Gastro-esophagel reflux Disorder) and complication,Hepatic failure and transplants, Neurosurgery.

UNIT-IV

Medical nutrition therapy: Enteral nutrition: Types, routes, composition of feeds, precautions while feeding. Parenteral nutrition: Types modes and composition of feeds and precautions while feeding. Complications of parenteral and enteral therapy, refeeding syndrome.Palliative care and rehabilitation diets in stages.

UNIT-V

Nutritional support system in relief and rehabilitation. Surveillance of nutritional status in emergency relief situations such as flood, cyclone, earthquake, drought, war etc., Assessment of food needs, food distribution strategy, mass and supplementary feeding, special foods/ rations for nutritional relief, organizations for mass feeding/food distribution, transportation and storage, Feeding centres, sanitation and hygiene.

References:

1. Zaloga, G.P. (1994): Nutritional in critical care, Times Mirror/Mosby.
2. Shils, M.E., Olson, J.A., Shile, M. and Ross, A.C. (Ed) (1999): Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.
3. Shikora, S.A. and Blackburn, G.L. (Ed) (1999). Nutritional support-Theory and Therapeutics, Chapman and Hall, ITP (International Thomoson Publishing).
4. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet Therapy, 10th Ed. W.B. Saundaers Ltd.
5. Phillips, G.D. and Lodgers C.L (1986). Parenteral and Enteral Nutrition. A Practical Guide. Churchill Livingstone.
6. Kinney, J.M. and Borum , P. R. (editors) (1989) Perspectives in Clinical Nutrition. Urban and Schwarzenberg.
7. Torosian, M.H (editor) (1995) Nutrition for the Hospitalized Patient. Basic Science & Principle of Practice.
8. Keynes, W.M. and Flower, P.B.S. (1984) Clinical Endocrinology. Willam Heinemann Medical Books, London.
9. Shields, R. (editor) (1992) Bailiere's Clinical Gastroentrology, Bailiere Tindall London
10. Galambos, J.P. (1979) Cirrohsis in the series major problems in Internal Medicine, W.B. Saunders company Philadelphia

Lecture Schedule

Units	Topics to be covered	Hours
I	Nutritional screening hospitalized patients	1
	Assessment of hospitalized patients	1
	Nutritional screening of outdoor patients	1
	Assessment of outdoor patients .	1
	Nutritional care plan	1
	Care plan process	1
	Change in attitude and behaviour	1
	Implementation of nutritional care	2
	Stages-I	1
	Stages-II.	1
	Total	**11**
II	Nutritional support systems	1
	Other life- saving measures for the critically ill.	1
	Role of immune enhancers,	1
	Conditionally essential nutrients,	1
	Immune suppressant's,	1
	Special diets in critical care.	2
	Total	**7**
III	Patho-physiological,	1
	clinical and	1
	metabolic aspects,	1
	understanding of the special nutritional requirements,	1
	Nutritional goals and monitoring the therapy in critical illnesses like: Stress,	1
	Nutritional goals and monitoring the therapy in critical illnesses like: trauma,	1
	Nutritional goals and monitoring the therapy in critical illnesses like: burns,	1
	CV complications and surgery,	1
	ESRD, dialysis, transplant, Multiple organs failure,Cancer, AIDS,	3
	GI tract surgery, GERD (Gastro-esophagel reflux Disorder) and complication	2
	Hepatic failure and transplants,	1

	Neurosurgery	1
	Total	**15**
IV	Medical nutrition therapy:	1
	Enteral nutrition: Types, routes,	1
	composition of feeds,	1
	precautions while feeding.	1
	Parenteral nutrition: Types modes and composition of feeds and precautions while feeding.	1
	Complications of parenteral and enteral therapy, refeeding syndrome.	1
	Palliative care and rehabilitation diets in stages.	2
	Total	**8**
V	Nutritional support system in relief and rehabilitation.	1
	Surveillance of nutritional status in emergency relief situations such as flood, cyclone, earthquake, drought, war etc.	1
	Assessment of food needs, food distribution strategy, mass and supplementary feeding, special foods/ rations for nutritional relief, organizations for mass feeding/food distribution, transportation and storage, Feeding centres, sanitation and hygiene.	3
	Total	**5**
	Seminar	**2**
	Total hours for Unit I - V	**48**

FOURTH SEMESTER

CORE PAPER – COMMUNITY NUTRITION

Code: 15FSNP0415 Credits: T4+P0 Hours/Week: 4 Marks: 100

Objectives:

1. To enable students to learn the concepts of community nutrition
2. To enable the students to assess the health status of the community

Specific Objectives of Learning :

- The students will be able to assess the health status of the community
- Will know the various organizations related with food and nutrition with its functions

Contents:

UNIT I

Community Nutrition –meaning and concept of community nutrition, relationship between health and nutrition. Malnutrition and infection- vicious cycle.Application of modern science and technology for effectively increasing the production and conservation of foods.

UNIT II

Communicable diseases and its control Socioeconomic and demographic status – relation to nutritional status importance of sanitation and hygiene in health.

UNIT III

Nutritional status- definition, Methods of assessments- anthropometry, clinical, biochemical and biophysical assessment.Diet surveys- food weighment survey, 24 hour recall, food dairy and food frequency.Vital statistics- mortality and morbidity statistics.

UNIT IV

Nutrition Education- objectives and methods used, integration of nutrition education with extension work, when to teach, whom to teach and who is to teach.Principles of planning, executing and evaluating, nutrition education programmes, problems in conducting nutrition education programmes.

