NEHRU ARTS AND SCIENCE COLLEGE
(An Autonomous Institution affiliated to Bharathiar University)
(Reaccredited with "A" Grade by NAAC, ISO 9001:2015 & 14001:2004 Certified
Recognized by UGC with 2(f) &12(B), Under Star College Scheme by DBT, Govt. of India)
Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105, Tamil Nadu.

Curriculum and Syllabus

M.Sc. Food Science and Nutrition

(2021-22)

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Scheme of Examination M.Sc. Food Science and Nutrition
(Applicable to the students admitted during the year 2021-2022 and onwards)

Semester	Sub. Code	Name of the Subject	Instruction hours / week	Duration of Examination	Examination Marks			Credits
					CIA	ESE	Total	
I	21PGFNC101	Paper-I Advanced Food Science	5	3	50	50	100	4
	21PGFNC102	Paper – II Nutrition Through Life Cycle	5	3	50	50	100	4
	21PGFNC103	Paper- III Nutritional Biochemistry	5	3	50	50	100	4
	21PGFNC104	Paper –IV Nutrition in Disease –I	5	3	50	50	100	4
	21PGFNE101/ 21PGFNE102/ 21PGFNE103	Elective Paper -I	4	3	50	50	100	4
	21PGFNQ101	Practical -I Food Analysis Practical	6	3	50	50	100	4
		Sub total	**30**				**600**	**24**
II	21PGFNC205	Paper –V Food Processing and preservation Techniques	5	3	50	50	100	4
	21PGFNC206	Paper – VI Macronutrients	5	3	50	50	100	4
	21PGFNC207	Paper – VII Physiological Aspects of Nutrition	5	3	50	50	100	4
	21PGFNC208	Paper-VIII Nutrition in Disease-II	5	3	50	50	100	4
	-	Online course	-	-	-	-	-	-
	21PGFNE201/ 21PGFNE 202/ 21PGFNE 203	Elective Paper - II	4	3	50	50	100	4
	21PGFNQ202	Practical –II Food Processing and Preservation Techniques	6	3	50	50	100	4
	30 days internship training in food processing industry /multispecialty hospital is compulsory							
		Sub total	**30**				**600**	**24**

III	21PGFNC309	Paper – IX Micronutrients	5	3	50	50	100	4
	21PGFNC310	Paper – X Research Methodology and Statistics	5	3	50	50	100	4
	21PGFNC311	Paper – XI Nutraceuticals and Functional Foods	5	3	50	50	100	4
	21PGFNQ303	Practical-III Dietetics	6	3	50	50	100	4
	21PGFNE301/ 21PGFNE302/ 21PGFNE303	Elective Paper -III	4	3	50	50	100	4
	21PGFNT301	Internship	-	-	-	-	50	2
	21PGFNV401	Project Work & Viva voce	5	-	-	-	-	-
	21PGFNONLC	Online course	-	3	-	-	100	4
		Sub total	**30**				**650**	**26**
IV	21PGFNC412	Paper – XII Community Nutrition	5	3	50	50	100	4
	21PGFNC413	Paper – XIII Food Microbiology	5	3	50	50	100	4
	21PGFNV401	Project Work & Viva voce	16	-	80	120	200	8
	21PGFNY401/ 21PGFNY402/ 21PGFNE403	Elective Paper -IV	4	3	50	50	100	4
		Sub total	**30**				**500**	**20**
						Total	**2350**	**94**

List of Elective Papers

Paper/Sem	Group A	Group B	Group C
Elective Paper I/Sem I	Convenience Foods (21PGFNE101)	Institutional Food Management (21PGFNE102)	Food Commodities (21PGFNE103)
Elective Paper II/Sem II	Food Packaging (21PGFNE201)	Food Production and Agriculture (21PGFNE202)	Instrumentation in Food Processing (21PGFNE203)
Elective Paper III/Sem III	Food Quality, Safety and Analysis (21PGFNE301)	Culinary Techniques (21PGFNE302)	Food Product Development and Marketing (21PGFNE303)
Elective Paper IV/Sem IV	Food Quality Control Practical (21PGFNY401)	Food Service Management Practical (21PGFNY402)	Food Industrial Waste Management (21PGFNE403)

List of Advanced Level Courses

S. No.	Course Code	Name of the Course
1	21PGFNSS01	Food toxicology
2	21PGFNSS02	Bakery and Confectionery
3	21PGFNSS03	Food Quality Management
4	21PGFNSS04	Entrepreneurship in food processing

Guidelines for Online Learning courses through SWAYAM

** Students should register for online courses during November- December (Beginning of second semester) and shall continue the course. They should complete their Examination and submit their certificate before September (Before they appear for ESE of Third Semester).

** There shall be a coordinator in each department to ensure the registration and submission of certificates to the office of CoE.

** A credit weightage of 4 is given to the online course (Core paper) which is mandatory and total credits will be 94.

** The department shall select the course with a credit weightage of 4.

** Ensure that the same course is not available as other core papers.

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Nehru Arts and Science College

Course Code	Title		
21PGFNC101	Paper I – Advanced Food Science		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To

1. Learn about different food groups and its nutritional compositions
2. Gain knowledge on changes in the processing of foods

Course Outcome

CO 1	Recall the physical and chemical properties of food
CO 2	Describe the structure and composition of cereals
CO 3	Apply appropriate processing methods for food groups
CO 4	Examine the processing changes in vegetables and meat
CO 5	Analyze the thermal changes in sugar, spices and condiments

Offered by **Food Science and Nutrition**

Course Content **Instructional Hours / week: 5**

Unit	Description	Text books	Chapter
I	**Properties of Foods**: Physical properties -Chemical bonds in foods, chemical reactions in foods - Enzymatic reaction and non enzymatic reaction. **Food Colloids** - Structure, formation, mechanisms, stabilization, factors affecting stabilization.	1	11
	Instructional Hours	**15**	
II	**Cereal**: Structure, composition of seed parts, storage of grains. **Wheat:** Structure, composition, nutritive value, Wheat flour-types, functionality of components, baking qualities, Gluten formation, manufacture of bread, cakes, cookies, pastries, changes during baking **Rice:** Structure, nutritive value and composition Cereal cookery. **Millets**: Products, composition, structure and nutritive value.	1 & 2	15, 16 & 2
	Instructional Hours	**15**	
III	**Pulses**: Composition, nutritive value, methods of processing, vegetable protein mixes protein, natural toxicants and pulse cookery. **Nuts and oilseeds:** Composition, nutritive value, nutritious food mixes from oil seeds. **Fats and oil**: Sources, nutritional composition, functions, physical and chemical properties, Rancidity - types and prevention, role of fat / oil in food preparations.	1 & 2	17&3 4 &10
	Instructional Hours	**15**	
IV	**Fruits and Vegetables:** Classification, selection, storage, composition, structure, texture, pigments, browning reaction, pectic substances, ripening of fruits, changes on cooking and processing. **Milk and milk products:** Composition, processing, heat changes, types of milk, milk beverages, fermented dairy products, storage **Meat, poultry and Egg:** Structure and composition, types of meat	1 & 2	14 &8

	and poultry, post mortem changes, grading, cooking changes, curing, ageing, smoking and storage		
	Instructional Hours		**15**
V	**Sugars and related products:** Sources, uses, reactions of sugar and sugar related products, Crystalline and non-crystalline candies. **Confectionary:** Ingredients, sugar boiled chocolates and Indian confectionary. **Beverages:** Fruit based and milk based, types and classification, composition. **Spices and Condiments:** Composition, common spices and condiments, nutraceutical properties, aroma components, types, changes during processing and storage	1 & 2	26 & 9
	Instructional Hours		**15**
	Total instructional hours		**75**

References

Text Books:

1. Shakuntala Manay, Shadaksharaswamy. M, Foods, Facts and Principles, New Age International Pvt Ltd Publishers, Sixth Edition, 2015.
2. Srilakshmi, B, Food Science, New Age International Private Ltd., New Delhi, 7th edition, 2018
3. Potter, N. and Hotchkiss, J.H. Food Science, CBS Publications and Distributors, Daryaganji, New Delhi, 5th Edition, 1998.

Reference Books:

1. Brow, A., Understanding Food, Thomson Learning Publications, Wadsworth, 2000.
2. Mehas, K.Y. and Rodgers, S.L. Food Science and You, McMillan McGraw Company, New York, 2000.
3. Parker, R. Introduction to food Science, Delmer, Thomson Learning Co., Delma, 2000

Journals

1. International journal of food science and nutrition
2. Asian journal of agriculture and food science
3. Indian journal of agriculture research

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Activity- E-Content Development	Open book test	Total
8	8	10	8	8	8	50

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L		M						M	M	M	M	L
CO2	L		L	H					M	M	M	L	L
CO3		L	L		L			H	M	M	H	H	H
CO4	H	H	H		M			H	H	H	H	H	L
CO5	H	H	M		H	H	L	H	H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNC102	Paper II – Nutrition through Life Cycle		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To
1. Understand the role of adequate nutrition in stages of life cycle.
2. Gain knowledge on methods of assessment of the nutritional status of population groups.

