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THE AMERICAN COLLEGE, MADURAI

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Department of Food Science & Nutrition

B.Sc. FOOD SCIENCE & NUTRITION

Program Course descriptions & Syllabi

(w.e.f. 2020 - 2021)

DEPARTMENT OF FOOD SCIENCE & NUTRITION

Choice Based Credit System

Program for B.Sc. – Food Science & Nutrition

SEM	PART	COURSE NO.	COURSE TITLE	HRS	CREDITS	MARKS
I	I	XXX 0000	Tamil/French/Hindi	3	2	30
I	II	ENS 1201	Conversational Skills	3	2	30
I	III-C	FSN 1511/1531	Basics of Food Science	5	5	75
I	III-C	FSN 1413	Lab in Food Science	4	4	60
I	III-C	FSN 1415/1435	Fundamentals of Nutrition	4	4	60
I	III-S	FSN 1401	Human Physiology	5	4	60
I	IV-E	FSN 1211	Basic Nutrition	3	2	30
I	IV-LS	FSN 1203	Ethnic foods	3	2	30
I	V	XXX 0000	Extension Activity (NSS/SLP/PED)			
			Total	**30**	**25**	**375**
II	I	XXX 0000	Tamil/French/Hindi	3	2	30
II	II	ENS 1202	Reading & Writing Skills	3	2	30
II	III-C	FSN 1512	Nutritional Biochemistry	5	5	75
II	III-C	FSN 1414	Lab in Nutritional Biochemistry	4	4	60
II	III-C	FSN 1416/1432	Food Microbiology	4	4	60
II	III-S	FSN 1428/1418/ 1402/ 1406	Nutrition Through Life Cycle	5	4	60
II	IV-E	FSN 1212	Diet and Disease	3	2	30
II	IV-LS	FSN 1204	First aid	3	2	30
II	V	XXX 0000	Extension Activity (NSS/SLP/PED)		1	
			Total	**30**	**25+1**	**375/3 90**

III	I	XXX 0000	Tamil/French/Hindi	3	2	30
III	II	ENS 2201	Study Skills	3	2	30
III	III-C	FSN 2517/2531	Food Chemistry	5	5	75
III	III-C	FSN 2519/2533	Food Processing	5	5	75
III	III-C	FSN 2411	Lab in Food Processing	4	4	60
III	III-C	FSN 2513/2535	Food Service Management	5	5	75
III	III-S	FSN 2403/2433	Human development	5	4	60
III	V	XXX 0000	Extension Activity – NSS/SLP/PED			
			Total	**30**	**27**	**405**
IV	I	XXX 0000	Tamil/French/Hindi	3	2	30
IV	II	ENS 2202	Career Skills	3	2	30
IV	III-C	FSN 2510	Therapeutic Nutrition-I	5	5	75
IV	III-C	FSN 2412	Lab in Therapeutic Nutrition-I	4	4	60
IV	III-C	FSN2514/2534	Food Preservation	5	5	75
IV	III-C	FSN2516/2536	Food packaging	5	5	75
IV	III-S	FSN 2414/2404	Functional foods and Nutraceuticals	5	4	60
IV	V	XXX 0000	Extension Activity - NSS/SLP/PED	-	1	15
			Total	**30**	**27+1**	**405/420**

SEM	PART	COURSE NO.	COURSE TITLE	HRS	CREDITS	MARKS
V	III-C	FSN 3615	Therapeutic Nutrition – II	6	6	90
V	III-C	FSN 3517	Lab in Therapeutic Nutrition– II	5	5	75
V	III-C	FSN 3619	Food Biotechnology	6	6	90
V	III-C	FSN 3621	Bakery and Confectionary	6	6	90
V	IV-LS	FSN 3203	Obesity Management	3	2	30
V	ES	FSN 3200	Environmental Studies	4	2	30
			Total	**30**	**27**	**405**
VI	III-C	FSN 3618	Food safety and Quality control	6	6	90
VI	III-C	FSN 3520	Mini Project	5	5	75
VI	III-C	FSN 3622	Health and Fitness	6	6	90
VI	III-C	FSN 3624/ 3626	Public Health Nutrition	6	6	90
VI	IV-LS	FSN 3206	Sports nutrition	3	2	30
VI	V-VE	HVS XXXX	Human Value Development	4	2	30
			Total	**30**	**27**	**405**
				180	**158+2**	**2370/2400**

C- Core Courses

S- Supportive Courses

LS- Life Skill

NME- Non- Major Elective

VE- Value Education

ES- Environmental Studies

Courses offered by the Department of Food sciences to Non-Major Students Part -III Supportive

SEM	Course No.	Course Title	Hrs.	Cr	Marks
I	FSN 1404	Human Physiology	**5**	**4**	**60**
II	FSN 1428	Nutrition Through Life Cycle	**5**	**4**	**60**
III	FSN 2433	Human Development	**5**	**4**	**60**
IV	FSN 2414	Functional foods and Nutraceuticals	**5**	**4**	**60**
Total			**20**	**12**	**240**

Part- IV Life skill course

SEM	Course No.	Course Title	Hrs.	Cr	Marks
I	FSN 1203	Ethnic foods	**3**	**2**	**30**
II	FSN 1204	First aid	**3**	**2**	**30**
V	FSN 3203	Obesity Management	**3**	**2**	**30**
VI	FSN 3206	Sports nutrition	**3**	**2**	**30**
Total			**12**	**8**	**120**

Part IV Non-Major Electives

SEM	Course No.	Course Title	Hrs.	Cr	Marks
I	FSN 1211	Basic Nutrition	**3**	**2**	**30**
II	FSN 1212	Diet and Disease	**3**	**2**	**30**
Total			**6**	**4**	**60**

Value added courses

SEM	Course No.	Course Title	Hrs.	Cr
I	FSN 121V	Techniques in mushroom and spirulina cultivation	2	2
II	FSN 122V	Mental Health Nutrition	2	2
III	FSN 221V	Food adulteration and additives	2	2
IV	FSN 222V	Oil Seed Processing	2	2
V	FSN 321V	Organic and terrace Farming	2	2
VI	FSN 322V	Technology of Fruits and Vegetables	2	2
Total			**12**	**12**

Program Specific Outcomes (PSOs)

At the end of the UG Food Science & Nutrition program, the student will be able to:

1. Apply the knowledge of food science & nutrition to appreciate in significant the healthy living and enhance to suit the contempory Indian situations.

2. Develop and test the theoretical aspects for applications in food processing

3. Developing the quality enrichment shelf life and value addition

4. Appreciate the chemistry underlying the properties of various food components in such a way that issue of malnutrition and hunger is addressed.

5. Describe techniques that can be used to monitor quality of raw ingredients and final products

6. Demonstrate food processing and preservation skills and innovate new strategies to upgrade the existing procedures.

7. Apply the contextual knowledge of food science & nutrition to function effectively as an individual or a leader in multidisciplinary environments

8. Explicitly communicate and exchange ideas in developing nutritious & healthy products to fill the avoid in malnutrition in Tamilnadu context

9. Solve complex problems and acquire analytical skills using latest techniques, tools to find out the solution to risks and maladies face.

10. Acquire ability to showcase competent to take up careers in academics, research and to become entrepreneur in local & global context

Mapping of Programme Specific Outcomes (PSOs) with Programme Outcomes (POs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
PSO 1	✔	✔			✔				✔	✔
PSO 2	✔	✔			✔	✔				
PSO 3	✔			✔	✔		✔			✔
PSO 4	✔	✔			✔	✔			✔	✔
PSO 5	✔									
PSO 6	✔	✔			✔	✔			✔	✔
PSO 7	✔	✔		✔	✔				✔	✔
PSO 8		✔		✔	✔	✔			✔	✔
PSO 9	✔	✔		✔	✔	✔	✔		✔	✔
PSO 10	✔	✔		✔		✔	✔	✔		

Mapping of Courses with Programme Specific Outcomes (PSOs)

Course Title	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
FSN 1511 / 1531	✔		✔		✔			✔		✔
FSN 1413		✔	✔			✔				✔
FSN 1415 / 1435	✔		✔				✔	✔		
FSN 1401	✔						✔	✔	✔	✔
FSN 1211	✔		✔		✔			✔		✔
FSN 1203	✔		✔		✔			✔		✔
FSN 1512	✔	✔	✔	✔			✔	✔		✔
FSN 1414	✔	✔	✔	✔			✔			✔
FSN 1416 /1432	✔	✔	✔		✔		✔		✔	✔
FSN 1428	✔						✔	✔	✔	✔
FSN 1212	✔		✔		✔	✔		✔		✔
FSN 1204	✔		✔		✔	✔		✔		✔
FSN 2517 / 2531	✔			✔		✔	✔			
FSN 2519 / 2533	✔			✔		✔	✔	✔		
FSN 2411		✔	✔			✔				✔
FSN 2513 /2535						✔	✔	✔		
FSN 2403 / 2433	✔							✔		✔

FSN 2510	✔						✔			✔
FSN 2412	✔		✔			✔	✔			✔
FSN 2514 / 2534	✔			✔		✔	✔	✔		
FSN 2516 /2536	✔		✔			✔				
FSN 2414	✔	✔							✔	✔
FSN 3615	✔						✔			✔
FSN 3517	✔	✔	✔			✔	✔			✔
FSN 3619			✔				✔		✔	✔
FSN 3621	✔		✔		✔			✔		✔
FSN 3203	✔		✔		✔			✔	✔	
FSN 3200			✔		✔			✔	✔	
FSN 3618	✔						✔			✔
FSN 3520	✔	✔	✔				✔		✔	✔
FSN 3622	✔						✔			✔
FSN 3626	✔		✔				✔	✔		✔
FSN 3204	✔		✔		✔			✔	✔	

FSN 1511 / 1531 Basics of Food Science (5hrs/wk) (5cr)

This is a foundational course for students to obtain knowledge on different food groups and their nutritive value, this course helps to understand the scientific principles underlying in food preparation and it also develops skills and techniques in food preparation with conservation of nutrients and palatability using cooking methods generally employed.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Identify and explain nutrients in foods and the specific functions in maintaining health.
ii. Outline the effects of various factors on cereals and pulses.
iii. Analyze the effects of different amounts of water added to vegetables during cooking on flavor and appearance and to compare the factors affecting coagulation of milk protein and prepare milk products.
iv. Assess the effect of addition of acid, fat, salt, water and sugar on the texture of flesh foods quality.
v. Determine the smoking point of any cooking oils and the stages of sugar cookery.

Unit 1: Introduction to foods (13 hours)

Food - Definition, Functions, Classification of foods, Food groups -Basic Four, Basic Five and Basic Seven, Food Pyramid. Cooking - Definition**,** Objectives, Preliminary preparation of food, Methods of cooking - Moist heat and Dry heat methods, advantages and disadvantages. Micro-wave cooking, Solar cooking - advantages and disadvantages.

Unit 2: Cereals and pulses (16 hours)

Cereals - Wheat and Rice - Structure, Composition and Nutritive value -Milling - By products of wheat and rice, Parboiling - methods, advantages, Effect of cooking on the nutritive value of cereals, Gelatinisation, Dextrinization, gluten formation. Millets - Ragi, Bajra, Italian millet, Varagu,Samai-Composition, Nutritive value. Pulses - Composition and Nutritive value, Germination, Effect of cooking on pulses, Factors affecting cooking quality of pulses, Role of pulses in cookery.