UNIT V

Nutrition programmes national and international organizations concern with food and nutrition- vitamin-A prophylaxis, anaemia, iodine, ICDS, ICMR, NIN, CFTRI, DFRL and FAO, WHO and UNICEF ,IVACG,INACG & IZACG

References

1. Annual Reviews of Nutrition, Annual Review Inc, California, USA.
2. Shills,M.E.; Olson,J.;Shike,M. and Roos,C.(1998): Modern Nutrition in Health and Disease.9th Edition .Williams and Williams.A. Beverly Co. London.
3. Bodwell,C.E. and Erdman,J.W.(1998) Nutrient Interactions.MarcelDekerInc.New York.
4. World Reviews of Nutrition and Dietetics.
5. WHO Technical Report Series.
6. Indian Council of Medical Research. Recommended Dietary intakes for Indians-Latest Recommendations.
7. Indian Council of Medical Research. Nutritive Value of Indian Foods-Latest Publication.
8. Berdanier, C. D. and Hargrove, J.L.(ed)(1996):nutrients and gene expression: Clinical Aspects .Boca Raton ,FL CRC Press.
9. Baeurle, P.A.(ed)(1992) Inducible Gene Expression. Part I: Environmental Stresses and Nutrients. Boston. Birkhauser.
10. Chandra,R.K. (ed)(1992): Nutrition Immunology.ARTSBiomedical.St John's New Foundland .

Journals

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition.
4. British Journal of Clinical Nutrition
5. European Journal of Clinical Nutrition.
6. International Journal of Vitamin and Nutrition Research

Lecture Schedule:

Units	Topics to be covered	Hours
I	Community Nutrition –meaning and concept of community nutrition,	**1**
	Relationship between health and nutrition.	2
	Malnutrition and infection-	2
	Vicious cycle.	1
	Application of modern science and technology for effectively increasing the production	2
	Conservation of foods.	1
	Total	**9**
II	Communicable diseases	3
	Control	2
	Socioeconomic and	2
	Demographic status – relation to nutritional status,	2
	Importance of sanitation in health	1
	Hygiene in health.	1
	Total	**11**
III	Nutritional status- definition,	**1**
	Methods of assessments- Introduction	1
	Anthropometry,	2
	Clinical,	1
	Biochemical	2
	Biophysical assessment.	1
	Diet surveys- food weighment survey, 24 hour recall, food dairy and food frequency.	3
	Vital statistics- mortality and morbidity statistics.	2
	Total	**13**

IV	Nutrition Education- objectives	1
	Methods used,	2
	Integration of nutrition education with extension work,	2
	When to teach, whom to teach and who is to teach.	1
	Principles of planning	1
	Executing and evaluating	1
	Nutrition education programmes	3
	Problems in conducting nutrition education programmes	2
	Total	**13**
V	Nutrition programmes-(32, 33, 34, 35, 36) national	3
	International organizations concern with food and nutrition-	2
	Vitamin-A prophylaxis,	1
	Anaemia, iodine,	1
	ICDS, ICMR, NIN, CFTRI, DFRL and	4
	FAO, WHO and UNICEF. IVACG,INACG & IZACG	4
	Total	**15**
	Seminar	**3**
	Total hours for Unit I - V	**64**

CORE PAPER- FOOD SAFETY AND QUALITY CONTROL

Code: 15FSNP0416 Credits:4+0 Hours/Week:4 Marks: 100

Objectives:

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

Specific Objectives of Learning :

After studying this paper, the students would know

- the importance and functions of quality control unit in food industries
- the methods used for evaluation of food quality
- the national and international organization enforcing food quality and safety

Contents:

UNIT 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.

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

UNIT II

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 of evaluation – subjective and objective; Subjective evaluation methods based on difference, 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

Food Quality Control and Assurance: Current concepts 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, ISI or 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. Handbook of Analysis and Quality Control for Fruit and Vegetable Products, 2nd Edition, Tata Mc Graw hill Publishing Co Ltd., New Delhi

6 Hagstad, H.V. and Hubbert, W.T. (1986). Food Quality Control, Foods of Animal Origin, Lowa State University Press, AMES

7 Srilakshmi, B. 2005. Food Science, New Age International (P) Ltd., Publishers, New Delhi.

Lecture Schedule

Units	Topics to be covered	Hours
I	**Food spoilage**	
	Food spoilage definition; factors influencing food spoilage	1
	Types of food spoilage such as microbes, enzymes and insects	2
	Physiochemical and biochemical changes in food quality during spoilage	1
	Methods used for detection of food spoilage	1
	Food preservation concept and the principles	1
	Food borne illness – infection caused by bacteria	1
	Food borne illness – infection caused by yeast and fungi	1
	Food borne illness - intoxication	1
	Food safety meaning and the principles, need and importance of food safety in home and food industries	2
	Factors affecting food safety in food industries	1
	Role of kitchen-hygiene, employee health and food plant hygiene in prevention of food spoilage	1
	Regulatory authorities at local and district level ensuring foodsafety in food industries	1
	Regulatory authorities at national level ensuring food safety in food industries	1
	Total	15
II	**Food Additives and Adulterants**	
	Food additives definition, common food additives and its function	2
	Food additives: antimicrobial, antioxidant, chemical preservative mechanism of action and the food applications	2
	Food additives: flour enhancer, emulsifier, thickening agent mechanism of action and the food applications	1
	Food additives: stabilizing agent, curing agent, anticaking agent mechanism of action and the food applications	2
	Permissible limits of additives in foods	1
	Implications of food additives on consumers health	1
	Food adulteration meaning, Types of food adulterants – incidental and accidental	1