Course Outcome

CO 1	Identify nutrient requirements during each stage of the life cycle
CO 2	Discuss the importance of nutrition during specific physiological stages
CO 3	Develop diet plan for different stages of the lifecycle
CO 4	Evaluate dietary intakes for individuals throughout the life cycle
CO 5	Modify diet to solve nutritional problems in different age groups

Offered by: Food Science and Nutrition

Course Content **Instructional hours/week-5**

Unit	Description	Text Books	Chapter
I	**Recommended dietary allowances and Nutrition in pregnancy:** Concept of health recommended dietary allowances for Indians, basis forrequirement, computation of allowance. ICMR - Indian recommended allowances	3	1
	Nutrition in pregnancy: Stages of gestation, maternal physiological adjustments, weight gain during pregnancy and nature of weight gain, Nutritional Requirements, physiological cost of pregnancy, complications of pregnancy and adolescent pregnancy.	1, 2	3, 5
	Instructional Hours	**15**	
II	**Nutrition in Lactation**: Physiological adjustments during lactation,physiology of milk production, Importance of breast feeding, nutritional components of breast milk, nutritional requirements in lactation, **Nutrition in infants**: Rate of growth, weight as the indicator, low birth weight, premature infant, feeding premature infants, breast vs. bottlefeeding, nutritional allowances, supplementary feeding, weaning foods.	1 2	5 6
	Instructional Hours	**15**	
III	**Nutrition in Preschool Children:** Growth and development of preschool children, prevalence of malnutrition (Vitamin A, deficiency, anaemia, IDD) in preschool age, food habits, nutritional requirements, supplementary foods. **Nutrition in School Age**: Early and middle childhood, physiological development, food habits, nutritional needs and feeding, RDA, feeding of children with special needs.	1	7
	Instructional Hours	**15**	
VI	**Nutrition During Adolescence**: Physical growth and psychological changes, nutritional needs. **Eating disorders**: Anorexia nervosa, bulimia nervosa, Nutrition and Medical problems during adolescents. **Nutrition During Adulthood**: Nutrition and work efficiency, basis for requirements. **Nutrition in Menopause**: Psychological changes and	1, 2, 4	8, 32,4

	nutritional requirements. **Nutrition for Old Age** - Socio economic and psychological factors, nutritional requirements, factors affecting food intake, clinical needs, institutionalized changes in old age, advances in geriatric nutrition.		
	Instructional Hours	**15**	
V	**Nutrition in physical activity and exercise**: Body systems involved of Cardio-respiratory and musculo-skeletal system in physical activity, Nutrition requirements in space travel and high altitude **Benefits of an active lifestyle:** Cardiorespiratory, musculo- skeletalimprovements and other health benefits of physical activity **Physical fitness assessment**: Cardio respiratory fitness, assessmentof body composition, muscular fitness assessment, flexibility assessment.	1,3	9,10, 2
	Instructional Hours	**15**	

References

Text books:

1. Srilakshmi, B, Dietetics, New Age International Pvt. Ltd, 7th edition, 2003.
2. Nutrient requirements and Recommended Dietary Allowances for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2010
3. Dietary guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2010
4. Bamji M.S, Prahlad Rao N, Reddy V ,Textbook of Human Nutrition II Edition, Oxford and PBH Publishing Co. Pvt. Ltd , New Delhi,2004

Reference book

1. Krause,M.V and Hunsher,M.A, Food, Nutrition and Diet Therapy, 11th edition, W.B.Saunders company, Philadelphia, London, 2004.

Journals:

1. Indian Journal of Medical Research, ICMR, New Delhi
2. Indian Journal of Pediatrics, Valley Nicro, Missouri, U.P.
3. Indian Journal of Nutrition and Dietetics, Avinashilingam Deemed University, Coimbatore.
4. Proceedings of the Nutrition Society of India, NSI, Hyderabad.

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Case studies	Mini project	Total
8	8	10	8	8	8	50

Mapping

PSO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	L					H	H	H	L	L	L
CO2	L	L		H		L			H	H	M	L	M
CO3	H	L	L			L		H	M	H	M	M	M
CO4	H	H	H			L		L	H	H	M	M	M
CO5	H	M			L	L	L	H	H	H	M	M	M

H-High; M-Medium; L-Low

Course Designed by	Verified by	Checked By	Approved by

Course Code	Title		
21PGFNC103	Paper –III Nutritional Biochemistry		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objective

To

1. Understand the application of biochemistry in the field of Foods and Nutrition
2. Learn the metabolism and biosynthesis of essential nutrients

Course Outcome

CO 1	Recall the structure and relationships of macronutrients
CO 2	Describe the biochemical pathways relevant in nutrient metabolism
CO 3	Discuss the synthesis of biomolecules
CO 4	Relate the biochemical metabolism and metabolic disorders
CO 5	Apply relevant biochemical techniques in biomolecule analysis

Offered by **Food Science and Nutrition**

Course content **Instructional hours/ week: 5**

Unit	Description	Text book	Chapter
I	**Carbohydrates**: Glucose metabolism, Glycolysis, TCA cycle, HMP shunt and energy production, Glycogenesis, Gluconeogenesis, Biosynthesis of ascorbic acid. Renal threshold for glucose.	1 & 2	1&13,16, 17,18
	Instructional hours		15
II	**Fatty Acids**: Biosynthesis and oxidation of saturated and unsaturated fatty acids, cholesterol and phospholipids, Bile salts and fatty liver.	2	21, 22
	Instructional hours		15
III	**Protein:** General break down of aminoacids- Denaturation, transamination, deamination, decarboxylation, urea formation. Metabolism of individual amino acids – Glycine, phenylalanine, tyrosine, tryptophan, protein biosynthesis, Synthesis and breakdown of HB and bile pigments.	1	14, 21
	Instructional hours		15
IV	**Nucleic acids**: Composition, function and classification Isolation, structure and properties of DNA and RNA. Biosynthesis and breakdown of purine and pyrimidine nucleotides.	1	19
V	**Techniques in nutritional biochemistry**: Separation of sugars and amino acids by chromatography. Electrophoretic separation of proteins. Colorimetry and spectrophotometry — principle, procedure and difference, Radioisotopes in clinical diagnosis. Microbiological assay of vitamins. Elemental analysis by atomic absorption spectroscopy and flame photometry.	5	4,5
	Instructional hours		15
	Total instructional hours		75

References

Text Books:

1. Albert L. Lehninger, David Lee Nelson, Michael M. Cox, Lehninger Principles of
2. Biochemistry, Published by W.H. Freeman, Edition: 5, 2008.
3. Robert K. Murray, Darryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Harper's Illustrated Biochemistry, Published by McGraw-Hill Professional, 2012, Edition: 29.
4. Burtis et al., Teitz Text Book of Clinical Biochemistry, Published by William Heinmann medical books, Ltd., 3rd edition, 1999.
5. Singh, Fundamental Techniques in Biochemistry Principles and Practice, LAP Lambert Academic Publishing, 2010

Reference Books:

1. Jeremy Mark Berg, John L. Tymoczko, Lubert Stryer, Biochemistry, Published by W.H.Freeman, Edition: 6, 2006.
2. Donald Voet, Judith G. Voet, Biochemistry, Published by J. Wiley & Sons, 4th edition, 2010.
3. Geoffrey L. Zubay, Biochemistry, Published by Wm. C. Brown Publishers, 3rd edition, 1993.
4. William J. Marashall and Stephen K. Bangert, Clinical Biochemistry – Metabolic and Clinical Aspects, Pearson Professional Ltd.1995.
5. Michael L. Bishop, Janet Duben-Engelkirk, Edward P. Fody., Clinical Chemistry – Principles, Procedures and Correlations, published by Philadelphia: Lippincott Williams & Wilkins, 2000.