Unit 3: Vegetables, Fruits and Milk (15 hours)

Classification, Composition and Nutritive value, Conservation of nutrients during cooking, Role of vegetables in cookery, Pigments in fruits and vegetables and effect of cooking on pigments. Milk - composition and Nutritive value, Physical properties of milk, Different types of milk and milk products, Role of milk and milk products in cookery.

Unit 4: Flesh foods (16 hours)

Meat - Classes of meat, Composition and Nutritive value, Methods of cooking and its Effects of Post mortem changes – Rigor Mortis Ageing of meat, Tenderising meat. Fish - Classification, Composition and Nutritive value, Selection criteria, Methods of cooking and its effects. Poultry - Classification, Composition and Nutritive value, Principles and methods of cooking poultry. Eggs - Structure Composition and Nutritive value, Role of egg in cookery, Evaluation of egg quality, Effect of cooking and Factors affecting coagulation.

Unit 5: Fats& Oils, Sugars, Spices, Nuts & Oilseeds (15 hours)

Composition & Nutritive value, Types of fats and oils, Hydrogenation, Role of fat in cookery, Effect of heating, Factors affecting absorption of fats, Smoking point, Rancidity-Types, Prevention. Sugar: Nutritive value, Properties**,** Types of sugars, Stages in sugar cookery, Sugar and related products. Spices: Functions, Role of spices in cookery, Uses and abuses. Nuts & Oilseeds: Types, Composition Nutritive value, Role of nuts and oil seeds in cookery.

Textbook:

1. Srilakshmi B (2005) Food Science New Age International Publishers, New Delhi.

References:

1. Swaminathan M (1979) Food Science and Experimental foods. Ganesh and Co, Madras.
2. Mudambi SR and Rao SM (1986) Food Science. Wiley Eastern Ltd. New Delhi.
3. Bennion M and Hughes D (1975) Introductory foods Macmillan Publishing Co. Inc. New york.
4. Brich CG, Spencer M and Cancerron AG (1977) Food Science. Pergamon Press, New York.
5. Gopalan C, Ramasastri PN and Balasubramanian SC (1977) Nutritive value of Indian Foods. National Institute of Nutrition, Hyderabad.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2				
CO 2		2		4		
CO 3			3	4	5	
CO 4		2			5	
CO 5		2		4	5	

Mean = 3.45

FSN 1413 **Lab in Food Science** **(4hrs/wk) (4cr)**

Course Outcomes

Upon completion of this course, the student will be able to:

i. Understand the fundamentals of cereals, pulses, fruits & vegetables processing, equipment and products.
ii. Assess the selection, purchase and storage of foods.
iii. Demonstrate the different methods of cooking.
iv. Evaluate the basic methods and principles involved in cooking.
v. Evaluate the change of pigment during cooking.

Laboratory Experiments

1. Technique in measurement of different food stuffs - use of standard measuring cups and spoons.
2. Different recipes from cereals, pulses, vegetables, fruits, fleshy foods, egg, milk and milk products.
3. Cereals - Examination of different starch granules, Gelatinisation, Dextrinisation.
4. Beverages - preparation of stimulating, nourishing and refreshing beverages.
5. Pulses - Effect of hard and soft water, alkali, cooking time of grams and dahls.
6. Vegetables - Effect of acids, alkali, steaming and pressure cooking on the different pigments and acceptability of vegetables.
7. Fruits - Study of different methods of preventing enzymatic browning of cut fruits, pectin content of fruits.
8. Sugars - Stages of sugar cookery.

Textbook:

1. Jamesen SK (1998) Food Science Laboratory Manual. Purdue University.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1	1		3		5	
CO 2			3	4	5	
CO 3		2	3		5	
CO 4			3		5	
CO 5	1		3		5	

Mean = 3. 42

FSN1415 / 1435 Fundamentals of Nutrition (4hrs/wk) (4cr)

This course enables the students to gain basic knowledge of the different nutrients and their role in maintaining health of the community and it also develop skills in qualitative analysis and quantitative estimation of nutrients.

Course Outcomes
Upon completion of this course, the student will be able to:

i. Identify the risk groups in community and find the solution.
ii. Analyze the different quality aspects of carbohydrates.
iii. Discuss on specific functions of macronutrients in human body.
iv. Identify the functions and deficiencies of minerals.
v. Rate the sources of vitamins

UNIT 1: Concept of nutrition (20 hours)
Definitions - Nutrition, Health, Malnutrition, Nutritional status, Balanced diet, Under nutrition & Over nutrition, Nutrients - Classification of nutrients, Relation of food and health. RDA - Definition, Factors, Methods used for deriving RDA, Reference man and woman - Definition. Energy - Definition, Units of measurement, Determination of energy value of foods, Physiological fuel value, Gross Energy value. Total energy requirement - Factorial method, Experimental determination, Thermic effect of food - Factors. BMR - Definition, measurement, Factors.

UNIT 2: Carbohydrates (10 hours)
Definition, Classification, Digestion, Absorption, Metabolism, Functions, Deficiency, Requirement and Sources of Carbohydrate. Dietary fiber - Definition, Classification, Physiological effects, Role of fiber in human nutrition, sources.

UNIT 3: Proteins and Lipids (10 hours)
Definition, Classification of proteins and amino acids, Functions of proteins, Sources, and Requirements, Deficiency, Digestion, Absorption and Metabolism, Quality of proteins ,PEM. Lipids - Definition, Classification, Functions, Sources, Requirements, Deficiency, Digestion, Absorption and Metabolism of fats.

UNIT4: Minerals (10 hours)
Definition, Classification, Functions, Sources, Requirements, Deficiency of Calcium, Sodium, Phosphorus, Iron, Zinc, Iodine, Fluorine, Magnesium, Potassium

UNIT 5: Vitamins (10 hours)
Definition, Classification, Functions, Sources, Requirements, Deficiency of Vitamins A, D, E, K, C, B1, B2, Niacin, Folic acid, Pyridoxine, B12.

Textbook:

1. Srilakshmi B (2004) Nutrition Science, New Age International (P) Ltd, Publishers.

References:
1. Kango M (2005) Normal nutrition, curing diseases through diet. Third Edition CBS Publications.
2. Paul S (2003) Text book of Bio-Nutrition, Fundamental and Management. RBSA Publishers.
3. Williams SR (2000) Nutrition and Diet Therapy. Sixth Edition. C.V. Melskey Co.
4. Mudambi SR, Rajagopal MV (1997) Fundamentals of Foods and Nutrition. Third Edition. New Age International (P) Ltd, Publishers, Third edition.

5. Swaminathan M (1999) Essential of Food and Nutrition. Vol I and II, Beppo publications, Madras.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4	5	
CO 2		2		4	5	
CO 3		2		4		
CO 4		2		4		
CO 5	1			4	5	6

Mean = 3. 57

FSN 1401 Human Physiology (5hrs/wk) (4cr)

This course helps the students to understand the structure and basic physiology of various organs of the body. The students will obtain better understanding of the principles of Foods and Nutrition through the study of physiology.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Compare the digestive and excretory system and infer the mechanisms of digestion and excretion in human beings.
ii. Explain the functions of circulatory system.
iii. Communicate the structure and functions of respiratory system in man.
iv. Analyze the relationship between nervous system and sense organs
v. Discuss the role of hormones and functions of human reproductive system.

UNIT 1: Digestive System and Excretory System (15 hours)

Structure and Functions of Digestive system, Process of digestion and absorption, Saliva - Composition, Function. Bile - Composition, Function. Structure and Function of Kidney, Nephron – Composition of urine, Mechanism of urine formation, Micturition.

UNIT 2: Blood and Cardiovascular System (15 hours)

Blood – Composition - RBC, WBC, Platelets –Functions of blood, Clotting mechanism, Blood groups. Heart - Structure and Functions, Cardiac muscle, Cardiac output, Heart rate, Heart sounds
.

UNIT 3: Respiratory System (15 hours)

Respiratory organs - Structure, Functions, Mechanism of respiration, Lung volumes, Types of breathing , Artificial methods of breathing – Mouth to mouth, Eve's rocking method.

UNIT 4: Nervous System and Sense Organs (15 hours)

Nervous system - Structure, Functions of Neuron, Brain, Spinal cord. Sense organs - Structure and Functions of Eye, Ear and Skin.

UNIT 5: Reproductive and Endocrine System (15 hours)

Structure and Function of male and female Reproductive organs, Menstrual cycle, Conception and Contraception. Endocrine System - Structure and Functions of Thyroid, Parathyroid, Adrenal and Pituitary glands.

Textbooks:

1. Arumugam N.(2016), Human Physiology,5th Edition, Sarah's Publication, Kanyakumari.(Unit I,II,III)

References:

1. Ganong (1995) Review of Medical physiology. Prentice Hall international, London.
2. Guyton,A.C,andHall. ,J.B.(2010):TextBookofMedicalPhysiology,9th Edition, W.B. Sanders company,Prime Books (Pvt.) Ltd.,Bangalore
3. S.Subramanian and S.M.Kutty (1971) Text Book of Physiology, Orient Longman.
4. Elaine N and Marie RN (1997) Human Anatomy and Physiology. Addison Wesley Longman, Inc., UK.
5. Chatterjee CC (1988) Text Book of Medical Physiology. W B Sounder's Co. London.Muthaiya N. M (2006), Human Physiology, 4th Edition , Jaypee Brothers Medical Publishers Ltd, NewDelhi.(Unit IV,V)

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2		2		4		
CO 3		2	3	4		
CO 4		2		4		
CO 5		2		4		

Mean = 3

FSN1203 **Ethnic Foods** **(3hrs/wk) (2cr)**

(Life Skill Course)

This course deals with the nutritional, social, cultural, economic and health effects of traditional foods.

Course outcomes

Upon completion of this course the student will be able to:

- Understand the historical perspective of nutrient requirements.
- Learn to critically evaluate the methodology and derivation of requirements for specific macronutrients.
- Appreciate importance of nutrition immunity interactions and their implications.
- Learn various measures for enhancing nutritional quality of diets.
- Stay updated with emerging concepts in nutrition.

UNIT-I Traditional food style: History – Concept and Principles of Traditional Foods–Benefits and nutritional content of Traditional Foods.

UNIT-II Traditionally Fermented foods: Unsweetened Yogurt, Kefir, Dahi, Lassi, Shrikhand, Miso, Kimchi, Kombucha, Tempeh, Pickles and Sauerkraut – Processing methods, Nutritional benefits and Therapeutic uses

UNIT-III Healthy Aspects of Traditionally foods: National Health Benefits - Impacts of Consuming Traditional Foods.

UNIT-IV Traditional methods of Cooking and Preservation: Introduction - Cooking techniques - Conventional cooking - Dry cooking - Wet cooking - Thermal processing – Effect of time and temperature - Equipments.

UNIT-V Traditionally Fermented Fruits and Vegetables: Cucumber, Onion, Olives, Carrot, Caper Berries, Pickled Garlic - Safety and Regulations.