	Heavy metal contamination in foods and ill effects on human health	1
	Methods used for detection of food adulterants	1
	Methods used for detection of food adulterants	1
	Total	**14**
III	**Testing of Food Quality**	
	Quality meaning and need of food quality testing	1
	Sensory attributes of food products – colour, flavour, texture and taste	1
	Subjective and objective, subjective evaluation methods based on difference	2
	Subjective evaluation methods based rate,	1
	Subjective evaluation methods based sensitivity and others	1
	Objective evaluation methods – tools and instruments used	1
	Quality standards for cereal, pulses and legumes	1
	Quality standards for vegetables and fruits	1
	Quality standards for milk and egg	1
	Quality standards for flesh foods	1
	Quality standards for fat and sugar	1
	Quality standards for processed food products	2
	Total	**14**
IV	**Food Quality Control and Assurance**	
	Food quality control and assurance meaning and the concepts of quality control and assurance	2
	Need and importance of setting up quality control unit in a food industry	1
	Requirements of food quality control unit	1
	Quality control process: raw material control, production process control, packing and distribution	2
	Total Quality Management – meaning and the principles	1
	Principles of HACCP and its role in total quality management process	1
	Duties and responsibilities of food quality controller	1
	Total	**9**

V	**Food Laws and Standards**	
	Food laws and standards concept, need and its importance	1
	National food legislation such as FSSA	1
	National food legislation: Essential Commodities Act, ISI or BIS, AGMARK,	2
	National food legislation: FPO	1
	National food legislation: PFA	1
	International Organization implementing food standards: FAO	1
	International Organization implementing food standards: FDA	1
	International Organization implementing food standards: Codex Alimentarius	1
	International Organization implementing food standards: WHO and APEDA	1
	Total	**10**
	Seminar	**2**
	Total hours for Unit I –V	**64**

MAJOR ELECTIVE- SCIENTIFIC WRITING

Code: 15FSNP03E1 Credits: 4 +0 Hours/Week: 4 Marks: 100

Objectives:

To be able to appreciate and understand importance of writing scientifically.

To develop competence in writing and abstracting skills

To write either a draft research proposal or a chapter of dissertation

UNIT – I

Scientific Writing as a means of communication

Different forms of scientific writing

- Articles in Journals, Research notes and reports , review articles, Monographs, Dissertations, Bibliographies.

UNIT – II

The reasons for preparing outlines

- As a guide for plan of writing
- As skeleton for the manuscript

Kinds of outline

- Topic outlines
- Conceptual outline
- Sentence outlines
- Combination of topic and sentence outlines

UNIT – III

Drafting Titles, Sub Titles, Tables, Illustrations

- Tables as systematic means of presenting data in rows and columns and lucid way of indication relationships and results.
- Formation Tables : Title, Body stab, Stab Column, Column Head, Spanner Head, Box Head
- Appendices : Use and guidelines

UNIT – IV

The Writing Process

- Getting started
- Use outline as a starting device
- Drafting
- Reflecting, Re-reading
    1. Checking organization
    2. Checking headings
    3. Checking content
    4. Checking clarity
    5. Checking grammar
- Brevity and precision in writing
- Drafting and Re-drafting based on critical evaluation

UNIT – V

- Clearly state the question to be addressed
- Rationale and importance of the
- Empirical and theoretical conceptualization
- Presenting pilot study / data
- Research proposal and time frame
- Clarity, specificity of method
- Clear organization
- Outcome of study and its implications
- Budgeting
- Available infra-structure and resources
- Executive summary

References

1. APA (1984) Publication Manual of American Physiological Association (3rd edition), Washington: APA

2. Cooper, H.M.(1990) integrating Research: A Guide for Literature Reviews (2nd edition). California: Sage

3. Dunn, F.V. & Others (Ed) (1994). Disseminating Research: Changing Practice, Sage

4. Harman, E & Montagnes, I (Eds) (1997). The thesis and the Book. New Delhi : Vistaar.

5. Locke, L.F. and others (1987). Proposals that work: A guide for planning Dissertations & Grant Proposals (2nd Ed) Beverly Hills: Sage.

6. Richardson.L (1990) Writing Strategies , Reaching Diverse Audience. Califormia: Sage

7. Seyler, V.Dorothy (1999) doing Research The complete Research Paper Guide, Boston : Mc.Graw – Hill College.

8. Thyer, B.A. (1994). Successful Publishing in Scholarly Journals. California: Sage.

Lecture Schedule

Units	Topics to be covered	Hours
I	Scientific Writing as a means of communication Different forms of scientific writing Articles in Journals, Research notes and reports , review articles, Monographs, Dissertations, Bibliographies.	**4** **4** **4**
	Total	12
II	The reasons for preparing outlines - As a guide for plan of writing - As skeleton for the manuscript Kinds of outline - Topic outlines - Conceptual outline - Sentence outlines - Combination of topic and sentence outlines	6 6
	Total	**12**
III	Drafting Titles, Sub Titles, Tables, Illustrations - Tables as systematic means of presenting data in rows and columns and lucid way of indication relationships and results. - Formation Tables : Title, Body stab, Stab Column, Column Head, Spanner Head, Box Head - Appendices : Use and guidelines	4 4 4
	Total	**12**
IV	The Writing Process - Getting started, Use outline as a starting device - Drafting - Reflecting, Re-reading 1. Checking organization 2. Checking headings 3. Checking content 4. Checking clarity 5. Checking grammar - Brevity and precision in writing - Drafting and Re-drafting based on critical evaluation	**7** **3** **3**
	Total	**13**