Journals

1. International journal of biotechnology and biochemistry
2. Indian journal of public health research

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Model preparation	Open book test	Total
8	8	10	8	8	8	50

Mapping

PSO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M			L					M	M	L	L	L
CO2	M	L	L	H					M	M	L	L	L
CO3	L		L	M					M	M	L	L	L
CO4	H	H	H			L		M	H	H	M	M	M
CO5	H	H	M		L	M		H	H	H	M	M	M

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNC104	Paper –IV Nutrition in Disease -I		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To
1. Understand the etiology of various diseases
2. To gain knowledge in the dietary modifications in various disease conditions

Course Outcome

CO 1	Practice the role of dietician in hospital and community
CO 2	Modify the diet for endocrine disorders
CO 3	Apply principle of nutrition for the prevention and treatment of specific diseases
CO 4	Execute nutrition care within the bounds of ethical, legal and professional practice standards
CO 5	Provide competent nutrition service for cancer patients

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Course content **Instructional hours / week: 5**

Unit	Description	Text book	Chapter
I	**Therapeutic Diets**: Principles, objectives and diet therapy, Review of hospital diets, type of dietitians, role of dietitian in the hospital and community, patient care, diet planning and use of exchange list in nutrient calculation, diet counseling and patient education. **Enteral and Parenteral nutrition**: Types, applications, nutrient composition of feeds, complications, merits and demerits. Functions of Indian Dietetic Association	1 2	1,10, 20
	Instructional hours		15
II	**Endocrine disorders and fever** **Diabetes Mellitus**: Epidemiology, classification, symptoms. metabolic changes, long term & short term complications, clinical findings, diagnostic tests. Glycemic index of foods, dietary modifications, herbal plant remedies for diabetes mellitus. Disorders of thyroid and para thyroid glands, Tetany, gout and arthritis. **Obesity**- Etiology, theories on obesity, types, dietary modification, complications. **Under weight**- Etiology, nutritional and food requirement. **Fevers**- Causes, types, metabolic changes, fevers of short duration and chronic fever and infections	2 2 1	30 21 9
	Instructional hours		**15**
III	**Diseases of the gastrointestinal tract and liver Diseases** **Gastrointestinal tract**: Etiology, type, clinical, signs and symptoms, diagnosis. **Diet modifications**- Peptic ulcer, diarrhoea, dysentery, constipation and other GTI problem like gastritis, tropical spruedumping syndrome, lactose intolerance, irritable bowel syndrome, diverticulosis **Diseases of liver:** Functions of liver, etiology, physiological and metabolic consequences, clinical signs and symptoms, Mode of treatment and diet modifications of jaundice, hepatitis, Cirrhosis, hepatic coma, cholescystitis, cholelithiasis and pancreatitis.	2	27, 2, 8
	Instructional hours		15

IV	**Diseases of the Heart and Circulatory System** – Acute and chronic cardiac disorders, risk factors of cardiac diseases, dietary management in hypertension, atherosclerosis, congestive heart failure, hyperlipoproteinemia, hypercholesterolemia, role of antioxidants in the prevention and treatment.	2	34
	Instructional hours		15
V	**Nutrition in cancer** – Epidemiological studies, reproduction of the normal cells, classification of neoplasms, principles of cancer, pathogenesis. Causes of cancer cell development, metabolic and nutritional alterations in malignancy, cancer therapy and nutrition, nutritional therapy and cancer, eating problems in cancer.	1	7
	Instructional hours		15
	Total instructional hours		**75**

References

Text books

1. Srilakshmi. B, Dietetics, New Age International Pvt Ltd, New Delhi, 2012
2. Krause M.V and Mahan L.K, Food, Nutrition and Diet therapy, W.B. Saunder Co, Philadeephia, 9th edition, 2010

References books

1. Robinson C.H. Normal and Therapeutic nutrition, , Mac Millan Publishing Co. 12th edition, 2007
2. Dietary Guidelines of Indians- A Manual, National Institute of Nutrition, Hyderabad,2006.

Journals:

1. Journal of American Dietetic Association. The American Dietetic Association MountArris, Illinois-61054, USA.
2. The American Journal of Clinical Nutrition Published by the American society for Clinical Nutrition, Inc., USA.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Home Science College for Women, Coimbatore.

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Case studies	Mini project	Total
8	8	10	8	8	8	50

Mappings

PSO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M				M		L		M	M	L	L	L
CO2	M	M	L			L		H	H	H	L	L	M
CO3	M	L				L		H	H	H	L	L	H
CO4	H	M	L			M		H	H	H	L	M	H
CO5	H		M	M		L		M	H	H	M	M	H

Course Designed by	Verified by	Checked By	Approved by

Course Code	Title		
21PGFNQ101	Practical I -Food Analysis		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To

1. Know the various techniques in food analysis
2. Select appropriate techniques for food analysis

Course Outcome

CO 1	Relate the theoretical concepts with analytical techniques associated with food.
CO 2	Describe the procedure for the food analysis
CO 3	Choose relevant techniques for different nutrient analysis
CO 4	Analyze different nutrients present in foods
CO 5	Interpret the results of food analysis

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Course content **Instructional hours/ week: 6**

Analysis of food for	
1. Moisture	
2. Ash	
3. Carbohydrate	
4. Glucose	
5. Water Soluble Protein-By Lowry's Method	
6. Estimation of gluten	
7. Estimation of lipid in egg yolk	
8. Iron	
9. Phosphorus	
10. Thiamine	
11. Vitamin C	
12. Analysis of fat –sap no	
Total Instructional hours	**90**

Tools for Internal Assessment (50 marks)

Test I (Mid term)	Test II (Models)	Observation notebook	Performance in lab experiments	Problem solving and critical thinking	Mini Project	Total
10	10	6	8	8	8	50

Mappings

PSO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	L					L	L	M	M	M	L
CO2	L	L		H		L			L	L	M	M	L
CO3	H	L	L			L		H	L	M	H	H	M
CO4	H	H	H			L		L	M	M	H	H	H
CO5	H	M			L	L	L	H	M	M	H	H	H

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE101	Elective I A-Convenience Foods		
Semester : I	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective : To

1. Gain knowledge on convenience foods
2. Acquire knowledge on food processing techniques.

Course Outcomes :

CO1	Describe food product development strategies
CO2	Classify different convenience foods in market
CO3	Explain the principles of processing of convenience foods
CO4	Develop innovative value added convenient foods
CO5	Evaluate the quality and safety of convenient food

Offered by : Food Science and Nutrition

Course content **Instructional hours / week : 4**

Unit	Description	Text Book	Chapter
I	**Food product development**: Development of new product, need for developing new products, Developing marketing strategy for newproduct, strategies in product development, success and failure factors for new products.	2	1
	Instructional hours		**12**
II	**Snack foods**: **Popped snacks**: Popcorn –popping procedures, loss during popping,measurement of expansion, factors affecting quality of popcorn, storage. **Puffed snacks**: Puffable materials, different puffed snacks **Baked snacks**: Sweet based plain cookies, wire cut cookies, Salt based – soda crackers and cheese crackers.	1	3
	Instructional hours		**12**
III	**Convenience foods for defense services**: Processing of dehydrated vegetables, vegetable powder, fruit slices, fruit bars, fruit milk, soup powder, Foods designed by DRDO for defense services – list and principle of processing applied.	2	3
	Instructional hours		**12**
IV	**Ready to eat foods**: Ready to eat foods available in India Principle of retort processing, technique, production, advantages anddisadvantages, Marketing and future prospects.	1	1
	Instructional hours		**12**
V	**Extruded foods**: Principle of extruders, Common extruders used in food industry, Merits and demerits of extruder technology, Factors affecting extrusion performance. Production of pasta- noodle and macaroni products	2	5
	Instructional hours		**12**
	Total Hours		**60**

References:

Text Book:

1. Richard Coles and Mark J. Kirwan, "Food and Beverage Packaging Technology", 2nd Edition, Blackwell Publishing Asia Pty Ltd, CRC press, USA, 2011.
2. Robertson Gordon L., "Food Packaging: Principles and Practice", 3rd Edition, Marcel Dekker Inc, USA, 2012.

Reference Books:

1. Han Jung H., "Innovations in Food Packaging", 2nd Edition, Academic Press, USA 2013.
2. Dong Sun Lee, Kit L. Yam and Luciano Piergiovanni, "Food Packaging Science and Technology", CRC press, USA, 2008.

Journals :

1. Food Packaging technology Hand book-NIIR, Delhi
2. Food processing technology- Fellows, Second edition, Woodhead Publ, England,2000.
3. Indian Food industry
4. Food Processed Industry
5. Food and nutrition World

Tools for Assessment (25 marks)

CIA I	CIA II	CIA III	Model preparation	Seminar	Mini product survey	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M								M		M	M	
CO2	H	M								M	M	M	
CO3	H	L			M					L	H	H	H
CO4	H	H			L				L	L	H	H	H
CO5	H	M			H				M	M	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE102	Elective I B - Institutional Food Management		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective: To

1. Emphasize the various facets of functioning of food service institutions,
2. Provide knowledge to become an efficient manager.