Text book:

1. Kristbergsson K and Oliveira J (2016) Traditional foods: General and Consumer Aspects. Springer, New York.

References:

1. Pathak YV, Handbook of nutraceuticals Volume 2, CRC Press 2011.
2. Prakash V and Belloso OM (2015) Regulating safety of traditional and ethnic foods. AcademicPress, Elsevier, USA.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2	3			
CO 2		2		4		6
CO 3		2				
CO 4	1		3			
CO 5	1			4		6

Mean =3.09

FSN 1211 **Basic Nutrition** **(3hrs/wk)(2cr)**
(Non-Major Elective)

This course provides an overview of the major macronutrients relevant to human health. They gain knowledge on dietary sources, intake levels, physiological role, and requirement of major nutrients on human body. They also attain knowledge about major nutrition-related deficiency conditions.

Course Outcomes
Upon completion of this course, the student will be able to:

i. Explain the structure and components of nutrients.
ii. Analyse the different quality aspects of macronutrients and to discuss on specific functions of macronutrients in human body
iii. Discuss on specific functions, digestion, absorption and utilization of vitamins.
iv. Identify the functions and deficiencies of minerals.
v. Outline the water distribution in human body.

Unit 1: Introduction to nutrition (9 hours)
Definition of Nutrition- Food, Health, Nutritional status, Malnutrition, Over Nutrition, Under Nutrition, Functions of food, Balanced diet, Food pyramid, ICMR Basic Five Food Groups.

Unit 2: Macro nutrients (11 hours)
Carbohydrates- Classification, Functions, Food Sources. Dietary fibre - Functions, Food Sources and Deficiencies. Lipids and Fats- Definition, Classification, Functions, Deficiency, Sources -Proteins, Definition, Classification, Functions, Deficiency, Sources.

Unit 3: Micronutrients (10 hours)
Vitamins - Definition, Classification and Functions of Vitamins. Nomenclature, Functions, Deficiency and Sources of vitamins A, D, E, K. Nomenclature, Functions, Deficiency, Sources of Vitamins B1, B2, B3, Folic acid, B6, B12

Unit 4: Minerals (8 hours)
Definition, Classification, Functions, Requirements, Deficiency, Sources of Calcium, Iron, Zinc, Phosphorus, Iodine, Fluorine, Sodium

Unit 5: Water (7 hours)
Distribution of Water & Electrolytes - Functions, Requirements, Sources, Water Balance, Water Depletion, Water Excess

Textbook:
1. Srilakshmi B (2004) Nutrition Science. New Age International (P) Ltd, Publishers.

References:
1. Kango M (2005) Normal Nutrition, Curing diseases through diet. First Edition CBS Publications.
2. Paul S (2003) Text Book of Bio-Nutrition, Fundamental and Management. RBSA Publishers.
3. Williams SR (2000) Nutrition and Diet Therapy. Sixth Edition C.V. Melskey Co.
4. Mudambi SR and Rajagopal MV (1997) Fundamentals of Foods and Nutrition. New Age International (P) Ltd, Publishers.
5. Swaminathan M (1999) Essential of Food and Nutrition. Vol I and II, Bappco publications, Madras.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2	3			
CO 2		2		4	5	
CO 3		2		4		
CO 4		2		4	5	
CO 5		2		4	5	

Mean = 3.38

FSN 1512 Nutritional Biochemistry (5hrs/wk.) (5 cr)

This course will foster understanding on the basis of nutrition and the effects of varied nutrition, it further provides knowledge on the effect of diet on health and the functions of biological systems in relation to Nutritional biochemistry.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Revise the basis of reactivity of biologically relevant molecules and their interactions
ii. Explain the principles of enzymatic reaction.
iii. Compile the major metabolic pathways involved in the metabolism of nutrients in the human body.
iv. Discuss the inborn errors of metabolism.
v. Explain about the synthesis of nucleic acids and proteins.

Unit 1: Introduction to Biochemistry (5 hours)

Definition, Objectives, Scope and Inter relationship between Biochemistry and other Biological science.

Unit 2: Enzymes (16 hours)

Definition - Types - Classification - Specificity - Isozymes - Coenzymes – Enzyme kinetics - Factors affecting enzyme action - Enzyme inhibition.

Unit 3: Intermediary metabolism (16 hours)

Carbohydrate metabolism, Glycolysis, TCA cycle and Energy generation, Gluconeogenesis, Glycogenesis, Glycogenolysis, Blood sugar regulation

Unit 4: Lipids and proteins (22 hours)

Oxidation and Biosynthesis of fatty acids (saturated and mono-unsaturated): Synthesis and utilization of ketone bodies, Ketosis, Fatty livers. Proteins - General reaction of amino acid metabolism, Urea cycle. Lipoproteins: Types, Composition, Role and Significance in disease

Unit 5: Introduction to Nucleic acids (16 hours)

Structure, Replication, Transcription, Genetic code elementary knowledge of biosynthesis of protein

Textbook:

1. Lehninger AC, Nelson DL and Cox MM (2001) Principles of Biochemistry. 4th Edition, W.H. Freeman Company, USA.

References:

1. Voet D and Voet JG (2004) Biochemistry. 3rd Edition. John Wiley & Sons Inc. USA.
2. Berg JM, Tymoczko JL, Stryer L (2011) Biochemistry. International Edition, Seventh Edition, W.H. Freeman & Co.
3. Murray R K, Grannen DK, Mayes PA and Rodwell VW (2012) Harper's Illustrated Biochemistry. Twenty Ninth Edition, Lange Medical Book, Mc Graw Hill Edition.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2		2		4		
CO 3		2		4		
CO 4				4		
CO 5	1	2		4		

Mean = 3.0

FSN 1414 Lab in Nutritional Biochemistry (4hrs/wk.) (4 cr)

This course emphasizes the clinical significance and understanding of the basic concepts and enables the students to get practical experience in lab and clinical nutrition.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Evaluate the carbohydrate using qualitative and quantitative tests.
ii. Apply practical skills in qualitative analysis of proteins.
iii. Assess the level of glucose in urine samples.
iv. Evaluate the normal & abnormal constituents of urine
v. Compare the blood glucose level.

Laboratory Experiments

1. Identification of carbohydrates (Qualitative, quantitative tests)
2. Identification of proteins (Qualitative Tests)
3. Estimation of glucose in urine by Benedict's methods
4. Urine analysis - normal & abnormal constituents of urine.
5. Blood glucose estimation.

Textbook:

1. Miller DD (2014) Food chemistry: a laboratory manual. First Edition, John Wiley & Sons.

References

1. Conn EE and Stump PK (1981) Outlines of Biochemistry. Wiley Eastern (P) Ltd., New Delhi.
2. Linder MC (1991) Nutritional Biochemistry and Metabolism: with clinical applications. Second Edition, Appleton and Lange.
3. Plummer DT (1996) An introduction to Practical Biochemistry. Tata McGraw Hill, New Delhi.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4	5	
CO 2				4	5	
CO 3		2		4	5	
CO 4		2		4	5	
CO 5		2		4	5	

Mean =3.78

FSN 1416/1432 Food Microbiology (4hrs/wk) (4cr)

The goal of teaching this course to students is to gain knowledge about the role of micro-organisms in health and disease, understand the role of micro-organisms in spoilage of various foods and its role in relation to food and food preservation.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Acquire, discover, and apply the theories and principles of food microbiology in practical, real-world situations and problems.
ii. Discuss on classification of micro-organisms and its characteristics.
iii. Evaluate the different factors responsible for the microbial growth.
iv. Analyze and describe the characteristics of important pathogens and spoilage microorganisms in foods.
v. Compare food borne infection and food intoxication.

Unit 1:Introduction to food microbiology (10 hours)

Definition to Food Microbiology- Scope of food microbiology-History- Role of microbiologist in food industries.

Unit 2: Overview of Microorganisms (12 hours)

An introduction to microbial world: Bacteria, Fungi, Yeast, Viruses Importance and significance of microorganisms in food science. Micro-organisms importance in food - Factors affecting the growth of micro organisms in food - Intrinsic and Extrinsic parameters that affect microbial growth.

Unit 3: Contamination and spoilage of foods (14 hours)

Principles of food spoilage - Microbiological, Physical and Biological factors - Contamination, Preservation and Spoilage of cereal and cereal products, Baked products, Fruits and Vegetables and their products, Fleshy food, Milk and Milk products.

Unit 4: Food Spoilage and Preservation (12 hours)

Definition, Sources of contamination and Microorganisms involved in spoilages of various foods: Milk, Bread, Canned food, Vegetables and fruits, Fruit juices, Meat, Eggs and Fish Physical and Chemical means used in destruction of microbes: Definition of Sterilization and Disinfection, Thermal- Role of heat, Pasteurization, Non-thermal- Filtration and Radiation in Sterilization, Use of Chemical agents - Alcohol, Halogens and Detergents

Unit 5:Fermentation Technology (12 hours)

Fermentation process - Dairy products (Cheese and Yoghurt) and Traditional Indian Fermented foods and their health benefits. Fermented Beverages- Wine, Beer, Toddy and Vodka.

Textbook:

1. Frazier WC and West off DC (2013) Food Microbiology. Fifth Edition, McGraw Hill Education (India) Pt. Ltd., New Delhi.

References:

1. Banwart GJ (1989) Basic Food Microbiology. Second Edition, Chapman and Hall, New York.
2. Pelczar MJ, Chan ECS and Kreigh NR (2000) Microbiology. Eighth Edition, Tata McGraw Hill,New Delhi.
3. Willey UM, Sherwood LM and WoolvertonCJ(2011) Prescott's Microbiology. Eighth Edition, Mc Graw-Hill International.
4. Adams MR and Moss MO (1991) Food Microbiology. The Royal society and chemistry,Cambridge.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2		2		4		
CO 3		2		3	5	
CO 4		2	4		5	
CO 5		2	4		5	

Mean = 3.38

FSN 1428 Nutrition Through Life Cycle (5hrs/wk) (5cr)

This course helps the students to have basic understanding on the nutritional needs from birth to adolescence and old age; it provides necessary theoretical background for the field of child guidance. Acquaint them about the needs of guidance and counselling at various stages of development.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Evaluate changes in human life span and to predict the required changes needed for life cycle.
ii. Plan a healthy food choice for physical, physiological psychological aspects in infancy.
iii. Discuss the impact of socioeconomic, cultural, and psychological factors on food habits of school going children.
iv. Identify socioeconomic and cultural barriers to meet nutrient needs of adolescence and adults.
v. Determine nutrient requirements during old age.

UNIT 1: Nutrition in Pregnancy and Lactation (16 hours)

Nutrition in Pregnancy - Food and nutrient Requirements, RDA, Physiological changes during pregnancy, Physiological cost of pregnancy and Complications in pregnancy.

Nutrition in Lactation - Food and nutrient requirements, RDA, Physiology of lactation, Composition of breast milk – Menu planning.

UNIT 2: Nutrition during Infancy and Preschool (16 hours)

Nutrition during Infancy - Food and nutrient requirements, RDA, Weaning, Types of weaning foods and Supplementary foods.

Nutrition during Preschool age - Food and nutrient requirements, RDA, Eating habits and behaviour, Growth – Menu planning.