V	Clearly state the question to be addressed Rationale and importance of the Empirical and theoretical conceptualization Presenting pilot study / data Research proposal and time frame Clarity, specificity of method Clear organization Outcome of study and its implications Budgeting Available infra-structure and resources Executive summary	**4** 4 4
	Total	**12**
	Seminar	**3**
	Total hours for Unit I –V	**64**

MAJOR ELECTIVE- FOOD SERVICE MANAGEMENT

Code: 15FSNP03E2 Credits: 4+0 Hours/Week: 4 Marks: 100

Objectives: To

1. develop skills in handling and maintenance of equipment
2. understand the key areas of institutional food service administration

Specific Objectives of Learning :

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

- To administer a food service system in an effective manner
- To manage the human resources within a food service organization or department
- To develop appropriate skills required for a food service industry
- To develop and provide best nutritional menu and food to the client

UNIT- I

Food Service Industry- Commercial and Non Commercial Institutions. Commercial-Hotel, Motel, Restaurant, Bar, Pub and Fast Food Restaurant. Non Commercial-Transport Catering, Industrial Catering, hospital catering. Miscellaneous- Contract and Outdoor.

UNIT - II

Management Tools-The Organization Chart, Job Description and specification, Work schedule, Job Analysis, staff analysis, Budget, leadership style , decision making and communication.

Material Management- Food materials, cleaning, table ware, equipment, staff, time, and energy.

UNIT - III

Equipments used in Food Service Industries-Classification of equipments electrical and non electricalequipments for food storage, Preparation, serving, dishwashing and laundering. Base materials used for finishes

UNIT - IV

Food plant -Types of Kitchen, Layout of different food service establishments, drainage,water lines, lighting and ventilation adopted in different units such as kitchen, storage and dining area, working heights in relation to equipment.

UNIT- V

Personnel Management: manpower planning, recruitment procedures, selection and induction, labour benefits and laws. Financial Management: Buying and accounting procedures in food service institution: budget, records to be maintained, Cost accounting/analysis-Cost concepts- types of cost-fixed cost, semi fixed cost, variable cost. Costing of foods-selling price

Food cost control - methods of controlling food cost, break even analysis. Records to be maintained- System of book keeping, book of account- cash book, purchase book, sales book, purchase returns book, sales returns book, journal and ledger.

References

1. Sethi, M.,Malhan,S.(2007) Catering Management: An integrated approach, New Age International

2. Sudhir Andrews,(1999) Food and Beverage Service Training Manual, Tata McGraw Hill Publishing Company Ltd New Delhi

3. Lilli Crap, D R and Cousins J A (1999) Food and Beverage Service,4th Edition, Hodder and Stoughton

4. Aggarwal D.K (2006) Housekeeping Management, AMAN Publications, New Delh

5. Singh.R.K (2006) Modern Trends in Hospitality industry, AMAN Publications,New Delhi

6. John Wiley (2005),Book Of Yeild :Accuracy in Food Costing and Purchasing,6th Edition

Lecture Schedule

Units	Topics to be covered	Hours
I	Food Service Industry- Definition, Commercial and Non Commercial Institutions – meaning	1
	Commercial- Description of Hotel, Motel,	1
	Restaurant, Bar,	1
	Pub, Fast Food Restaurant	1
	Non Commercial- meaning,types	2
	Transport Catering,	1
	Industrial Catering,	2
	Hospital catering.	2
	Miscellaneous- Contract and Outdoor.	2
	Total	**13**
II	Management Tools- meaning,types	2
	Organization Chart,	3
	Job Description and specification,	1
	Work schedule, Job Analysis,	2
	Staff analysis, Budget,	1
	Leadership style ,	2
	Decision making and communication.	1
	Material Management- Food materials, cleaning,	2
	Table ware,	1
	Equipment,	2
	Staff, time, and energy.	1
	Total	**18**
III	Classification of equipments electrical	**2**
	Classification of non electricalequipments for food storage	1
	Preparation,	2
	Serving,	1
	Dishwashing	1
	Laundering.	1
	Base materials used for finishes	1
	Total	**9**

IV	Types of Kitchen	**1**
	Layout of different food service establishments	1
	Drainage in kitchen, storage and dining area	1
	Water lines, in kitchen, storage and dining area	1
	Lighting in kitchen, storage and dining area	1
	Ventilation in kitchen, storage and dining area	1
	Working heights in relation to equipment.	1
	Total	7
V	Manpower planning Meaning and need	2
	Recruitment procedures	1
	Selection	1
	Induction	1
	Labour benefits	1
	Labour laws.	1
	Financial Management: Buying and accounting procedures in food service institution	2
	Budget- Meaning, Cost accounting/analysis-Cost concepts and components-	2
	Types of cost-fixed cost , semi fixed cost, variable cost.	1
	Costing of foods-selling price	1
	Food cost control - methods of controlling food cost,	2
	Break even analysis.	1
	Records to be maintained- System of book keeping,	1
	Book of account- cash book,	1
	Purchase book, sales book,	1
	Purchase returns book, sales returns book	1
	Ledger andJournal.	1
	Total	**21**
	Seminar	**3**
	Total hours for Unit I – V	64

MAJOR ELECTIVE - FAMILY AND COMMUNITY SCIENCE

Code: 15FSNP03E3 Credits: 4 Hours/Week: 4 Marks:100

Objectives :

To enable students

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

Specific Objectives of Learning

on successful completion of these units, students are expected :

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

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 receipe, 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.
3. Education Planning Gropu . (1987). Home Management, New Delhi : Arya Publishing House.