Course Outcomes:

CO 1	Describe the organizations and functions of restaurant and food service industry
CO2	Assess leadership, supervisory and human relation skills within the food service industry
CO3	Demonstrate the quantity preparation of foods
CO4	Perform essential food production and cost control skills
CO5	Execute various roles in food service industry

Offered by: Food Science and Nutrition

Course content **Instructional hours /week:4**

Unit	Description	Text book	Chapter
I	**Food service system** Introduction to food service system, evaluation of the food service industry, characteristics of the various types of food service units-commercial, institutional, hospital, military, any other. Scope and development of food service institution in India Principles and functions of food service management.	1	5
	Instructional hours		12
II	**Food service organization** Definition and types of organization in food, tools of organization and administrative leadership. Financial management –definitions, application of management accounting to catering operations, budgeting, determining the financial needs sources and book-keeping and accounting.	1	5
	Instructional hours		12
III	**Quantity food purchase** Procedures and records involved in purchasing, receiving, storing, and issuing of food materials. Factors involved in selection of raw materials. Quantity food service – types, objectives, Indian and western styles of service.	2	6
	Instructional hours		12
IV	**Quantity food preparation** Menu planning – definition, types of menus. Standardization of recipe – definition, standard recipe formatand uses. Standard portion sizes – definition, portioning equipment and portion control. Use of left over foods.	3	5
	Instructional hours		12

V	**Organization of space and equipment** Kitchen- type, designing, storage space and service areas. Equipment – planning, selection and purchasing. Sanitation and safety of food service Industry- Sanitationof plant – measures taken to maintain sanitation – types of cleaning. Personnel hygiene – facilities and benefits provided to workers. Safety at work – measures adopted.	**2**	**5**
	Instructional hours		**12**
	Total Instructional hours		**60**

References :

Text books:

1. Sethi, M. and Matha, S. Catering Management – An Integrated approach, wiley Eastern Ltd., New Delhi, II Edition 1993.
2. Palacio, J.P. Harger, V., Shugart, G. and Theis, M. West's Introduction to food service, MacMillan Publication Co., New York, XVII Edition, 1994.
3. Kotschevar, L.H. and Teerell, M.E., Food service planning, Layout and Equipment, MacMillan Publication co., New York, III Edition, 1985.

Reference books:

1. Delfakis, H. Scanion, W.C. and Van Burch, J.B. Food service Management, South Western Publication Co., cincinattti, Ohio, 1992.
2. Cracknell, H.C. and Nobis, G. Mastering Restaurant Service, Macmillan Master Service, Macmillsn Education Ltd, (pub) London, 1989

Journals :

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore

Tools for Assessment (50 marks)

CIA I	CIA II	CIA III	Product preparation	Seminar	Visit to any food service industry	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M								M	L	M	M	L
CO2	M	M							L	M	M	M	L
CO3	M	L			M				L	L	H	H	H
CO4	H	H			L				L	L	H	H	H
CO5	H	M			H				M	M	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE103	Elective I C-Food Commodities		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To

1. Understand the basic commodities both raw and processed in food industries
2. Discuss the qualities and standards of available commodities and their suitability

Course Outcome

CO1	Explain the different food commodities
CO2	Analyze the different types of food products
CO3	Describe the types of processing of various foods
CO4	Examine the quality of various food products used
CO5	Interpret the usage of food commodities in Indian cookery.

Offered by: **Food Science and Nutrition**

Course content **Instructional hours/week: 4**

Unit	Description	Text book	Chapter
I	**Perishable Food Commodities Milk, Meat, Fish, Egg and Poultry-** Introduction, composition, types, processing, products, uses in IndianCookery	1	5
	Instructional hours		12
II	**Semi Perishable Food CommoditiesFruits and Vegetable, Fats and Oils** Introduction, composition, types, processing, products, uses in Indian Cookery	3	2
	Instructional hours		12
III	**Non Perishable Food Commodities Cereals, Pulses, Legumes, Oil seeds and Spices** Introduction, composition, types, processing, products, uses in IndianCookery	4	3
	Instructional hours		12
IV	**Types Of Foods** Nutraceuticals, Probiotics, Prebiotics, GM Foods, Organic Foods, Traditional Foods, Fabricated Foods, Junk Foods, Fast Foods, Convenience Foods, RTS, and RTE	1	5
	Instructional hours		12
V	**Sugar and Confectionary** Different types of sugar (sugar, Jaggery, honey, syrup), Manufacture,selection, storage and use as preservative	2,4	
	Instructional hours		12
	Total Instructional hours		60

References

1. Srilakshmi, B.. Food Science (3rd edition), New Age International (P) Limited Publishers, New Delhi, 2003.
2. National Institute of Industrial Research Board, Hand Book on SPICES Asia Pacific Business press Inc. New Delhi.
3. Potter, N.N. Food Science (5th edition), CBS publishers and Distributors, New Delhi, 1995.
4. Manay, N.S, Shadaksharaswamy, M., Foods- Facts and Principles., New Age International., New Delhi., 2004.

Journals

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore.

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Groupactivity	Openbook test	Total
8	8	10	8	8	8	50

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M								M	L	M	M	L
CO2	M	M							L	M	M	M	L
CO3	M	L			M				L	L	H	H	H
CO4	H	H			L				L	L	H	H	H
CO5	H	M			H				M	M	H	H	H

Course designed by	Verified by	Checked By	Approved by

Course Code	Title		
21PGFNC205	Paper V-Food Processing and Preservation Techniques		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To
1. Learn different food processing and preservation techniques
2. Provide knowledge on processed food products

Course Outcome

CO 1	Define the principles and application of thermal processing of food
CO 2	Identify the various methods in low temperature processing
CO 3	Summarize the significance of drying process and the equipment used
CO 4	Enumerate the applications of non thermal processing techniques in food industry
CO 5	Apply critical thinking and problem-solving skills to address current challenges in the processing of food

Offered by: Food Science and Nutrition

Course content **Instructional hours / week: 5**

Unit	Description	Text book	Chapter number
I	**Thermal processing of foods:** Principles, Thermal method of preservation-Pasteurization, sterilization, blanching, canning, UHT processing, dielectric heating, microwave heating, baking, roasting and frying, retort processing of Ready to eat (RTE) products.	1, 3	1 &5
	Instructional hours		**15**
II	**Low temperature processing of food**: Introduction, freezing point and freezing rate, comparison of freezing and thawing process. **Freezing methods**- Air freezing, plate freezing, liquid immersion freezing and cryogenic freezing, advantages and disadvantages of freezing and changes in food during freezing storage. **Food irradiation**- History and mechanism, the electro-magnetic spectrum, forms of radiant energy, principles of using electromagnetic radiation in food processing, ionizing radiations and non ionizing radiations, advantages and disadvantages.	5,2	4 & 6
	Instructional hours		**15**
III	**Food Drying/Dehydration**: Definition, free and bound moisture, concept of water activity, factors affecting drying, Drying curve (constant rate period and falling rate period), moisture content (wet basis and dry basis), equilibrium moisture content. **Drying methods and equipments:** sun/solar drying, Cabinet drying, tunnel dryer, spray dryer, freeze dryer, fluidized bed dryer, nutritional, physio-chemical changes during drying.	3	7
	Instructional hours		**15**
IV	**Processing and preservation by non-thermal methods:** High pressure, pulsed electric field, hurdle technology, permissible limits for chemical preservatives, use and	5,3	5 & 8,9, 10

	application of enzymes and microorganism in processing and preservation of foods, food fermentations, pickling, smoking. **Food additives:** Definition, types and functions, permissible limits and safety aspects. Chemical Preservatives- type I and type II	
	Instructional hours	**15**
	Membrane Processing: General principles and advantages, dead end and cross flow. **Classification of membrane system-** Reverse osmosis, nano Filtration, ultra-filtration, micro filtration, electro dialysis and evaporation, membrane application in the food industries, membrane performance, and limitation of membrane processes.	4, 5 7, 3
	Instructional hours	**15**
	Total instruction hours	**75**

References

1. Khatkar, Singh, B., Food science and technology, Daya Publishing House, 2007.
2. Singh, N.P., Fruit and vegetable preservation, Oxford Book Company, 2007.
3. Modi, H.A., Food preservation, Aavishkar publishers, Jaipur, 2010
4. Sivasankar,B., Food processing and preservation, Prentice - Hall of India, 2005.
5. Fellows.P.J., 3rd Edn Food processing technology, Woodhead publishing company, 2015

Reference Books

1. Zeuthen, Peter , Food preservation techniques. Woodhead publishing ltd, 2005

Journals:

1. Journal of advancement in food technology
2. Journal of food processing and technology

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Model preparation	Mini project	Total
8	8	10	8	8	8	50