UNIT 3: Nutrition during School-going age (15 hours)

Nutrition during School-going age - Food and nutrient requirements, RDA, Factors affecting eating habits, Packed lunch– Menu planning.

UNIT 4: Nutrition in Adolescence and Adult (13 hours)

Nutrition in Adolescence - Food and nutrient requirements, RDA, Changes in growth pattern, Puberty, Menarche, Changes in food habits, Nutritional disorders, Psychological and Peer group influence on eating habits.

Nutrition in adulthood - Food and nutrient requirements, RDA– Menu planning.

UNIT 5: Nutrition in Old age (12 hours)

Nutrition in Old age - Food and nutrient requirements, RDA, Physical, Physiological, Biological and Psychological changes Influencing meal pattern – Menu planning.

Textbooks:

1. Srilakshmi B. (2018) Dietetics, New Age International (P) Ltd, Publishers. (Unit III, IV & V)

References:

1. Whiteny EN and Cataldo CB (1983) Understanding normal and clinical Nutrition. West Publishing Company, New York.
2. Krause MV and Mohan LK (1984) Food, Nutrition and Diet Therapy. W.B. Saunders company, Philadelphia.
3. Passmore R and East Wood MA (1987) Human Nutrition and Dietetics. English Language Book Society/Chruchill, Livingstone.

4. Swaminathan M (1985) Advanced Text Book on Food and Nutrition. Vol.II. BAPPOO, No.88, Mysore Road, Bangalore.
5. Robinson CH, Lawber MR, Chenoweth WL and Garwick AE (1986) Normal and Therapeutic Nutrition. Seventh Edition, Mc Millan Publishing company, New York.
6. Judith E Brown et al., Nutrition Through the Life Cycle Paperback –Publisher: Cengage Learning, Inc; 4th ed. June 2010.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4	5	
CO 2		2				
CO 3		2		4	5	
CO 4		2		4		
CO 5		2			5	

Mean = 3.36

FSN1204 **First Aid** **(3 hrs/wk) (2 cr)**

This course has been designed to train the general public to a basic standard of first aid, to impart a wide spectrum of knowledge spanning the basic principles of immediate action to be taken in emergency situation and consolidating such knowledge through the discussion and hand on practice of numerous common scenarious.

Upon completion of this course, the student will be able to:

I. Assess an emergency situation quickly and calmly.
ii. Product him/herself, bystanders and casualties from danger.
iii. Obtain medical aid and call an ambulance when necessary.
iv. Deal with other major condition mainly bleeding, shocking and other emergency
v. Assess the condition of all casualties and identify the need to immediate care.

Unit 1: Introduction to First Aid (7hours)

General Principles - Body structure and function - Positioning of casualty - Unconscious casualty- Resuscitation - Bleeding; Management of shock, Burns and Scalds and Accidents caused by electrical

Unit 2: Managing an incident (5 hours)

Action at an Emergency - Making an area safe - Giving emergency help and assisting the emergency services

Unit 3: Fire (7 hours)

The Elements of fire - Leaving a burning building - Clothing on fire - Smoke and fumes. Electrical incidents: High voltage -Low voltage current and lightning.

Unit 4:Environmental and Medical Emergencies (5hours)

Bites and stings - Temperature related emergencies and Poison Emergencies. Medical: Breathing Problems - Choking - Allergic Reaction – Stroke - Shock and Fainting

Unit 5: Final First aid safety skill and CPR (6 hours)

Removing Gloves, Proper use of personal protective equipment- Proper technique on application of bandage and splint- How to stop bleeding – Application of wound dressing

Textbook:

1. M.F.Hazinki, J.P .Nolan , 2015 international consensus on first Aid science with treatment recommendations.

References:

1. IFRC international first aid guide for field workers 2011.
2. Indian red cross society -Belgian red cross flander. Indian first aid guidelines 2014.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2				4	5	6
CO 3		2		4		
CO 4			3		5	
CO 5	1				5	

Mean = 3. 72

FSN 1212 **Diet and Disease** **(3hrs/wk) (2cr)**
(Non-Major Elective)

This course imparts knowledge in the field of clinical nutrition to make appropriate dietary modifications for various disease conditions based on the pathophysiology. They develop capacity and aptitude in taking up dietetics as a profession by understanding the consequences of nutritional problems in the society to create awareness on community nutrition-based programmes.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Explain the types of diet and compare it.
ii. Plan diet for obesity and underweight and to analyse the etiology of the disorders.
iii. Analyse the etiology and symptoms of fever to identify the metabolic changes
iv. Critique the control of diabetes and complications.
v. Compute the nutritional planning for CVD.

Unit 1: Therapeutic diets (9 hours)

Definition, Hospital diet - Clear fluid, Full fluid - Liquid and Soft diets, Pre and Post-operative diet

Unit 2: Diet in Obesity and Underweight (9 hours)

Definition, Aetiology, Types, Complication, Dietary guidelines, Foods to be included and avoided.

Unit 3: Diet in Fever (9 hours)

Types, Causes, Metabolic changes. Typhoid, Malaria, Tuberculosis – Symptoms, Causes, Dietary guidelines, Foods to be included and avoided

Unit 4: Diet in Diabetes Mellitus (9 hours)

Definition, Causes, Symptoms, Diagnosis, Types, Dietary guidelines, Foods to be included and avoided

Unit 5: Diet in Cardiovascular disease (9 hours)

Definition, Risk factors, Dietary guidelines, Foods to be included and avoided

Textbook:

1. Srilakshmi B. (2018) Dietetics, New Age International (P) Ltd, Publishers.

References:

1. Antia P and Abraham P (1998) Clinical Dietetics and Nutrition, 2nd edition, Oxford UniversityPress.
2. Bamji MS andReddy V (1998) Text Book of Human Nutrition ford. IBH Publishing Co. Ltd New Delhi.
3. Guthrie HA and Picciano M F (1995) Human Nutrition. Mosby, St. Louis Missionary.
4. Sharon M (1994) Complete Nutrition. Avery publishing group, New York.
5. Robinson CH and Lawler MR (1990) Normal and Therapeutic Nutrition, Seventeenth Edition, Mac Milan Publishers.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2				4	5	6
CO 3		2		4		
CO 4			3		5	
CO 5	1				5	

Mean = 3. 72

FSN 2517 / 2531 Food Chemistry (5hrs/wk) (5cr)

Enable students to gain knowledge on the composition and chemistry of foods in relation to food processing and quality of physical, chemical and nutritional properties of major and minor food components of the functional properties of food components and their applications.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Explain the importance and scope of food chemistry.
ii. Identify the chemistry and functional properties of carbohydrates.
iii. Outline the physicochemical properties of proteins in relation to food quality.
iv. Evaluate the properties of lipids and the changes obtained by processing.
v. Analyse the effects of various reactions in food.

Unit 1: Introduction to Food Chemistry (18 hours): Definition of food chemistry, Properties of foods physical properties – Solution, Vapour pressure, Boiling point, Freezing point, Osmotic pressure, Viscosity, Surface and interfacial tension, Specific gravity, Acids, Bases and Buffers - Acids and bases in foods, Buffers, The chemical bond ionic bond, Covalent bond, Hydrogen bond Colloids – Sols, Gels, Emulsions, Foams.

Unit 2: Chemistry of Carbohydrates (14 hours)

Classification of Carbohydrates - Hemi Cellulose, Pectin, Gel formation, Changes of carbohydrates on cooking – Solubility, Hydrolysis, Gelatinisation, Browning reaction.

Unit 3: Proteins (12 hours)

Classification of Protein - Native and denatured protein, Heat treatment of protein, Pure protein - Whey protein, Colostrums.

Unit 4: Fats (15 hours)

Physical Properties - Melting point, Softening point, Slipping point, Smoke, Flash, Fire points, Short melting points, Chemical properties – Rancidity - Definitions, Types, Prevention.

Unit 5: Reactions in Food (16 hours)

Browning reaction - Enzymatic, Non enzymatic, Mailard reaction, Gas production in batters - Changes in pH, Staling, Scoring.

Textbook:

1. Damodran, Parkin, Fennema, Fennema's Food Chemistry, Fifth Edition, Apple Academic Press Inc., ISBN: 9781482208122, 1482208121 Pages: 1107

References:

1. Ambika shanmugam, Fundamentals of biochemistry for Medical Students, Publisher: Lippincott India, ISBN: 9788184736960, 8184736967
2. Bertram O. Fraser-Reid, Kuniaki Tatsuta & Joachim Thiem, Glycoscience: Chemistry and Chemical Biology

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2		2		4		
CO 3		2	3	4		
CO 4		2	3		5	
CO 5				4	5	

Mean = 3. 33

FSN 2519/ 2533 Food Processing (5hrs/wk) (5cr)

This course focuses on fundamentals of processing, nature, harvesting, and storage conditions of varying food products. The students gain knowledge in the various methods used for preservation of food products. This provides comprehensive coverage on processing and preservation aspects of food science that include chemical, microbiological and technological processes

.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Revise the historical perspective, traditional technologies used in food processing.

ii. Discuss the processing of cereals and pulses.

iii. Discuss the bio-chemical conversion of milk into different by products.

iv. Outline the processing and bio chemical changes during ripening.

v. Explain the preservation and storage techniques of meat and poultry.

Unit 1: Essential Processing of Foods (15 hours)

Need for food processing, convenience food, RTE, RTS, Rice-parboiling, Milling - merits and demerits. Wheat - Milling, Extraction of flour, By-products. Millets - Types, Processing - Pearling, Flaking and Puffing.

Unit 2: Pulses and Oils (15 hours)

Decortication, Dhal milling, Elimination of toxic factors, Soaking, Germination, Sprouting, Fermentation and Soya based products. Oils-pressing, Solvent extraction, Purification- Degumming, Refining, Blanching, Deodorizing, Hydrogenation - Margarines, Shortening.

Unit 3: Milk and Egg products (15 hours)

Pasteurization, Homogenization, UHT processing, Dehydrated milk products, Egg- Storage, Frozen egg and Dehydrated egg products.

Unit 4: Fruits and Vegetables (15 hours)

Harvesting, Handling and Storage, Physiological and Biochemical changes during ripening. Method of preparation of squash, Crush, Sauce, RTS, Puree, Ketchup, RTE.

Unit 5: **Spices and Beverages (15 hours)**

Spice – Processing and Extraction of essential oils and colours, Storage and Preservation.
Beverages - Tea, Green tea, Coffee, Cocoa, White pepper, Black pepper.

Textbook:

1. Fellows P J (2000) Food Processing Technology: Principles and Practice 2nd edition CRC Woodhead Publishing Ltd., Cambridge.

References:

1. Khetarpaul Neelam (2005) Food Processing and Preservation, Daya Publications, New Delhi.

2. Salunke D K and Kadam S (1995) Hand book of Food Science and Technology -production, composition, storage and processing, Marcel Dekker INC, New York.