4. Jha, J.K. (2002). Encyclopaedia of Teaching of Home Science, Vol.I,II and III . New Delhi: Anmol Publications.
5. Srilakshmi.B. (1997). Food Science. New Delhi. New Age International Pvt.Ltd.
6. Suriakanthi.A., (2002). Child Development - An Introduction Gandhigram : Kavitha Publications.
7. Varghese , M.A.et al (1994). Home Management , New Delhi: Viley Eastern Limited.

Lecture Schedule

Units	Topic to be covered	Hours
I	Food Science and Nutrition : Food groups, Cooking Methods, Principles and Methods of Preservation, Composition of Food	2
	Food Additives, Food Adulteration, Food Laws, Food Processing	2
	Concept of nutrition, Nutrients, Malnutrition digestion, absorption and metabolism of macro and micro nutrients, deficiencies and sources	2
	Food Hygiene and sanitation.Food borne infections,	1
	Nutrition through life cycle – RDA, Diet modifications for Diabetes, Cardio Vascular Disease, Obesity, Anaemia and Renal Disorders	4
	Total	11
II	Institution Management – Management, principles and functions	2
	Food Service – Types and styles	3
	personnel management	2
	Record maintenance in food service institutions	2
	Standardization of receipe, portion control and cost control	2
	Total	11
III	Textiles and Clothing : General properties and structure of all textile fibers. Processing and manufacture of natural and man-made fibers	2
	Definition and classification of yarns: Identification of yarns and their use in various fabrics	1
	Fabric construction, definition and types of woven, non-woven and knitted fabric	2
	Testing of fibers, yarns and fabric Clothing : Principles of clothing-Socio-Psychological aspects of clothing, selection of fabrics for the family	1 1

	Clothing construction – basic principles of drafting, flat pattern and draping methods	1
	Textile design-principles and concepts. Care and maintenance of textiles materials and garments	1
	Laundry agents-methods and equipments	1
	Total	10
IV	Resource Management – Concept of Home Management and steps	2
	Management of Human Resources; Classification of Resources; Basics characteristics of Resources	2
	Decision making in family, Steps in decision making; Methods of resolving conflicts	2
	Work simplification; Importance of work simplification in home	2
	Mundel's classes of change; Housing	2
	Interior design. Principles of Interior design, Various colours and colour schemes	3
	Household equipment-selection and Care	2
	Total	15
V	Human Development – Child development- Principles and Stage	2
	Life Span Development – Theories of Human Development and Behaviour	2
	Child rearing	2
	Socialization practices and Dynamics	2
	Early Childhood Care and Education – Emerging trends	2
	Development problems and disabilities during childhood and adolescence	3
	Advanced child study methods and assessment	2
	Total	**15**
	Seminar	**2**
	Total hours for Unit I to V	**64**

MAJOR ELECTIVE - FOOD PROCESSING AND TECHNOLOGY

Code : 15FSNP03E4 Credits: T4+P0 Hours/Week: 4 Marks: 100

Objectives:

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

Specific Objectives of Learning :

After studying this paper, the students 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

Contents:

UNIT I

Cereal Processing and Technology: Structure, composition and nutritive valueof cereal grains such as rice, wheat, maize, barley, oats and rye; Rice: parboiling, milling and pearling; Processing and milling of wheat, maize, barley, oats and rye; Millets: Structure, composition and nutritive value and processing of millets; Cereal Products: Flours and its quality; Processed 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; Antinutritional factors: nature and health problems and methods used to eliminate toxic constituents; 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; Hydrogenated fat and margarine; Effect of processing on nutritive value and physiochemical properties of vegetable oils; Rancidity and the types; Rancidity prevention methods.

UNIT III

Vegetables Processing and Technology: Structure, composition and nutritive value of vegetables; Pigments: Classification, effects on processing of vegetables; post harvest changes in vegetables and storage; Preliminary processing of vegetables; Vegetable products: Fermented and nonfermented 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 nonfermented; Effect of processing on nutritive value and physiochemical properties of fruits; Browning reactions: types and mechanism; prevention methods; 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; Concept of imitation milk and dairy substitutes.

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; changes in egg quality during storage and preservation methods; 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; Factors influencing meat quality; Ageing and tenderization of meat; Poultry: Muscle composition and nutritive value; Processing and storage of poultry meat; Preservation methods for poultry; Fish: Fish composition and nutritive value; Selection criteria for fish; Processing and storage; Preservation methods for fish; Meat products: Fermented and nonfermented; Byproducts utilization; Effect of processing on nutritive value and physiochemical properties of meat, poultry and fish.