Mappings

PSO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L			L					L	L	M	M	L
CO2	M	L		H					L	L	M	M	L
CO3	M	H	L			L			M	M	M	M	M
CO4	H	H	L			L		H	M	M	H	H	M
CO5	H	H	H	H		H		H	L	M	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked By	Approved by

Course Code	Title		
21PGFNC206	Paper VI-Macronutrients		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To

I. Learn about macro nutrients and its functional importance

2. Acquire knowledge on findings in the study

Course Outcome

CO 1	Describe the energy requirements and its utilization process
CO 2	Discuss the metabolism of carbohydrates and dietary fibre
CO 3	Analyze the physiology of fats and lipids
CO 4	Examine food protein quality and its bioavailability
CO 5	Relate the role of hormone with nutrient metabolism

Offered by: **Dept. of Food Science and Nutrition**

Course content **Instructional hours / week: 5**

Unit	Description	Text books	Chapter Number
I	**Energy:** Historical background, energy content of food, energy measurements – direct and indirect calorimetry, energy utilization in cells, basal metabolism, physical activity. Regulatory thermogenesis, energy requirements, variables which influence the energy requirements with reference to adults, infants, adolescents, ICMR, FAO and WHO requirements, energy balance and control of body weight, the share of three main energy nutrients — carbohydrates, proteins and fats, Energy utilization in cells-Role of Mitochondria, energy metabolism during physical activity, CED and Obesity, energy metabolism and vascular homeostasis energy requirements for strenuous physical activity -sports, expeditions. Nutritional adaptation in malnutrition	1	6
	Instructional hours		**15**
II	**Carbohydrates** : Classification, digestion, absorption and utilization of carbohydrates, nutritional importance of carbohydrates, Concept of Glycemic Index and Glycemic Load **Dietary fibre:** Definition, types of fibre in plant foods, sources, composition, digestion, clinical aspects. Role of dietary fibre in therapeutic nutrition, Effect of fibre in the absorption of different nutrients. Inherited disorders of carbohydrate metabolism, carbohydrates and exercise performance, role of multiple transportable carbohydrates	1	**3**
	Instructional hours		**15**
III	**Fats and lipids:** Classification of fats and fatty acids, review of digestion and absorption of fats, transport of lipid in blood, lipid transformation in the liver, lipotropic factors, role of essential fatty acids, deposition of fats in the body, Free radical formation and	1	4

	role of antioxidant enzymes in mammalian cells Consequences of high and low fat intakes, role of fats in the etiology of arteriosclerosis. Recent Trends in Lipid Nutrition - saturated, poly unsaturated, mono unsaturated and trans-fat, Fat Burners and Replacers		
	Instructional hours	**15**	
IV	**Protein:** Classification of proteins and amino acids, function, digestion, absorption and utilization. Factors affecting protein utilization. Amino acid requirements and amino acid pattern, essential amino acids, amino acid balance, imbalance and toxicity Evaluation of Protein Quality- Different methods based on albino rats and microbes – BV, DC, PER, NPR, NPU, PDCAAS, ICMR and FAO / WHO requirements, food sources, estimation of amino acids and protein needs.	1	**5**
	Instructional hours	**15**	
V	**Hormone and Nutrient Interactions:** Interaction over carbohydrate, protein and fat metabolism. Nutrition in alcoholism — effect of alcohol in digestion and absorption of nutrients, alterations of nutrient metabolism and organ damage.	**3**	5
	Instructional hours	**15**	
	Total Instructional hours		**75**

References

Text Books

1. Srilakshmi, B., Nutrition Science, New Age International Publications, 6th edition, 2017.
2. Swaminathan,M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printing and Publishing Co Inc, Bangalore, 2012.
3. Recommended dietary allowances, ICMR, National Institute of Nutrition, Hyderabad, 2010.

Reference Book:

1. Berdanier, C and Zempline, J, Advanced nutrition-macronutrient, micronutrient and metabolism, CRC press, United States of America, 2009
2. Krause,M.V and Hunsher,M.A, Food, Nutrition and Diet Therapy, 11th edition, W.B.Saunders company, Philadelphia, London, 2007.

Journals:

1. Annual Reports, National Institute of Nutrition, Hyderabad.
2. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
3. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.
4. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore.

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Model preparation	Open book test	Total
8	8	10	8	8	8	50

Mappings

PSO/ PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	H						L	M	M	L	L	L
CO2	L	H	L	M					M	M	L	L	L
CO3	H	H	L			L		H	M	M	L	L	M
CO4	H	H	L	L					H	H	H	H	H
CO5	M		L	H				L	M	M	L	L	M

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked By	Approved by

Course Code	Title		
21PGFSC207	Paper VII-Physiological Aspects of Nutrition		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives To
1. Gain knowledge on blood components and immunological aspects
2. Understand the physiological aspects of hormones, drugs, etc.

Course Outcome

CO 1	Outline the physiological of blood
CO 2	Discuss the mechanism of immunity and electrolyte balance in body
CO 3	Relate the functions of hormone and its biological effects
CO 4	Outline the water and electrolyte balance in body
CO 5	Interpret the drug and nutrient interaction in the body

Offered by: Dept. of Food Science and Nutrition

Course content **Instructional hours / week: 5**

Unit	Descriptions	Text book	Chapter Number
I	**Blood -** Composition, cellular elements of blood — RBC, WBC and Platelets. Haemoglobin — structure and function. plasma proteins — functions. Blood coagulation and disorders of blood coagulation	2	8
	Instructional hours		15
II	**Immunity** - Types of immunity, cells of the immune system, immune response - humoral immunity, cell mediated immunity, immune changes in malnutrition, vitamin deficiency, iron deficiency and zinc modulation, neuro-endocrine control of stress and immunity, immune mechanisms in infections, auto-immunity and hypersensitivity.	1,4	23
	Instructional hours		15
III	**Hormones** - Principles of hormone action and endocrine control, synthesis, secretion and biological effect of pituitary, thyroid, parathyroid, adrenal, pancreas, male and female reproductive hormones. Enzymes- definition, classification, action, factors influencing rate of enzyme action, Michaels Menton equation, derivation, enzymes in medical diagnosis.	4	19
	Instructional hours		15
IV	**Water and Electrolyte Balance** - Total body water, intake versus output of water, body fluid compartments, composition of body fluid, measurement of body fluid volumes, forces controlling the water and electrolyte balance between cells and extra cellular fluid, metabolism of water and electrolytes, regulation of acid balance, effect of diet on water, electrolyte and acid base balance. **Function tests** – Gastric function test, liver function test, renal function test and endocrine function test	3,4	4
	Instructional hours		15

V	**Drug and Nutrient interaction** Introduction, absorption, biotransformation and excretion of drugs, drug metabolism, routes of drug administration, mechanisms of drug action factors modifying drug effects, receptor theories, drug and nutrient interactions. Hunger, appetite and satiety, physiological and psychological factors affecting food intake.	**2**	**5**
		Instructional hours	**15**
		Total instructional hours	**75**

Re**ferences**

Text Books

1. Chakrabarti., Ghosh and Sahara., Human Physiology, The New Book Stall, Second Edition, 1984.
2. Maurice E.S., and Verrnon, R., Modern Nutrition in Health and Disease- Indian Edition, Seventh Edition, The new age publications, 1980.
3. Muthayya, M., Essentials of physiology, Emerald Publishers, Second Edition, 1986.
4. Parimoo, P., A textbook of Medicinal Chemistry, CBS Publishers and Distributors, 1995.