3. Sivasankar B (2002) Food Processing & Preservation, Prentice Hall, India.

4. Desrosier N W and Desrosier J N (1987) The Technology of Food Preservation, 4thEdition, CBS, New Delhi.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4	5	
CO 2		2		4		
CO 3				4		
CO 4		2			5	
CO 5		2		4		

Mean = 3. 4

FSN 2411 Lab in Food Processing (4hrs/WK) (4cr)

This course deals with the practical aspects of the principles and concepts of Food processing and preservation technology in which the students gain knowledge along with the handling practices to process and preserve the food more efficiently using scientific methods.

Course Outcomes

Upon completion of this course, the students will be able to:

i. Apply the concepts and scientific knowledge of various processing and preservation technologies.
ii. Justify the principles of food preservation for various food groups.
iii. Combine the preservation techniques and methods for various food groups.
iv. Analyze the effect of processing methods on the quality characteristics on the foods.
v. Summarize the industrial level of food processing concepts.

Laboratory Experiments

1. Determination of pH and Assessment of Total Soluble Solids of different food samples
2. Measurement of acidity food samples by titration method
3. Estimation of gluten content in wheat flour.
4. Estimation of moisture content in food sample.
5. Blanching and browning control of food sample.
6. Preparation of vegetable preserves (ketchup, pickle).
7. Preparation of fruit preserves (jam, jelly, squash).
8. Tenderization properties of different types of meat by natural and artificial enzymes.
9. Sensory evaluation of processed foods.
10. Visiting of food processing plant.

Textbook:

1. Fellows P J (2002) Food Processing Technology. Principles and Practices, 2nd Edition, Woodland Publishing Ltd, Cambridge, England.

References:

1. Potter, N. (1998) Food Science, Fifth Edition, CBS Publication, New Delhi.
2. Ramaswamy H and Marcotte M (2009) Food Processing Principles and Applications, CRC Press.
3. Avantina Sharma (2006) Text Book of Food Science and Technology, International Book, Distributing Co, Lucknow, Utter Pradesh.
4. Sivasankar (2005) Food Processing and Preservation, Prentice hall of India Pvt Ltd, New Delhi.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1			3			
CO 2					5	
CO 3						6
CO 4				4		
CO 5		2				

Mean = 4

FSN 2513 /2535 Food Service Management (5hrs/wk) (5cr)

This course gives a comprehensive understanding of the basic principles of management in food service units. It helps to accept responsibilities in catering establishment and hospitals and paves a way for becoming a conscientious caterer and food service administrator. The major aim is to develop skills in setting up food service units.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Discuss about the scope of food service management principles and functions.
ii. Explain the functions of personnel management organization
iii. Compare the electrical and non-electrical equipment's in food service establishment.
iv. Analyse the cost account methods and its importance.
v. Evaluate kind of kitchen layout.

Unit 1: Food Service Establishment (18 hours)

Definition of Food Management – Characteristic of Food Service Institution – Types of Food Service Establishment – Principles of Management – Tools of Management and Functions of Management.

Unit 2: Personnel Management (15 hours)

Recruitment, Selection, Induction, Training and Supervision of Personnel, Labour Policies and Legislation

Unit 3: Food Services and Equipment (12 hours)

Types of Food Service, Styles of Service, Formal and Informal. Equipments, Classification, Selection, Maintenance and Care of equipment

Unit 4: Financial Management (15 hours)

Cost account and keeping, Inventory maintenance of Account Books, Balance Sheets, Food Costing.

Unit 5: Institutional kitchen and Sanitation (15 hours)

Types of Kitchen, Layout of Kitchen, Kitchen Design plan and Work Simplification

Textbook:

1. Mohini Sethi and Surjet Malhan, (1987). Catering Management, "An Integrated Approach. Wiley Eastern Ltd.

References:

1. Nathaniel, R. S. (1991) Catering Management for Hotel Restaurants and Institute, Surjeet Pub. Delhi 110 007.
2. P.N. Reddy, S.S. Gulshan. Principles of Business Organization and Management. Eurasia Publishing House, Ramnagar New Delhi.
3. West. B.B. Wood L., Harger, V.F. (1977) Food Service Institutions, JohnWiley and sons, Inc., NewYork, V Ed.
4. West. B.B. Wood L., Harger, V.F. (1977) Food Service Institutions, JohnWiley and sons, Inc.
5. NewYork, V Ed. 2. Shukla. M.C. (1982) Business Organization and Management S. Chand and Co., Ltd., Ramnagar, New Delhi.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4	5	
CO 2		2			5	
CO 3				4		
CO 4		2		4		
CO 5	1				5	

Mean = 3. 4

FSN 2403 / 2433 Human Development (5hrs/wk) (4cr)

This course helps the students to understand human development (both normal and exceptional) to guide effectively. They have complete knowledge about the behaviour pattern of the individual and various factors influencing them.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Outline the principles of development from conception to birth.
ii. Compare the development pattern of infancy and early childhood during life cycle.
iii. Critique the growth and development changes between childhood and adolescence.
iv. Explain the importance of childhood care, guidance and counselling.
v. Discuss the methods of disciplining children and their effects.

Unit 1: Concept of Growth & Development (12 hours)

Definition, Principles and Factors influencing growth and development. Pregnancy - Symptoms, discomforts and complications. Prenatal stage - Period gestation, Period of embryo, Period of fetus. Birth process and Types of birth

Unit 2: Development Stages (Infancy- Early childhood) (18 hours)

Infancy - Neonate and Partunate, Physical and motor, Cognitive emotional, Language and Social development. Care of an Infant - Breast feeding and Artificial feeding, Weaning and Supplementary feeding. Common ailments and Treatments - Immunization schedule

Early childhood - Physical and Motor, Cognitive, Language, Social and Emotional development. Importance of Preschool education, Play, Methods and Theories.

Unit 3: **Development Stages (Childhood to Adolescence) (15 hours)**

Middle Childhood and late childhood (6 - 12 years) - Physical and Motor, Cognitive, Language, Moral, Social and Emotional development.

Adolescence (12 – 20 years) - Physical and Motor Development, Cognitive, Social, Juvenile Delinquency and Emotional development

Unit 4: Childhood Care (16 hours)

Children with Special needs - a brief study - Physically impaired (Orthopedic, Visual, Hearing, Speech) Mental retardation, Gifted and Juvenile Delinquency.

Unit 5: Parental styles (14 hours)

Different methods of Disciplining children and their effects - Learning theories - Intellectual theories - Psycho-social Theories - Personality theories - Moral theories - Implications of theories

Textbook:

1. Suriakanthi.A (1991) Child Development, 2nd edition, Kavitha publications, Chennai. (Unit I,III,V)

References:

1. Papalia, D.E and Olds, S.W. (2005) Human Development, Tata Mc.Graw Hill Company, New York.
2. Suriakanthi,A (1992) A Handbook on Human Development, Gandhigram Rural University, Gandhi gram, Dindigul.
3. Parikh S, and Sudarshan R (1993) Human Development and Structural Adjustment, UNPP, Delhi.
4. Mussen et al (1990) Child Development and personality, Harper and Row publishers, New York.
5. Devadass R. and P, Jaya N (1996) A Text Book on Child Development, Macmillan Indian Ltd., Delhi. (Unit II, IV)

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2		2			5	
CO 3		2		4	5	
CO 4		2		4		
CO 5		2		4	5	

Mean = 3. 41

FSN 2510 Therapeutic Nutrition - I (5hrs/wk) (5cr)

The prime objective of this course is to provide an exposure on the study of aetiology, symptoms and medical nutrition therapy in various diseases. They easily learn the method to plan and prepare diet for various diseases.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Plan and prepare standardized hospital diet for the needed patients.
ii. Select specific foods for management for obesity and underweight.
iii. Apply nutrition principles to health promotion and the prevention of gastrointestinal diseases.
iv. Compare the food exchange list in the control of diabetes and complications
v. Identify the relationship between diet and cardiovascular disease.

Unit 1: Therapeutic diets (14 hours)

Definition - Introduction - Types - Routine hospital diet - Clear fluid, full - Liquid and soft diets, Pre and Post-operative diet. Regular normal diet. Special feeding methods - Tube feeding - Types of food - Food requirements - Parental feeding. TPN formula for children, Adolescents

Unit 2: Diet in Obesity & Underweight (12 hours)

Aetiology, Symptoms, Medical Nutrition Therapy for Obesity and Underweight

Unit 3: Diet in Febrile condition & Gastrointestinal Diseases (15 hours)

Fever- Definition, Types, Metabolic changes and Dietary modifications.
GI disorders - Aetiology, Symptoms and Medical nutrition therapy for Peptic ulcer, Constipation, Diarrhoea

Unit 4: Diet in Diabetes Mellitus (16 hours)

Types, Aetiology, Symptoms, Factors affecting normal blood sugar level, Diagnosis, Dietary modifications, Food exchange system, Glycaemic Index, Glycaemic load, Complications of Diabetes

Unit 5: Diet in Cardiovascular Diseases (18 hours)

Aetiology, Symptoms, Risk factors - Atherosclerosis and Hypercholesterolemia.
Hypertension – Aetiology, Symptoms, Medical nutrition therapy

Textbook:

1. Srilakshmi, B. (2018). Dietetics, New Age International Publishers, New Delhi

References:

1. Sharon,M. (1994) Complete Nutrition, Avery publishing group. New York.
2. Garrrow J.S, James W. P.T. and Ralph A, (2000) Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London
3. Robinson C.H, Lawler M.R, Cheweth W.L and Gaswick A.E (1990) Normal and Therapeutic Nutrition, Seventeenth Edition, Mac Milan Publishers. New York.
4. Bamji M.S. and Vinodini Reddy (1998) Text Book of Human Nutrition, ford and IBH Publishing Co. Ltd New Delhi.
5. Mohan K. L. and Krause M.V (2002), 2nd edition Food, Nutrition and Diet Therapy, W.S. Suders Co, Philadelphia.
6. Antia P. (2001) Clinical Dietetics and Nutrition, 4th edition, Oxford University Press.
7. Guthrie H. A, Picciano M. F (1995), Human Nutrition, Mosby, St. Louis Missionery.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2				4	5	6
CO 3		2		4		
CO 4			3		5	
CO 5		1			5	

Mean = 3. 72

FSN 2412 Lab in Therapeutic Nutrition- I (4hrs/wk.) (4cr)

Course Outcomes

Upon completion of this course, the student will be able to:

i. Assess knowledge in the method to plan and prepare diet for various diseases.
ii. Identify about the principles of meal planning, diet therapy, therapeutic diets and nutrition support.
iii. Create skill development in planning therapeutic diets using food exchange lists.
iv. Evaluate the concept of food groups and exchanges for planning and preparing a balanced diet for various age groups and physiological conditions
v. Make appropriate dietary modifications for various disease conditions based on the path physiology.