References

1. Srilakshmi, B. 2005. Food Science, New Age International (P) Ltd., Publishers, New Delhi.
2. Potter, N. and Hotch Kiss, J.H. (1996): Food Science, Fifth edition, CBS Publishers and Distributors, New Delhi
3. Julians, B.O. (1985). Rice Chemistry and Technology, 2nd edition, American Association Chemists, St. Paul Mimesota, USA.
4. Charley, H. (1982). Food Science, 2nd edition, John Wiley & Sons, New York.
5. Gould, G.W. (1995). New Methods of Food Preservation, Blackie Academic and Professional, London
6. Arthey, D. and Ashurst, P.R. (1996). Fruit Processing, Blackie Academic & Professional, London
7. Desrosier, N.W. and James N. (2007). Technology of food preservation. AVI Publishers.

Lecture Schedule

Units	Topics to be covered	Hours
I	**Cereal Processing and Technology**	
	Structure, composition and nutritive valueof cereal grains such as rice, wheat, maize	1
	Structure, composition and nutritive valueof cereal grains such as barley, oats and rye	1
	Rice processing: parboiling, milling and polishing pearling	1
	Processing and milling of wheat, maize	1
	Processing and milling of barley, oats and rye	1
	Millets: Structure, composition and nutritive value	1
	Processing of millets	1
	Cereal Products: Flours and its quality, Processed products of rice	1
	Processed products wheat and maize	1
	By products of cereal processing and its utilization, breakfast cereals and extrusion	1
	Effect of processing on nutritive value of cereals, changes in physiochemical properties of cereal starch due to processing	2
	Changes in physiochemical properties of protein due to processing	1
	Storage of cereal grains and its product and the changes in quality	2
	Total	**15**
II	**Pulses Processing and Technology**	
	Structure, composition and nutritive value of pulses	1
	Processing of pulses – milling	1
	Antinutritional factors: nature and health problems and methods used to eliminate toxic constituents	1
	Pulse products: Dals, flours, texturized vegetable protein, protein concentrates, isolates and hydrolysates	2
	By-products from pulses processing and its utilization	1
	Effect of processing on nutritive value and physiochemical properties of pulses.	1
	Storage of pulses grains and its product and the changes in quality during storage	1
	Structure, composition and nutritive value of nuts and oilseeds	1
	Oil extraction methods and refining process	1
	By-products during processing and its utilization, quality of refined vegetable oil, hydrogenated fat and margarine	1
	Effect of processing on nutritive value and physiochemical properties of vegetable oils	1

	Storage of nuts and oilseeds and the quality changes during storage	1
	Rancidity and the types; Rancidity prevention methods	1
	Total	**14**
III	**Vegetables Processing and Technology**	
	Structure, composition and nutritive value of vegetables	1
	Pigments: Classification and the properties	1
	Post harvest changes in vegetables and storage	1
	Preliminary processing of vegetables, fermented vegetable products	1
	Nonfermented vegetable products	1
	Vegetable waste during processing and its utilization	1
	Effect of processing on nutritive value and physiochemical properties of vegetables	1
	Storage of vegetables and the quality changes during storage	1
	Structure, composition and nutritive value of fruits	1
	Post harvest changes in fruits, concept of maturity, ripening and senescence	1
	Fermented fruit products Nonfermented fruit products Effect of processing on nutritive value and physiochemical properties of fruits (browning reactions)	2
	Storage of fruits and the quality changes during storage, fruit waste during processing and it utilization Methods used for preservation of vegetables and fruits	1
	Total	**13**
IV	**Milk Processing and Technology**	
	Milk types and composition	1
	Physiochemical and functional properties of milk	1
	Milk processing, by products of milk processing and its utilization	1
	Effects of processing on nutritive value and physicochemical properties of milk	1
	Fermented milk products	1
	Nonfermented milk products	1
	Concept of imitation milk and dairy substitutes	1
	Quality changes in milk and milk products during storage, the preservation methods	1
	Structure, composition and nutritive value of eggs	1
	Egg quality evaluation methods	1
	Egg processing and egg products	1
	Effect of processing on nutritive value and physiochemical properties of eggs	1
	Changes in egg quality during storage and preservation methods	1
	Total	**13**
	Meat Processing and Technology	
	Meat types, structure, composition and nutritive value	1

V	Post mortem changes in meat and meat quality, factors influencing meat quality Meat processing, tenderization of meat Fermented and non-fermented meat products	2
	Quality changes in meat and meat products during storage and the preservation methods Effect of processing on nutritive value and physiochemical properties of meat, Poultry: Muscle composition and nutritive value	1
	Poultry processing and the products Quality changes in poultry and its product during storage and the preservation methods	1
	Effect of processing on nutritive value and physiochemical properties of poultry	1
	Fish: Fish composition, types and nutritive value	1
	Selection criteria for fish, fermented and non-fermented fish products	1
	Effect of processing on nutritive value and physiochemical properties of meat, poultry and fish. Quality changes in fish and fish products during storage and preservation methods By-products of meat, poultry and fish processing and its utilization	1
	Total	**9**
	Total hours for Unit I – V	**64**

MODULAR COURSE- FUNCTIONAL FOODS AND NUTRACEUTICALS

Code: 15FSNP03M1 Credits:2 Hours/Week: 2 MARKS: 50

Objectives:

- To enable students to understand the relation between functional foods and nutraceuticals
- To impart knowledge on the role of functional foods and nutraceuticals in the areas of preventive dietetics.