Reference Books

1. Sukkar, M Y., El-Murshid, H A., and Ardawi, C., Human Physio1ogy, Blackwell Scientific Publications, 1993

Journals

1. Indian journal of public health and research
2. Journal of medicine toxicology

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Assignment-Poster presentation	Group discussion	Seminar	Total
8	8	10	8	8	8	50

Mappings

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L						L	L	L	L	L	L
CO2	L	L							M	M	L	L	L
CO3	H	H	L						H	M	L	L	M
CO4	M			L					H	H	L	L	L
CO5	M	M		L				L	H	L	M	M	M

H-High; M-Medium; L-Low;

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNC208	Paper VIII-Nutrition in Disease -II		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To

1. Understand the etiology of various diseases
2. To gain knowledge in the dietary modifications in various disease conditions

Course Outcome

CO 1	Develop dietary plan to overcome nutrition deficiency diseases
CO 2	Summarize the dietary management in allergy and bone diseases
CO 3	Explain the inborn errors of metabolism and its dietary treatment
CO 4	Plan nutritional care for the kidney disorders and HIV infected person
CO 5	Execute therapeutic diets for disease management and control

Offered by: **Dept. of Food Science and Nutrition**

Course content **Instructional hours / week: 5**

Unit	Descriptions	Text book	Chapter Number
I	**Injury, burns and deficiency diseases** Etiological factors and Dietary modifications in (a) Injury and burns and surgery (b) Nutritional deficiency diseases - anaemia, vitamin A deficiency (d) Dental diseases -Dental caries and Peridontitis	1,2	4
	Instructional hours		15
II	**Food allergy** Food allergy and food intolerance, Etiology, clinical features, diagnosis and nutritional management, Diet in allergy **Respiratory and Musculo-skeletal Systems** Arthritis, rheumatoid and osteo arthritis, asthma, chronic pulmonary diseases	1,2	5
	Instructional hours		15
II I	**Inborn errors of Metabolism.** Etiology, symptoms and dietary treatment for 1. Disorders of Amino Acid Metabolism Phenylketonuria, tyrosemia, histidinemia and maple syrup urine diseases. 2. Disorders of Carbohydrate Metabolism Galactosemia, fructose and lactose intolerance.	2	10
	Instructional hours		15
I V	**Diseases of Kidney** Etiology, dietary Management in kidney, urinary tract disorders, acute and chronic glomerulo nephritis, nephrosis, acute renal failure, chronic renal failure, end stage renal disease, uremia, nephrosclerosis, nephrolithiasis, kidney transplants, maintenance of an artificial kidney (dialysis)	2	13
	Instructional hours		15
V	**HIV Infection and AIDS** Epidemiology, transmission of HIV, pathophysiology, clinical manifestations, HIV infection and other diseases, Immunity and AIDS virus, COVID-19, dietary management, Prevention and Control.	1	6
	Instructional hours		15
	Total instructional hours		75

References

Text books:

1. Srilakshmi. B, **Dietetics**, New Age International Pvt Ltd, New Delhi, 2012
2. Krause M.V and Mahan L.K, **Food, Nutrition and Diet therapy**, W.B. Saunder Co, Philadeephia, 9th edition, 2010

References books

1. Robinson C.H. **Normal and Therapeutic nutrition**, , Mac Millan Publishing Co. 12th edition, 2007
2. **Dietary Guidelines of Indians**- A Manual, National Institute of Nutrition, Hyderabad, 2006.

Journals:

1. Journal of American Dietetic Association. The American Dietetic Association Mount Arris, Illinois-61054, USA.
2. The American Journal of Clinical Nutrition Published by the American society for Clinical Nutrition, Inc., USA.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Home Science College for Women, Coimbatore.

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Case studies	Open book test	Total
8	8	10	8	8	8	50

Mapping

PSO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M				M		L		M	M	L	L	L
CO2	M	M	L			L		H	H	H	L	L	M
CO3	M	L				L		H	H	H	L	L	H
CO4	H	M	L			M		H	H	H	L	M	H
CO5	H		M	M		L		M	H	H	M	M	H

Course designed by	Verified by	Checked By	Approved by

Course Code	Title		
21PGFNQ202	Practical II-Food processing and preservation techniques		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To

1. Learn the different food processing techniques
2. Acquire knowledge on food product development

Course Outcome

CO1	Relate the food processing theory with practical
CO2	Demonstrate different food processing technique
CO3	Apply relevant technology to develop innovative foods
CO4	Exhibit professional skills in processing of food
CO5	Analyze the safety and quality of processed foods

Offered by: Dept. of Food Science and Nutrition

Course content **Instruction hour / week: 6**

1. Blanching of fruits and vegetables
2. Drying characteristics of foods
3. Thermal processing of food
4. Wet and dry processing of cereals
5. Osmotic dehydration of fruits and vegetables
6. Minimal processing of fruits and vegetables
7. Fermented milk products
8. Processing of milk and sensory analysis
9. Formulation of value added extruded products
10. Preparation and physical, sensory analysis of jam/ Squash/pickles
11. Sugar processing
12. New product development –Thermal and non thermal processing

Total instructional 90

Tools for Internal Assessment (50 marks)

Test I (Mid term)	Test II (Models)	Observation notebook	Performance in lab experiments	Problem solving and critical thinking	Results and presentations	Total
10	10	6	8	8	8	50

Mapping

PSO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M						H	L	L	H	M	L
CO2	M	L	H	H				L	L	L	M	M	H
CO3	H	H	H			L		H	L	M	H	H	H
CO4	H	H	H					H	M	M	H	H	H
CO5	H	M						H	L	L	H	M	L

Course designed by	Verified by	Checked By	Approved by

Course Code	Title		
21PGFNE201	Elective II A Food Packaging		
Semester : II	Credits : 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective:

1. To enable students to understand the need for food packaging
2. To explore recent packaging materials and labeling.

Course Outcomes :

CO1	Recall the types and characteristics of materials used for food packaging
CO2	Identify application of different food packaging methods
CO3	Develop eco-friendly and innovative packaging materials for different foods
CO4	Apply standards of labeling for food packaging
CO5	Analyze different types of packaging and labeling in commercial food products

Offered by : Food Science and Nutrition

Course content **Instructional hours /week : 4**

Unit	Description	Text book	Chapter
I	Definition, functions of packaging materials for different foods,characteristics of packaging material, food packages-bags, pouches, wrappers, tetra packs.	1	4
	Instructional hours		**12**
II	Types of packaging materials – characteristics, applications in food industry, merits and demerits, textiles and wood, metal, glass, flexiblefilms, rigid and semirigid plastic containers, paper and boards.	2	4
	Instructional hours		**12**
III	Microwave ovenable containers – characteristics, applications and advantages. Retortable packages – Retort pouches, retortable aluminium containers, composite flexible retortable packages – application and advantages. Shrink packaging, active packaging, smart pack, Intelligent packaging.	2	10
	Instructional hours		**12**
IV	Ecofriendly alternatives to plastics – Edible packaging – advantages, material used – lipid coating, proteins, composite films, current applications, biodegradable packaging material – biopolymer based edible film. Packaging of finished goods – weighing, filling, scaling, wrapping, cartooning, labeling, marking and trapping.	2	5
	Instructional hours		**12**

V	**Labeling**- Standards for labeling, Purpose of labels, description of label for food packaging, critical elements of food label, types of labels, common terms for labels, materials used, surface treatment, labels for freight containers, labeling regulations, bar code, nutrition labeling, health claims, mandatory labeling provisions.	2	3
		Instructional hours	**12**
		Total Instructional hours	**60**

References :

Text books:

1. Richard Coles and Mark J. Kirwan, "Food and Beverage Packaging Technology", 2nd Edition, Blackwell Publishing Asia Pty Ltd, CRC press, USA, 2011.
2. Robertson Gordon L., "Food Packaging: Principles and Practice", 3rd Edition, Marcel Dekker Inc, USA, 2012.

Reference books:

1. Han Jung H., "Innovations in Food Packaging", 2nd Edition, Academic Press, USA 2013.
2. Dong Sun Lee, Kit L. Yam and Luciano Piergiovanni, "Food Packaging Science and Technology", CRC press, USA, 2008.

Journals :

1. Food Packaging technology Hand book-NIIR,Delhi
2. Food processing technology- Fellows, Second edition, Woodhead Publ,England,2000.
3. Indian Food industry
4. Food Processed Industry
5. Food and nutrition World

Tools for Assessment (50 marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Designing food packaging	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H							L	L	L	L	L
CO2	M	M							L	M	M	M	L
CO3	M	L		M	M		L		M	M	M	M	M
CO4	H	H	M						M	M	H	H	H
CO5	H	H	M				L		M	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE202	Elective II B -Food Production and agriculture		
Semester: II	Credits: 4	CIA:50 Marks	ESE:50 Marks

Course Objectives : To

1. Learn about scope of Agriculture and production of crop in India and Tamilnadu.
2. Improve the knowledge about post harvesting techniques of food grains.