Laboratory Experiments

1. Planning of routine hospital diet: Clear fluid diet, Full fluid diet, Soft diet,
2. Planning of diet in Underweight & Obesity: High calorie and low-calorie diet, High residue and low residue diet.
3. Planning of diet in Gastrointestinal diseases: Peptic ulcer, ORS
4. Planning of diet in Diabetes Mellitus
5. Planning of diet in Cardiovascular Disease & Hypertension: Low sodium diet

Textbook:

1. Gibney M.J, Elia, M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science Publishing Co. USA.

References:

1. Robinson C.H and Winely E.S, (1984) Basic Nutrition and Diet Therapy 5th ed, Macmillian Pub. Co. New York.
2. Swaminathan, M (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing Company. Bangalore.
3. Bhala S.M.L, Bhatia N, Gopinath (1983). Diet Manual for heart patient, CTC, AHMS, New Delhi.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1	1			4		
CO 2	1			4		
CO 3						6
CO 4					5	6
CO 5		2				6

Mean = 3. 88

FSN 2514 /2534 Food Preservation (5hrs/Wk) (5cr)

This course equips the students to study the basics of various food preservation technologies and the criteria's need to be taken for appropriate processing of foods. This course helps the students to contribute proper utilization of food free from contamination, increased shelf life with prevention of wastage.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Design and develop the unit operations required to produce a given food product.
ii. Classify the various types of food spoilage and prevent using suitable processing methods.
iii. Outline the principles and concepts of processing techniques and its effects on product quality.
iv. Evaluate the novel technologies in food preservation.
v. Utilize the possible, recent preservation methods in the food processing sector.

Unit 1: Introduction to Food Preservation (10 hours)

Definition and Scope of Food preservation Technology, Principles of food preservation, Perishable, Non-perishable food, Causes of food spoilage: Microbial, Physical, Chemical & Miscellaneous.

Unit 2: Food preservation by Low temperature (16 hours)

Introduction to Refrigeration, Cold storage and Freezing, Principle of freezing, Freezing curve, Changes occurring during freezing, Types of freezing - Slow freezing, Quick freezing. Introduction to thawing, Changes during thawing and its effect on food.

Unit 3: Food preservation by High temperature (15 hours)

Thermal processing of foods: Cooking, Blanching, Pasteurization and Sterilization of foods, Canning, Bottling and Spoilages in canned foods.

Unit 4: Food preservation by Drying and Dehydration (18 hours)

Definition of Drying and Dehydration, Drying curve and Factors affecting rate of drying, Different methods of drying and Driers used in Food industry. Evaporation - Definition, Factors affecting evaporation and Evaporators used in Food industry,

Unit 5: Food preservation by Irradiation and Preservatives (16 hours)

Definition, Methods of Irradiation, Uses and Safety aspects of radiation in food processing. Presentation of foods by Preservatives: Types, Advantages and disadvantages, Recent methods in food preservation.

Textbook:

1. Sivasankar, B. (2013) Food Processing and preservation, 2nd edition, Prentice Hall, Pvt, Ltd.

References:

1. Manoranjan Kalia (2014) Food Quality Management Second Edition, Aggrotech Publishing Academy, Udaipur.
2. Walter A. Mercer, (1988) Advances in Food Research First Edition, Academic Press,University of California, U.S.A.
3. Brennan JG and Grandison AS (2012) Food processing handbook. 2nd Edition, John Wiley.
4. Potter N (1995) Food Technology, 5th Edition, Cornell University, Ithaca, New York.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1						6
CO 2		2				
CO 3		2				
CO 4					5	
CO 5			3			

Mean = 3.6

FSN 2536 Food Packaging (5hrs/wk) (5cr)

This course deals with the functions of packaging along with the influence of various factors on food and different packaging materials like cans, bottles, flexible films etc. and helps to study about the various methods of packaging to improve the shelf life of the products. This course especially emphasizes on the equipment used for packaging and applications during transportation.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Discuss the characteristics and function of materials used in food packaging.
ii. Identify different types of packaging materials suitable for food products.
iii. Explain about the standard method used for marketing of developed food products
iv. Apply various method of food packaging in order to increase the shelf life.
v. Use eco-friendly food packaging material

Unit 1: Food Packaging (12 hours)

Introduction to food packaging: Packaging Terminology – Definition, Functions of food packaging, Packaging environment, Characteristics of food stuff that influences packaging selection

Unit 2: Packaging Material and their properties (18 hours)

Glass, Paper and Paper board, Corrugated fibre board (CFB), Metal containers: Tin Plate and Aluminium, Composite containers, Collapsible tubes, Plastic Films, Laminations, Metalized films, Co extruded films, Testing of packaging material

Unit 3: Packaging Systems and methods (18 hours)

Vacuum Packaging, Controlled Atmospheric Packaging, Modified Atmospheric Packaging, Aseptic Packaging, Retort processing, Microwave packaging, Active Packaging, Intelligent Packaging, Edible Packaging, Shrink and Stretch Packaging

Unit 4: Packaging of finished goods (12 hours)

Weighing, Filling, Scaling, Wrapping, Cartooning, Labelling, Marking and Trapping. Labelling: Standards, Purpose, Description - Types of labels, Labelling regulation barcode, Nutrition labelling, Health claims, Mandatory labelling provision

Unit 5: Hazards of packaging material (15 hours)

Packaging specifications, Shelf life of packed foods, Convenience and hazards of packaging materials, Moisture sorption properties of foods and selection of packaging materials, Interaction between packaging and foods

Textbook:

1. Stainley Sacharous. Roger C Griffin (1972) Principles of Food Packaging, 2nd Edition AVI Publishers Co. Westport.

References:

1. NIIR Board (2004) Food Packaging Technology Handbook National Institute of Industrial Research, New Delhi.
2. Frank A. Paine and Heather Y.Paine (1983) A Hand Book of Food Packaging, Leonard Hill Publications (Blackie and sons).

3. O.G.Pirenger and A.L.Baver (2000) Plastic Packaging Materials for Food, Wiley VCH, GmbH, Germany.
4. Shirly V. Vangrade and Morgy Woodburn, Food Preservation and Safety Surabhi Publications, Jaipur India.
5. Vijaya Khader (2001) Text book of Food Science and Technology, Indian Council of Agricultural Research, New Delhi.
6. Sacharows.S. (1976) Handbook of packaging materials, AVI Publishers Co., Westport.
7. F.A. and Paine. H.Y. Leonard Hill (1987) A hand book of Food Packaging. Blackie Sons Ltd., London.

Bloom's Taxonomy	**K1 Remembering**	**K2 Understanding**	**K3 Applying**	**K4 Analyzing**	**K5 Evaluating**	**K6 Creating**
CO 1		2		4		
CO 2				4	5	
CO 3		2		4		
CO 4		2				
CO 5		2			5	

Mean = 3. 33

FSN 2404/2414 Functional Foods and Nutraceuticals (5hrs/wk) (4cr)

This course gives comprehensive understanding of different nutraceuticals and functional foods and students will understand the potential of various functional foods in promoting human health.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Analyze the physiological and functional basis of various phytochemical compounds of natural as well as synthetic compounds
ii. Compare functional food and nutraceuticals in plant sources to evaluate the potential health benefits of plant based bioactive components
iii. Assess probiotics, prebiotics and symbiotic and to evaluate the potential health benefits.
iv. Explain the regulatory issues related to nutraceuticals and functional foods.
v. Evaluate the Consumer acceptability and marketing of potentially available functional food products

Unit1: Introduction (12 hours)

History, Functional foods and nutraceuticals definitions, difference between functional foods and nutraceuticals, Categorization of functional foods and nutraceuticals. status of nutraceuticals and functional foods.

Unit 2: Functional Foods and Nutraceuticals of Plant Origin (17 hours)

Sources – Bio active compounds – Potential Health benefits (Allyl sulphur, Lycopene, Limonene, Carotenoids, Caffeine, Flavonoids, Kaempferol, Quercetin, Beta-glucan, Tannins, Resveratrol, Xylitol)

Unit 3: Functional Foods and Nutraceuticals of Animal Origin (15 hours)

Sources – Bio active compounds (Omega 3 & Omega 6 fatty acids) – Potential Health benefits.

Omega 3 fatty acids – ALA, DHA, EPA.

Omega 6 fatty acids – LA, ARA, GLA, CLA.

Unit 4: Functional Foods and Nutraceuticals of Microbial Origin (15 hours)

Prebiotics – Definition, Types, Sources, Mechanism, Advantages and side-effects.

Probiotics –Definition, Common types, mode of action, Advantages and side-effects.

Synbiotics -Definition,role in disease prevention – health promotion.

Unit 5: Legal Aspects (15 hours)

Safety, Consumer acceptance and assessment of health claims, Labelling, Consumer acceptability and marketing - Regulatory issues related to nutraceuticals and functional foods(FOSHU, DSHEA, FDA)

Textbook:

1. Wildman REC (2001) Handbook of Nutraceutical and Functional Foods, CRC Press, USA.

References:

1. Ghosh D et al, (2012) Innovations in Healthy and Functional Foods, CRC Press, USA.
2. Pathak YV (2011) Handbook of nutraceuticals Volume 2, CRC Press, USA.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2		2			5	
CO 3		2		4		
CO 4		2		4		
CO 5				4	5	

Mean = 3. 4

FSN 3615 Therapeutic Nutrition – II (6 hrs/wk) (6cr)

This course imparts knowledge in the field of clinical nutrition to make appropriate dietary modifications for various disease conditions based on the pathophysiology. They develop capacity and aptitude in taking up dietetics as a profession by understanding the consequences of nutritional problems in the society to create awareness on community nutrition-based programmes.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Discuss the role of dietitians and their responsibilities
ii. Formulate the therapeutic diet based on disease condition
iii. Evaluate the nutritive adequacy of a diet and prescribed nutrient and energy levels.
iv. Explain disease states and types of diet prescribed for each.
v. Identify and define medical terminology.

Unit 1:The Dietitian (14 hours)

Introduction- Classification - Code of Ethics - Responsibilities - Diet Counselling – Need and importance.

Unit 2: Diet in Liver and gall bladder (22 hours)

Hepatitis, Liver Cirrhosis, Cholelithiasis - Aetiology - Symptoms - Dietary Management.

Unit 3: Diet in Gout and Special conditions (20 hours)

Diet in Gout: Aetiology - Symptoms –Medical Nutritional Therapy

Diet in special conditions: Trauma, Burns

Unit 4: Diet in kidney disease (20 hours)

Nephritis, Nephrosis, Acute renal failure, Chronic renal failure - Aetiology - Symptoms - Dietary Management.

Kidney Stones – Types, Aetiology, Prevention - Dietary Modification.

Unit 5: Diet in Cancer and AIDS (14 hours)

Diet in Cancer: Types, Stages, Aetiology - Symptoms - Medical Nutritional Therapy

AIDS: Aetiology - Symptoms - Dietary Management

Textbook:

1. Srilakshmi B. (2018) Dietetics, New Age International (P) Ltd, Publishers.

References:

1. Robinson C.H, *et al.,* (1990) Normal and Therapeutic Nutrition, Seventeenth Edition, Mac Milan Publishers.USA.(Unit III)
2. Bamji M.S. and Vinodini Reddy (1998) Text Book of Human Nutrition, Ford and IBH Publishing Co. Ltd New Delhi.