Specific Objectives of Learning:

on successful completion of these units, students are expected:

- To learn about specific issues concerning functional foods and nutraceuticals
- To understand the use of various functional foods in therapeutic conditions
- To develop diet supplements incorporating functional foods
- To gainindepth knowledge on the effect of each food and its effect on health

Contents:

UNIT I

Definition of Functional Foods and Nutraceuticals Classifying nutraceuticals

A. Food source: plant, animal, microbial

B. Mechanism of action: Antidiabetic, Antiinflammatory, Antitumor and Anti hypertensive

C. Chemical nature: isoprene derivatives,polyphenol, aminoacidderivatives,carbohydrate derivatives and structure lipids.

UNIT - II

Role of functional foods and nutraceuticals on health from plant foods:Soyabean, olive oil, tea, grape seed, garlic, capsicum, dietary fibre, tomato, cruciferous vegetables, fenugreek, coffee bean and almond

UNIT - III

Role of functional foods and nutraceuticals on health from animal foods: Animal milk, fish, beef Role of omega 3 and omega 6 fatty acids.

UNIT- IV

Role of functional foods and nutraceuticals on health from Microbial sources : probiotics, prebiotics, Symbiotics, Synbiotic.ICMR regulations on probiotics.

UNIT - V

Dietary supplements from plant, animal and microbial sources, with special reference to conditions obesity, cancer, diabetes mellitus and hypertension.FOSHU and regulatory issues for functional foods and nutraceuticals in India.

References

- Mary K. Schmidl, Theodore P. Labuza, 2000, Essentials Of Functional Foods
- Se-Kwon Kim, 2013,Marine Nutraceuticals, CRC Press
- Dilip Ghosh et al., 2012, Innovation in Healthy and Functional Foods, CRC Press
- YashwantVishnupant Pathak, 2011, Hand book of Nutraceuticals, Volume II, CRC press
- Robert E.C. Wildman, 2006, Handbook of Nutraceuticals & Functional Foods , Second edition, CRC press

JOURNALS

- Nutraceuticals world
- Current topics in nutraceutical research
- Journal of medical nutrition and nutraceuticals
- Journal of nutraceuticals and nutrition
- Journal of nutraceuticals, functional & medical foods
- European journal of nutraceuticals & functional foods

WEBSITES

- www.chiro.org/nutrition/FULL/**Functional_Foods**.shtml
- newhope360.com/**functional**-ingredients
- https://www.rcffn.ca/
- www.statcan.gc.ca/bsolc/olc-cel/olc-cel?lang=eng&catno=88...
- www.ift.org › Community › Divisions

MODULAR COURSE - GERIATRIC CARE

CODE: 15FSNP03M2 Credits: 2 Hours/Week: 2 Marks: 50

Objectives:

To enable the students to

- To provide in-depth knowledge on normal aging
- To understand the care required during acute and chronic disease conditions
- To provide insight on the issues and problems related to geriatrics

Specific Objective of Learning

- Student will be in a position to assess the health status and QOL of the elderly
- Confident in Providing care and support to the elderly
- Trained care givers will be available in home,community and institutions to care the elderly.

UNITS:

1. **Geriatrics:** definition, age group, theories of aging process- biological,physiological and psychological changes during aging **.**

2. **Problems related to aging , quality of life and care for elderly: u**niversal precautions, Maintaining personal hygiene, Environmental hygiene,Bed making Prevention of bed sores **,**Bed bath(sponge bath), mouth care, taking & Recording of temperature, pulse, respiration, blood pressure etc. Simple sterilization methods and prevention of cross infection, Positioning & transferring skills.

3. **Nutrition management in aging:** Nutrition requirements, changes in total body mass and body composition, nutritional assessment, nutrition deficiency in old age, osteoporosis and vitamin D, simple diets for elderly and nasal feeding skills. Management of neurological diseases in elderly:Parkinson' s disease and Alzheimer's.

REFERENCES

1. Cathy Jo Cress(2011).Hand book of Geriatric care Management,Jones&Bartlett learning publisher
2. Joy Loverde(2009).The Complete Eldercare Planner,Hormony publishers
3. Davidson,S.R. and Pasmore (1986). Human Nutrition and Dietetics. Church Hill Livingstone, London.
1. Srilakshmi (2008). Nutrition Science. Newage International Publishers. Newdelhi.
2. Swaran Pasricha and Thimmayamma, B.V. (1992). Dietary Tips for the Elderly. Hyderabad: NIN.

MODULAR COURSE- NUTRITION FOR HEALTH AND FITNESS

Code: 15FSNP03M1 Credits: 2 Hours/Week: 2 Marks: 50

Objectives:

This course will prepare the students to:

1. Understand the components of health and fitness and the role of nutrition in these.
2. Make nutritional, dietary and physical activity recommendations to achieve fitness and well-being.
3. Develop ability to evaluate fitness and well-being.

Specific Objectives of Learning:

1. The students will be able to know the importance of health and fitness and its role in nutrition.
2. The students will be able to develop their ability to evaluate fitness and well-being of an individual.

Contents:

UNIT-I

Definitions, components and assessment criteria of age: specific fitness and health status. Holistic approach to the management of fitness and health: Energy input and output. Definition of health and fitness, Factors influencing health and wellbeing Gender and health. Nutritional status**:** Definition, methods to assess nutritional status- (Relevant to maintenance of fitness),

UNIT-II

Review of different energy system for endurance and power activity: Fuels and nutrients to support physical activity. Mobilization of fat stores during exercise.