Course Outcomes :

CO1	Explain the scope of agriculture
CO2	Summarize trends of production of crops in India and Tamil Nadu
CO3	Develop different strategies in production of food
CO4	Comprehend post harvest technology of food grains
CO5	Identify the uses of different fertilizers and manures in agriculture production

Offered by: Food Science and Nutrition

Course content **Instructional hours /week : 4**

Unit	Description	Text book	Chapter
I	Agriculture- scope in India and Tamil Nadu, Branches of Agriculture, Agronomic classification of crops and their economic importance, Major crops of India and Tamil Nadu-Adaptation and distribution. Agro-climatic norms of major field crops, Development of scientific agriculture in world and India.	1	4
	Instructional hours		**12**
II	Crop production- production trends in world, India and Tamil Nadu.Factors affecting crop production. Systems of farming-wet, irrigated,dry and rain fed farming. Factors governing the choice and varieties,Cropping patterns and systems in India and Tamil Nadu, crop rotation -advantages of crop rotation followed in India and Tamil Nadu.	1	4
	Instructional hours		**12**
III	General procedure for cultivation of wetland crops and garden land crops-field preparation, sowing/ planting, maintenance/ field sanitation, cost of cultivation and economics. Irrigation management – methods of irrigation suitability, advantages and limitations, irrigation systems of India and Tamil Nadu. Weeds classification and its characteristics, principles and methods of weeds control (outline only).	2	10
	Instructional hours		**12**

IV	**Manures and fertilizers**- Types and its role in crop production, factors affecting quantity of manures and fertilizers for different crops. Nutrient potential of different organic manure Agricultural, Industrial and Urban wastes- preparation enriched Farm Yard Manure (FYM) –Zinc enriched organics, compost making- coir pith, sugar cane trash, farm waste, farm weds and vermin composting.	2	**5**
		Instructional hours	**12**
V	**Storage of food grains** - Types and characteristics of storage structures, grain storage and distribution system in India and Tamil Nadu. General aspects of food security in India. Agricultural researchschemes in India and Tamil Nadu.	**2**	**3**
		Instructional hours	**12**
		Total Instructional hours	**60**

References:

Text books:

1. Dharma, A.K.1996. Organic Farming for sustainable Agriculture. Agri Botanical Publishers (India), Bikaner.
2. Gopal Chandra De, Fundamentals of Agronomy. Oxford and IBH publishing Co.Pvt Ltd,New Delhi, 1997.

Reference books:

1. Icar..Handbook of Agriculture.Indain Council of Agricultural Research, New Delhi.
2. Morachan, Y.b. 1996
3. Gupts, O.P. Modern weed management. Mrs. Saraswathi for agro botanical, New Delhi.,1996

Journals:

1. Journal of Agriculture Science
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad

Tools for Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Open book test	Visit to agricultural land	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	L	L	M	M			H	H	L	L	H
CO2	M	M		M	M	M			L	M			L
CO3	M	L	H	H	M	L	L	L	M	M			M
CO4	H	H	H		H				H	H	M	L	H
CO5	H	H	H		H				H	H	M	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE203	Elective II C -Instrumentation in Food Processing		
Semester : II	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective: To

1. Learn about different instruments used in food processing
2. Develop the skill on operation techniques in food processing equipments.

Course Outcomes :

CO1	Recall the principles of food processing and unit operation analysis of food
CO2	Comprehend the equipments for mechanical separation
CO3	Summarize the principles in crushing and mixing of food
CO4	Identify different types of refrigerators and its mechanism of working
CO5	Explain advanced techniques in quality

Offered by : Food Science and Nutrition

Course content **Instructional Hours / week : 4**

Unit	Description	Text book	Chapter
I	Unit operations – classification – conservations of mass and energy- Dimensions and units – Dimensional and unit consistency – dimensionless ratios – Evaporators- Single and multiple effect evaporator- Vacuum evaporator- - Forced circulation evaporators.	1,2	5
	Instructional hours		**12**
II	Mechanical separations- Filtration- Filter cake compressibility- Filtration equipment- Sedimentation, Gravitational sedimentation of particles in fluid and gas. Setting under combined forces- Centrifugal and liquid – Liquid separation – Centrifuge – Size reduction.	1	2
	Instructional hours		**12**
III	Principles of combination in Crushing and Mixing – Characteristics- Particle size distribution – Energy and power requirements – Crushing efficiency- Mixing of solids, pastes, dry powders- Criteria of mixer effectiveness- Mixing index. Solar equipments – Heaters, driers, cookers, distillators for food products.	1	6
	Instructional hours		**12**
IV	Refrigerators – Types of refrigeration system- Mechanical vapour compression –Vapour absorption system – Components of mechanical refrigeration- Refrigerants- Properties- Comparison of Freon and ammonia systems- cold storages- Design of cold storages- Defrosting- Humidifiers and dehumidifiers.	2	7
	Instructional hours		**12**

V	Principles and uses of Gas chromatography, Gas liquid chromatography, Electrophorosis, High performance liquid chromatography and Atomic Absorption, Spectrophotometry, pH meter, Photoelectric calorimeter.	2	3
	Instructional hours		**12**
	Total Instructional hours		**60**

References :

Text books:

1. Coulson, J.M. and J.F.Richaradson, chemical Engineering. Volume I to V the pergamon press New Yor. 1977.
2. Henderson, S.M. and R.L. Perry. Agricultural process Engineering, John Wiley and sons, New York. 1955

Reference books :

1. Mc Cabe, W.L. and J.C.Smith unit operations of chemical Engineering. Mc Graw – Hill Inc. Kosaido printing Ltd. Tokyo, Japan. 1976
2. Pande, P.H. Principles of Agricultural Processing –A Text Book, Kalyan Publishers, Ludhiana. 1994
3. Sahay, K.M. and K.K. Singh, Unit operation of Agricultural Processing, Vikas Publishing House Pvt., Ltd., New Delhi. 1994.

Journals :

1. Journal of food processing and preservation

Tools for Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Model preparation	Assignment	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H	L	L	M	M			H	H	L	L	H
CO2	M	M		M	M	M			L	M			L
CO3	M	L	H	H	M	L	L	L	M	M			M
CO4	H	H	H		H				H	H	M	L	H
CO5	H	H	H		H				H	H	M	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNC309	Paper IX - Micronutrients		
Semester: III	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective: To

1. Acquire knowledge in the role of micronutrients in health and disease.
2. Understand the recent advance in the study of micro-nutrients.

Course Outcomes :

CO1	Enlist the functions of macro and micro minerals
CO2	Indicate the role of vitamins in human health
CO3	Describe the transport and utilization of macro and micronutrient
CO4	Identify the micronutrient deficiency symptoms and interpret
CO5	Design strategies to prevent micronutrient deficiency

Offered by: Food Science and Nutrition

Course content **Instructional Hours / week: 5**

Unit	Content	Text Book	Chapter number
I	**Macro Nutrients: Calcium** - Calcium in skeleton and other tissues, measurements, bone mass, functions, effect of diet and immobilization, calcium absorption and utilization, calcium balance, requirements, sources, deficiency and excess. **Phosphorus** - Functions, distribution in the body, calcium - phosphorus ratio, phosphorus adsorption and utilization, deficiency and toxicity. **Sodium** - Potassium, Magnesium and Sulfur - Distribution, absorption, utilization, role in human nutrition, deficiency and toxicity.	1	10
	Instructional hours		**15**
II	**Trace Elements:** Concept, mode of action, trace element interaction **Iron**- Functions, sources, recommended intake, utilization, storage, output and iron balance, deficiency and toxicity, role in prevention of anaemia, methods of assessing iron status and availability of iron. **Iodine** - Functions, sources, recommended intake, metabolism, deficiency **Fluorine**- Functions, sources, uses of fluoride in the prevention of dental caries, toxic effects of fluoride. Functions, sources, deficiency and toxicity of zinc, Copper, molybdenum, cobalt, nickel, manganese, selenium, chromium and cadmium.	1	11- 13
	Instructional hours		**15**
III	**Vitamins: Fat soluble vitamins** - A, D, E and K- History, chemistry, physiological action, absorption, transport, utilization and storage, methods of assay, dietary sources and losses in preparation and handling. Conversion of carotene into vitamin A in human beings, recommended intake, human deficiency and diagnosis, hypervitaminosis.	1	15,16
	Instructional hours		**15**

IV	**Water Soluble Vitamins:** **Thiamine, riboflavin, niacin, vitamin B12, folic acid, pyridoxine, pantothenic acid, biotin and ascorbic acid**- History, Chemistry, Physiological action, biochemical utilization, storage, absorption, transport, biosynthesis - of vitamins, dietary sources, losses in preparation and handling, recommended intake, human deficiency and diagnosis, toxicity and inter relationships between macro and micro nutrients	1	17-19
	Instructional hours		**15**
V	**Vitamin Like Molecules:** **Choline, carnitine, inositol, taurine**-Chemistry, metabolism, deficiency, excess and dietary consideration. **Pseudo vitamins**: Flavanoid, pangamate, laetrile. Interdependence between nutrients and hormones in general.	4	4,5
	Instructional hours		**15**
	Total Instructional hours		**75**

References

Text Books:

1. Srilakshmi. E. Nutrition Science, New Age International Publishers, 2021
2. Recommended dietary intakes for Indian – Indian Council of Medical Research, New Delhi, 2012.
3. Gopalan, C Ramasastry, B.V. and Balasubramanian, S. Nutritive Value of Indian Foods, National Institute of Nutrition, Hyderabad, 2007
4. Swaminathan, M. Essentials of Foods and Nutrition, Volume I and II Ganesh and Co., Madras, 2003.
5. Mahtab S Bamji Kamala Krishnaswamy & G N V Brahmam, Text book of Human Nutrition, 2019, OXFORD & IBH PUBL.