3. Garrrow J.S James W. P.T. and Ralph A (2000) Human Nutrition and Dietetics, 10th edition, Churchill Livingston, London.
4. Guthrie H. A, Picciano M. F (1995) Human Nutrition, St. Louis, MO: Mosby-Year Book.
5. Mohan K. L. and Krause M.V (2002) Food, Nutrition and Diet Therapy, 2nd edition W.S. Suders Co, Philadelphia.
6. Sharon,M (1994), Complete Nutrition, Avery publishing group, New York.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1	1	2		4	5	
CO 2		2			5	6
CO 3		2	3	4		6
CO 4		2	3	4	5	6
CO 5		2	3	4	5	6

Mean = 3.61

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FSN 3517 **Lab in Therapeutic Nutrition–II** **(5hrs/wk)(5cr)**

Course Outcomes

Upon completion of this course, the student will be able to:

i. Demonstrate in the method to plan and prepare diet for various diseases.
ii. Design the principles of meal planning, diet therapy, therapeutic diets and nutrition support.
iii. Create skill development in planning therapeutic diets using food exchange lists.
iv. Evaluate the concept of food groups and exchanges for planning and preparing a balanced diet for various age groups and physiological conditions.
v. Make appropriate dietary modifications for various disease conditions based on the pathophysiology.

Planning and preparation of Diets for the following diseases:

1. Meal planning for Liver disease -Hepatitis,Cirrhosis
2. Meal planning for Gout
3. Meal planning, Trauma and Burns
4. Meal planning for kidney disease - Nephrosis,Nephritis, ARF & CRF
5. Meal planning for Cancer and AIDS.

Textbook:

1. Anita F. P. (2002) Clinical Dietetics and Nutrition, FourthEdition, Oxford University Press,Delhi.

References:

1. Anderson, L *et al.*, Nutrition in Health and Disease, Seventh edition, J.B. Lipincott & Co. Philadelphia.
2. Joshi, S. A (1998) Nutrition and Dietetics, Fourth edition, Tata McGraw Hill Publications, New Delhi.
3. Raheena, B (2009) A Textbook of Food, Nutrition and Dietetics, Sterling Publishers, New Delhi.
4. Robinson.C.H.*et al.,* (1986) Normal and Therapeutic Nutrition, Seventh edition, Mac Milan Publishing Co.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1				4	5	
CO 2					5	6
CO 3			3	4		6
CO 4			3	4	5	6
CO 5			3	4	5	6

Mean = 4.6

FSN 3619 Food Biotechnology (6hrs/wk) (6cr)

This course helps to enable the students to understand the basic principles of biotechnology and application of the knowledge of biotechnology for the development of new food products.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Explain the methods that humans have developed to use biotechnology to produce foods and food ingredients
ii. Identify the pros and cons of the use of biotechnology to produce foods including ecological, social and economic impacts
iii. Apply the biotechnological tools and techniques
iv. Assess the importance of various fermentation methods to design various fermented foods and food products
v. Apply the knowledge and synthesize new solutions and ways of thinking in food industries

Unit 1: Introduction to Biotechnology (16 hours)

Definition, Scope of Biotechnology, Concept of Genetic engineering, Genetically Modified Foods-Definition, examples of GM foods, advantages, disadvantages and Safety aspects of foods produced by genetic engineering, Application of genetic engineering in food biotechnology.

Unit 2: Food fermentation (16 hours)

Concept of microbial fermentation; Fermentation process: Dual and multiple fermentation, continuous fermentation and batch fermentation; Factors controlling fermentation.

Unit 3: Fermented Food products (18 hours)

Beer, Wine, Vinegar, Sauerkraut, Tempeh, Soya sauce, Cheese and Bread preparation

Unit 4: Enzymes in food processing industries (18 hours)

Principles of enzyme immobilization: Types of immobilization techniques and their importance; Immobilized enzymes in food processing.

Unit 5: Biotechnology for Food Production (22 hours)

History, Developments, Current status of transgenic crops - Crop improvement and enhanced agronomic performance - Food products with enhanced shelf-life, Processing and functional quality-Nutritional enhancement - Macro and Micro-nutrients.

Textbook:

1. Satyanarayana, U, (2007). Biotechnology, Books and Allied (P) Ltd., Kolkata.

References:

1. Owen Pward (1989) Fermentation Biotechnology Principles, Processes and Products, Prentice H NewJersey.
2. Dubey, R.C (2001) Text Book of Biotechnology, S.Chand and Co. Ltd, NewDelhi.
3. Frazier and West Hoff (1996) Food Microbiology, Tata McGrawHill Publishing Company Ltd, NewDelhi.
4. Israel Goldberg (2001) Functional foods, Pharma foods and Nutraceuticals, Culinary and hospitality Industry PublicationServices.
5. Robert Easy Wildman (2001) Handbook of Nutraceuticals and functional foods, Culinary and Hospitality Industry Publication Services.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1				4		
CO 2				4		
CO 3					5	
CO 4					5	
CO 5						6

Mean = 4.8

FSN 3621 Bakery and Confectionery (6hrs/wk)(6cr)

This course provides the opportunity for the students to study and understand the fundamentals of baking and learn the technologies behind bakery products. And also learn the current status, growth rate, economic importance of baking and confectionery in India.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Discuss the current status, growth rate, and economic importance of Bakery Industry in India.
ii. Explain different types of bakery and confectionery products and its quality characteristics, faults and corrective measures.
iii. Identify the basic ingredients to prepare bakery and confectionery products.
iv. Assess various methods in the preparation of modified bakeryproducts.
v. Choose the appropriate bakery equipment based on the specific needs.

Unit-I Baking Industry (10 hours)

Baking industry and its scope in the Indian economy. History of Bakery- present trends, Bakery terms. Nutrition facts of bakery products, Standards and regulations.

Unit 2: Bakery Products (20 hours)

Ingredients and processes - Breads, Biscuits, Cookies, Crackers, Cakes, Pastries, Doughnuts, Rusks and Other baked products. Staling and losses in baking.

Unit 3: Confectionary Products (20 hours): Characteristics and processing of raw material, Technology of manufacturing of Hard-boiled candies, Toffees, Fruit drops, Chocolates and other confectioneries: Ingredients, Processes, Product quality parameters, Defects and Corrective measures.

Unit 4: Modified Bakery products and breakfast cereals (20 hours)

High fiber, low sugar, low fat and gluten free bakery products for people with special requirements. Production and quality of breakfast cereals.

Unit 5: Equipment used in Bakery and Confectionary Industry (20 hours)

Working of various equipment like Mixers, Proofing chambers, Dough dividers, Molder and Sheeter, Baking Ovens, Cooling Chamber, Sealing and Packaging machines, Rolling and Cutting machine of Bakery and Confectionary unit.

Textbook:

1. Dubey, S.C (2007) Basic Baking 5th edition. Chanakya Mudrak Pvt. Ltd. NewDelhi.

References:

1. FaridiFaubion (1997). Dough Rheology and Baked Product Texture, CBS Publications. New Delhi.
2. Samuel A. Matz (1992). Cookies & Cracker Technology, Van Nostrand Reinhold, USA.
3. Raina et.al. (2003) Basic Food Preparation-A complete Manual. 3rd edition, Orient Longman Pvt. Ltd.USA.
4. Barndt R. L. (1993) Fat & Calorie – Modified Bakery Products, Springer USA.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1						6
CO 2		2				
CO 3			3			
CO 4				4		
CO 5						6

Mean = 4.2

FSN 3203 Obesity Management (3hrs/wk)(2cr)

(Life Skill Course)

This course describes the health risks and problems associated with obesity. It differentiates the theories of obesity through which the students will learn the role of nutrition/diet in the treatment of obesity. The need of physical activity and exercise are also stressed in this paper. The behavioural theory also applies to weight loss.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Explain the scientific definition of obesity and various body fat distribution patterns.
ii. Discuss the interaction of environmental factors and genetic factors (the genetic factors may influence energy expenditure and efficiency as well as appetite control) in development of obesity.
iii. Use different assessment methods to identify obesity
iv. Outline the treatment goals for clinical management of obesity.
v. Evaluate the effects of fast-foods and junk-foods on health.

Unit 1: Introduction to Obesity (7 hours)

Introduction, Aetiology, Genetic factors - Age, Sex, Eating habits, Physical activity, Stress, Endocrine factors - Trauma, Prosperity and Civilisation, Physiology of obesity.

Unit 2: Theory of Obesity (5 hours)

Fat cell theory, Set point theory, Leptin. Regional distribution of adipose tissues, Metabolic changes,

Unit 3: Assessment (7 hours)

Body weight Measurement - Body mass index (BMI) - Waist circumference - Measurement of body fat. Ponderal index, waist - Hip ratio.

Unit 4: Treatment (5 hours)

Diet therapy, Principles of Dietetic Management - Glycaemic Index, Physical exercise, Stress management, Pharmaco therapy, Behaviour therapy, Weight loss surgery.

Unit 5: New trends in nutrition (6 hours)

Introduction - Health - Specific meals. Fast foods - Junk foods. Convenience foods - Types

Textbook:

1. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, NewDelhi

References:

1. Bamji, M.S, Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., NewDelhi.
2. Srilakshmi, B. (2004), Nutrition Science, New Age International Pvt. Ltd, NewDelhi.
3. Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing,USA.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2				
CO 2						6
CO 3			3			
CO 4		2				
CO 5					5	

Mean = 3.6

FSN3200 Environmental studies (4Hrs/Wk)(2Cr)

This course is designed to introduce students the importance, scope and problems in environment. It focuses on the natural resources, energy flow and types of ecosystems. Values of biodiversity, hotspots, endangered species and conservation are emphasized. It also highlights the social issues and population explosion in the environment.

Course Outcomes:

Upon successful completion of this course, student will be able to

i. Outline the values of renewable and non-renewable resources.
ii. Evaluate the concept, functions and types of ecosystems.
iii. Discuss the values of biodiversity and importance of conservation.
iv. Compare different types of pollution and assess the various waste management strategies
v. Critique the importance of sustainable development, climate change and population explosion.

Unit 1: Natural Resources (10 hours)

Ecology – Scope – Importance- Components –Awareness – Renewable resources – Forest, Water, Mineral, Food, Land and Energy resources – Renewable and Non-renewable energy – Conservation.

Unit 2: Ecosystems (13 hours)

Concepts – Structure and Function – Food chain & Web and Ecological pyramids – Energy flow in the ecosystem – Ecological niche – Ecological succession. Types of ecosystems - Forest, Grassland, Desert and aquatic ecosystems

Unit 3: Biodiversity (12 hours)

Introduction – Levels – Values of biodiversity – Global, National and local biodiversity – Hotspots – Major threats – Endangered species. Conservation of biodiversity – In situ and Ex situ conservation.

Unit 4: Environmental pollution (10 hours)

Definition – Source, Types, Effects and Control measures of Air, Water, Soil, Marine, Noise, Thermal pollution – Nuclear hazards – Solid waste management – Disaster management.

Unit 5: Social issues and population (15 hours) Sustainable Development – Water conservation - environmental ethics – Global climate change problem – Role of environmental legislation (acts). Human population growth – Population explosion – Human rights – Value education

Textbook:

1. Kaushik A and C.P.Kaushik (2014), Perspectives in Environmental Studies, 4th multicolour edition, New Age International (P) Limited Publishers.