UNIT-III

Approaches to the management of fitness and health**;** Diet and exercise**:** Effect of specific nutrients on work performance and physical fitness. Fuel and other nutrients that support physical activity (metabolic pathways. Mobilization of fuel stores during exercise.

UNIT – IV

Significance of physical fitness and nutrition in prevention and management of weight control regimes**.** Nutrition guidelines for maintenance of health and fitness.Awareness about the alternative systems for health and fitness, like ayurveda, yoga, Meditation, vegetarianism and traditional diets.

UNIT-V

Defining nutritional goals/guidelines appropriate to health, fitness and prevention and management of the chronic degenerative disorder.Nutrition and exercise regimes for pre and post-natal fitness.

References

1. Mahan, L.K. &Ecott-Stumps, S. (2000): Krause's food, Nutrition and Diet Therapy, 10th Edition, W.B. Sauders Ltd.

2. Sizer, F. & Whitney, E. (2000): Nutrition – Concepts & Controversies, 8th Edition, Wadsworth Thomson Learning.

3. & Whitney, E.N. &Rolfes, S.R. (1999): Understanding Nutrition, 8th Edition, West/ Wadsworth, An International Thomson Publishing Co.

4. Ira Wolinsky (ED) (1998): Nutrition in Exersice and Sports, 3rd Edition, CRC press.

5. Parizkova, J. Nutrition, Physical activity ad Health inearly life, Ed. Wolinsky, I., CRC press.

6. Shills, M.E., Osian, J.A., Shike, N. and Ross, A.C. (Ed) (1999): Modern Nutrition and Health & Disease, 9th Edition, Willams& Wilkins.

7. McArdle, W. Katch, F. and Katch, V .(1996) Exercise Physiology.Energy, Nutrition and Human Performance, 4th edition, Williams and Wilkins, Philadelphia.

Journals

1. Medicine and Science in Sports and Exercise.

2. International journal of sports Nutrition.

MODULAR COURSE-NUTRITIONAL ASSESSMENT

Code : 15FSNP04M2 Credits: 2 Hours/Week: 2 Marks: 50

Objectives:
The course is designed to:

- Orient the students with all the Important state-of-the –art methodologies applied in nutritional assessment and surveillance of human group
- Develop specific skills to apply the most widely used methods

Specific Objectives of Learning

on successful completion of these units, students are expected :

- To gain hands on experience on nutritional assessment
- To understand the methods to assess hospitalized patients
- To gain on knowledge to interpret the results using the assessment data

Units

1. Nutritional assessment as a tool improving the quality of life of various segments of the population including hospitalized patients.

2. Current methodologies of assessment of nutritional status their interpretation and comparative applications of the following.
    - Anthropometric measurement
    - Biochemical analysis
    - Clinical analysis
    - Diet survey

3. Techniques used:

   Rapid assessment, functional indicators such as grip strength, respiratory fitness, Harvard step test, squatting test.
4. Nutritional surveillance- Basic concepts used and setting up of surveillance system.
5. Medical nutrition therapy- role of nutritional assessment and intervention in medical care

Practicals

1. Community based project for assessment of nutritional status of any vulnerable group.

References

1. Jelliffe, D>B. and Jelliffe, E.F.P (1989): Community Nutritional Assessment. Oxford University Press.
2. Beghin, I., Cap, M and Dujardan, B. (1988): A Guide to Nutritional Status Assessment, WHO, Geneva.
3. Gopaldas., T. and Seshadri., S. (1987): Nutritional Monitoring and Assessment. Oxford University Press.
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5. Lee, R.D. and Nieman, D.C. (1993): Nutritional Assessment, Brown and Benchmark Publishers.
6. Sauberlich, H.E. (Ed) (1999): Laboratory Tests for the Assessment of Nutrition Status, CRC Press.
7. Cameron, N. (1984): Measures of Human Growth. Sheridan House Inc. New York
8. Scrimshw, N. and Gleason G (Ed) (1991): Rapid Assessment Methodologies for Planning and Evaluaton of Health Related Programs. Published by (INFDC) Internationa; Nutrition Foundation for Developing Countries.
9. FAO Nutritional Studies No. 4 (1953): Dietary Surveys: Their Technique and Interpretation, FAO.
10. Bingham, Sa.A. (1987): The Dietary Assessment of Individuals, Methods. Accuracy, New Techniques and Recommendations Nutrition Abstracts and Reviews. 57: 705-743.
11. Fidanza.
12. Collins, K.J. (Ed) (1990) Handbook of Methods for the Measurement of Work Performance, Physical Fitness and Energy Expenditure in Tropical Populations International Union of Biological Sciences.
13. Ulijaszek, S.J. and Mascie-Taylor, C.G.N. (Ed) Anthropometry: the Individual and the Population, Cambridge University Press, Cambridge.
14. Shetty, P.S. and James, W.P.T. (1994): Body Mass Index. A Measure of Chronic Energy deficiency in Adults. FAO Food and Agriculture Organization of the United Natins, Rome.
15. Davies, P.S.W. and Cole, T.J. (Ed): Body Composition Techniques in Health and Dieseas.Cambridge University Cambridge.
16. Himes, J.H.(1991): Anthropometric Assessment of Nutritional Status. Wiley-Liss New York.
17. Lohman, T. GL Roche, A.F.; and Martorell, R.(Ed). Anthropometric Standardization Reference Manual. Human Kinetics Books, Illinois.