References:

1. Bharucha E (2013), Textbook of Environmental studies for Undergraduate courses, 2nd edition, Universities press (India) PrivateLtd.
2. Thatheyus A.J (2011) Textbook of Environmental Studies, Narosa Publishing House, New Delhi.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1	1	2		4		
CO 2			3			
CO 3		2	3	4		
CO 4		2	3			
CO 5		2	3	4		

Mean = 2.75

FSN 3618 Food Safety And Quality Control (6hrs/wk)(6cr)

This course enables students to gain knowledge on food safety and food laws and study about quality control and common food standards.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Discuss on different food safety and quality aspects.
ii. Identify objectives, Importance, functions of quality control, stages of quality control.
iii. Create awareness on personal hygiene and to identify adulterants present in food
iv. Apply safety principles related to food industry.
v. Analyze basic principles of HACCP, SQF and ISO and sanitation.

Unit 1: Introduction to Food safety (20 hours)

Definition of Food Safety and Quality Control - Importance of food safety in the food processing industry Microbial contamination (including cross-contamination/indirect contamination) Chemical contamination, Physical contamination, Allergen contamination.

Unit 2: Food Safety Programs (20 hours)

Definitions and importance, Good Manufacturing Practices (GMPs), Pest Control Program, Facility Maintenance, Personal Hygiene, Supplier Control, Sanitary Design of Equipment and Infrastructure.

Unit 3: Food Adulteration (18 hours)

Adulteration of food - Common adulterants and Tests to detect common adulterants. Cereals and products - Bread, Biscuits, Cakes products. Fruits Products: Jam, Juices, Squashes, Ketchup, Sauce. Oils and Fats: Coconut oil, Groundnut oil, Palm oil, Sunflower oil, Vanaspati. Milk and Products: Skimmed milk powder, Partly skimmed milk powder, Condensed sweetened milk. Other products - Coffee, Tea, Sugar, Honey, Toffees

Unit 4: Hygiene and Sanitary Practices (16 hours)

Personal Hygiene - Health Requirements - Location and Surroundings of Food Industry - Slaughter House - Good Manufacturing Practices - Good Food Hygiene Practices - Storage.

Unit 5: National and International laws (16 hours)

FAO/WHO, FSSAI Codex Alimentarius commission, Fair average quality (FAQ) Specification for food grains, ISO 22000 series. HACCP: Background, Current status, Structured approach, Principles, Benefits and limitation. Consumer Protection Act (CPA).

Textbook:

1. Potter N and Joseph.H (1996) Food Science, CBS Publishers, New Delhi.

References:

1. Sather A.Y (1999) A first course in food analysis, New Age Publications, New Delhi.
2. M.Swaminathan (1995) Food Science, Chemistry and Experimental Foods, The Bangalore Printing & Publishing Co. Ltd, Bangalore.
3. Desrosier and Desrosier (1999) Technology of food preservation,4th edition, CBS Publishers. New Delhi.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4		
CO 2				4	5	
CO 3		2		4		
CO 4		2				
CO 5		2			5	

Mean = 3. 33

FSN 3520 **Mini Project** **(5hrs/wk)(5cr)**

This course aimed at orienting students towards research methodology and to do independent research work. The students will do experiments individually after designing them by standard statistical procedures followed by critical interpretation and drawing valid conclusions. The research project is evaluated at the end of the fourth semester.

Course Outcomes:

Upon successful completion of the project the students will be able to

i. Formulate a hypothesis to investigate on any particular issue
ii. Design a set of experiments to verify the formulate a hypothesis
iii. Compile the set of data generated by the designed experimental setup
iv. Analyze the different parameters that are studied to verify the hypothesis
v. Communicate the outcome of the analytical approach to resolve the hypothesis

FSN 3622 Health and Fitness (6hrs/wk)(6cr)

This course enables the students to learn about the terms related to health and fitness and to comprehend the interaction between fitness and nutrition.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Outline the self-responsibility for personal health and wellness.
ii. Analyse the role of nutrition in sports.
iii. Discuss the various parameters used to find health status.
iv. Evaluate the effect of exercise on various nutrient metabolisms.
v. Compare different exercise methods and learn its application.

Unit 1: Health (15 hours)

Concept of Health, Changing concepts definitions of health, Dimensions of health, Concept of wellbeing, Spectrum of health, determinants of health, Ecology of health, right to health, Responsibility for health, Indicators of health.

Unit 2: Exercise and health related fitness (18 hours)

Health related fitness, Health promotion, Physical activity for health benefits. Sports related fitness: Role of nutrition in sports, Nutrition to athletic performance.

Unit 3: Body weight and composition for health and sports (20 hours)

Ideal body weight, Values and Limitations of the BMI, Composition of the body, Diet during training, Prior to competition, During Dietary supplements after competition for sports.

Unit 4: Exercise performance (19 hours)

Energy expenditure during physical activity, Carbohydrate metabolism and performance, Fat metabolism and performance, Effect of exercise on protein requirements, Physique and sports performance.

Unit 5: Exercise programmes (18 hours)

Resistance exercise training, Aerobic exercise, Types of exercise, Effective for weight contrast, - Dieting or exercise, Weight reduction programme for young athletes.

Textbook:

1. K. Park, (1997) Test book of Preventive and Social Medicine, Fifteenth edition, MIS BanarsidasBhano Publishers,Jabalpur.

References:

2. Melvin H.Williams (2005) Nutrition for Health, fitness and Sports, Seventh edition, MC Graw Hill international Edition,USA.
3. Micheal J.et.al., (2004) Nutrition and Metabolism, Blackwell Publishing Company, Bangalore.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2	3	4		
CO 2	1	2		4		
CO 3		2	3			
CO 4			3	4		
CO 5		2	3			

Mean = 2.75

FSN 3626 Public Health Nutrition (6hrs/wk) (6cr)

The course is designed to enable the students to understand the importance of nutrition in national progress and the significance of assessment of nutritional status. The course also aims to recognize the solutions to overcome problems of malnutrition in the community and the role of national and international agencies in this area. Discuss the unifying concepts of public health nutrition, particularly with relevance to health promotion and disease prevention efforts, and the most current and controversial issues in the field.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Identify suitable methods for resolve nutrition related problems in community.
ii. Evaluate nutritional status of the community.
iii. Analyze maternal and child health care programs.
iv. Assess immunization and its effective actions.
v. Outline the various agencies in uplifting the nutritional status and their roles.

Unit 1: Health and Nutrition Education (16 hours)

Components and Principles of Health Education, Methodology - Individual, Group and Mass methods, Aids used for health and nutrition education, Steps in planning of Community nutrition program

Unit 2: Methods of Assessing Nutritional status (22 hours)

Sampling techniques, Identifications of risk groups, Direct assessment- Anthropometric, Clinical and Biochemical estimation, Indirect assessment - Diet surveys, Food balance sheet, Ecological parameters and Vital statistics.

Unit 3: Improvement of Nutrition of a Community (20 hours)

Primary health care system with special reference to maternal & child health care through Balwadies, Anganwadies, Crèche and Janani Shishu Suraksha Karyakaram (JSSK), Janani Suraksha Yojana (JSY), Indian Newborn Action plan.
Methods to improve nutritional quality of food - Fortification and nutrient supplementations.

Unit 4: Immunization (18 hours)

Immunization and its importance, Classification, specific and non-specific immunity- Immunoglobulin, Cellular and hormonal, immune response, Immunization active and passive immunization schedule, Immunizing agents, Hazards of immunization.

Unit 5: Regional, National and International agencies in uplifting the nutritional status

Objectives, functions and responsibilities- WHO, UNICEF, CARE, ICMR. Various nutrition related welfare programmes, ICDS, TINP, MDM, SNP,WNP, ANP, BNP NNAPP, NGCP, RGSEAG.

Textbook:

1. Bamji, M.S, Rao, N.P and Reddy, V. (2003), Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

References:

1. Dandiya, P.C, and Zafer, Z.Y.(2003) Health education and community pharmacy, Vallabh Prakashan Printers, New Delhi.
2. Gibney, M.J, Margetts, B.M, Kearney, J.M and Arab, L. (2005). Public Health Nutrition, Blackwell Publishing, USA.
3. Park. K, (2005) Park's Textbook of Preventive and Social Medicine, 18th edition, Banarsidas Bhanot Publishers, Jabalpur.
4. Srilakshmi, B. (2004) Nutrition Science, New Age International Pvt. Ltd, New Delhi
5. Ramachandran, L. and Dharmalingam, T. (2005) Health Education, Vikas Publishing House Pvt. Ltd., New Delhi.
6. Khader, V. (2003) Foods,Nutrition and Health, Kalyani Publishers, New Delhi.
7. Reddy, R.S. (1998) Nutrition Education, Commonwealth Publishers, New Delhi.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1		2		4	5	
CO 2		2	3		5	6
CO 3		2	3	4		6
CO 4		2	3	4	5	
CO 5		2		4	5	

Mean = 4.27

FSN 3206 Sports Nutrition (3hrs/wk) (2cr)

This course provides the Learners a complete knowledge to understand the Science of Exercise that will have an improved physiological understanding of how your body responds to exercise. It will give you the knowledge and skills you need in order to achieve your sports nutrition and athletic performance goals.

Course Outcomes

Upon completion of this course, the student will be able to:

i. Explain the body's adaptation to exercise and understand the physiology of exercise.
ii. Compile the importance of nutrition and its impact on sport performance.
iii. Critique the physical activity and its importance in athlete's diet.
iv. Outline the effect of Ergogenic aids, nutaceuticals and herbal diuretics in sports nutrition.
v. Comprehensive understanding of how hydration status effects performance and exact recommended requirement of fluid pre, during, and post-exercise.

Unit 1: Introduction to Exercise (7 hours)

Definition – Types of Exercise - Physiology of Exercise - Fuels for Exercise - Acute Adaptations to Exercise (Cardiovascular Responses, Pulmonary System Adaptations, Hormonal Responses to Exercise, Immunological Adjustments)

Unit 2: Introduction to Sports Nutrition (5 hours)

Definition and scope of Sports Nutrition - Diet and Performance - Importance of Sports Nutrition

Unit 3: Physical activity (7hours)

Measuring Physical activity - Types of Competition/ event/ sport - Athletics - Track & Field - Team Sports - Individual Sports

Unit 4: Ergogenic Aids (5hours)

Definition, Benefits & Side effects- Anti doping agency - list of banned drugs/substances - Nutritional Ergogenic Aids

Unit 5: Dehydration & Performance (6 hours)

Proper Pre-Hydration, Rehydration / fluid replacement - Electrolytes - Role of electrolytes in Muscular contraction- Electrolyte loss & exercise - Maintaining / Restoring electrolyte Balance - Sports &Energy drinks

Textbook:

1. Richard B. Kreider, 2019. Essentials of Exercise & Sport Nutrition: Science to Practice Kindle Edition.Lulu publishing services.

References:

2. Heather Mangieri ,2017. Fueling Young Athletes, Versa Press, United states of America.
3. O'Halloran, P and Bhogal, G (Eds). Exercise Medicine for Students: A one-stop resource for the knowledge and promotion of physical activity.

Bloom's Taxonomy	K1 Remembering	K2 Understanding	K3 Applying	K4 Analyzing	K5 Evaluating	K6 Creating
CO 1	1	2	3			
CO2	1	2	3			
CO 3		2	3		5	
CO 4		2	3		5	
CO 5		2			5	

Mean = 3.0