Reference Books:

1. James L. Groff and Sareen, S. Gropper, Advanced Nutrition and Human Metabolism‖, 1999, Thomson Wards worth.
2. Robert S. Goodhart and Manice EShills, Modem Nutrition in Health and diseases, 1980, Lea and Feliger

Journals:

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.
3. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore.

Tools for Internal Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Activity- Model development	Open book test	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L		L						M	M	L	L	L
CO2	M	L		L					H	H	M	L	L
CO3	M				M				H	H	M	L	L
CO4	H	M	L		H	M			H	H	M	L	H
CO5	H	H		L	H	H			H	H	M	M	H

H-High; M-Medium; L-Low

Course prepared by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNC310	Paper X - Research Methodology and Statistics		
Semester : III	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objectives : To

1. Understand the principles and methods of research
2. Apply statistical procedure to analyse numerical data and draw inferences.

Course Outcomes :

CO1	Distinguish between research objectives and sampling methods
CO2	Identify different data collection methods
CO3	Use effective tools and techniques to analyse and present data
CO4	Critically evaluate the research designs and apply appropriate statistical analysis
CO5	Analyse data statistically using ICT tools

Offered by: Food Science and Nutrition

Course content **Instructional Hours / week: 5**

Unit	Descriptions	Text Book	Chapter number
I	**Research types and sampling methods:** Meaning of research, objectives of research, types of research and their application, selection and formulation of research problems, hypothesis, designing a research — different types, census and sample method,theoretical basis of sampling, sampling methods — random sampling methods and non-random sampling methods, size of sample, sampling and non sampling errors.	1	1
	Instructional hours		**14**
II	**Methods of Collecting Data:** Questionnaire, preparation of schedules, interview method, case study method, experimentation method, sources of secondary data, precautionswhile using secondary data. **Editing and Coding the Data Organization of Data** – Classification – meaning and objectives, types of classification, formation of discrete and continuous frequencydistribution, tabulation – role, part of a table, general rules of tabulation, types of tables.	1	4
	Instructional hours		**14**
III	**Representation of Data:** Diagrammatic and graphical representation – significance of diagrams and graphs – general rules for constructing diagrams – types of diagrams, graphs of time series, graphs of frequency distribution. **Interpretation and Report Writing** – Meaning of interpretation, technique, precautions, format of research report, types, steps and stages, mechanism and style, precautions and essentials for good report, footnotes and bibliographical citations.	1, 2	5, 6
	Instructional hours		**14**

IV	**Measures of Central Tendency:** Mean, median, mode, their relative advantages and disadvantages. Measures of dispersion — mean deviation, standard deviation, quartile deviation. Co-efficient of variation, percentile and percentile ranks. Association of attributes, contingency tables, correlation, coefficient of correlation and its interpretation, rank correlation, regression equations and predictions.	3	4
	Instructional hours		**14**
V	**Probability** – Rules of probability and its applications. Distribution – normal, binomial, their properties, importance of these distributions in statistical studies. Tests of significance – large and small samples, _t' and _F' test, tests for independence using chi-square test. Analysis of variance – one-way and two-way classification.	1	6
	Instructional hours		**14**
	Related practical Data analysis and presentation using Ms. Excel, SPSS and RSM	3	**5, 2**
	Total instructional hours		**75**

***Question shall be taken only form theory portion**

References

Text Books :

1. Kothari, C.R. Research Methodology: Methods and Techniques, New age International Publications, 4th Edition, 2018
2. Gupta, S.F., Statistical Methods, Sultana Chand and Sons, 3l Revises Edition, 2002
3. Ramakrishnan, P., Biostatistics, Sara Publication, 2001.

Reference Books :

1. Shanthi Sophia Bharathi, Computer Oriented Statistical Methods / Probability and Statistics,Chanilatha Publications, Second Edition, 2000.
2. Donald, H. Mc. Burney, Research Methods, Fifth Edition, Thomson and Wadsworth Publications, 2002

Journals :

1. Journal of research statistics in social science
2. The journal of social science research

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Seminar	Performance in practical	Mini project	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L	L			L			M	H	L	L	
CO2	M	M	L	L					H	H	M	L	L
CO3	H	H	H		M				H	H	L	L	L
CO4	H	H	H		H	H			H	H	L	L	H
CO5	H	H	H	L	H				H	H	M	M	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course code	Title		
21PGFNC311	Paper –XI Nutraceuticals and functional foods		
Semester: III	Credits: 4	CIA :50 Marks	ESE: 50 Marks

Course Objective : To

1. Learn about role nutraceuticals property of foods
2. Know about functional foods and its importance

Course Outcomes :

CO1	Define and identify the nutraceuticals and its sources
CO2	Identify different types of eye, heart and digestive health ingredients
CO3	Examine the types of women and bone & joint health ingredients
CO4	Categorize functional foods and dietary supplements
CO5	Analyze the significance of Asian functional foods

Offered by: Dept. of Food Science and Nutrition

Course content **Instructional hours/week: 5**

Unit	Descriptions	Text Book	Chapter Number
I	**Introduction to Nutraceuticals as Science:** Nutraceutical- Definition, Classification - Dietary supplements, functional foods, historical perspective, scope & future prospects. Applied aspects of the nutraceutical science, sources of nutraceuticals,relation of nutraceutical science with other sciences: medicine, human physiology, genetics, food technology, chemistry and nutrition (brief description).	2	1
	Instructional hours		**15**
II	**Eye, Heart and Digestive Health Ingredients:** Eye health ingredients – lutein, zeaxanthin, astaxanthin, beta-carotene, bilberry extracts; Heart health ingredients - omega-3, omega-6, omega-9, beta- glucan, soy protein, phytosterols; Digestive Health Ingredients – prebiotics, probiotics, synbiotics, digestive enzymes, zinc carnosine	1	3
	Instructional hours		**15**
III	**Women and Bone & Joint Health Ingredients:** Women health ingredients - Vitamin D, iron, calcium, soy isoflavones, folic acid, cranberry extract, lycopene, phytoestrogens; Bone and Joint health ingredients - prebiotic fiber, glucosamine, chondroitin, collagen peptide, hyaluronic acid, devils claw, olive polyphenols, Boswelia Serrata, horsetail extract	2	3
	Instructional hours		**15**
IV	**Functional Foods:** Definition, applications of herbs to functional foods, concept of free radicals and antioxidants; Nutritive and Non-nutritive foodcomponents with potential health effects-Agnuscastus, Aloe vera, Bee products, Chitosan, Echinacea, Garlic, Ginger, biloba, Ginseng, Guarana, Kelp,	2	4

	Milk thistle, Saw palmetto, Spirulina, Chlorella, Hypericumper foratum, Tea extracts. **Dietary supplements** – Need for dietary supplements, supplements forms-tablets, capsules, powders, soft gels, gel caps, liquids		
	Instructional hours	**15**	
V	**Asian Functional food:** Functional Foods from Meat, Fruit, Fermented Vegetable Products: Kimchi, Sugarcane, Garlic, Onion, Date Fruits, Japanese Green Tea, Miso, Fermented Soybean Products. Cereal based Functional food and their health effects.	2	5
	Instructional hours	**15**	
	Total Instructional hours	**75**	

References

Text Books :

1. Bamji (2003), Textbook of Human Nutrition, 3rd edition, Oxford & IBH Publishing Co Pvt Ltd, New Delhi
2. Srilakshmi.B (2012), Nutrition Science, 4th edition, New Age International Pvt Ltd

Reference Books :

1. Wildman, Robert E.C., "Handbook of Nutraceuticals and Functional Foods", CRC Press, New York
2. Webb G.P (2006), Dietary Supplements and Functional Foods, Blackwell Publishing Ltd,
3. New York.
4. John Shi, Chi-Tang Ho and Fereidoon Shahidi, "Asian Functional Foods", First Edition, CRC Press, 2005

Journals :

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.

Tools for Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	E-Content Development	Open book test	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L								M	M	M	M	L
CO2	M								L	M	M	M	L
CO3	M	M			M				L	M	M	M	M
CO4	H	H			M		M		H	M	H	H	H
CO5	H	H			H	M	M		H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNQ303	Practical III - Dietetics		
Semester : III	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective : To

1. Apply the knowledge of diet planning for normal and disease condition
2. Provide hands on training on nutrient calculation on prepared menu

Course Outcomes :

CO1	Recall the principles of diet planning for normal and disease conditions
CO2	Identify right food choices to plan menu
CO3	Assess the nutritional and health status of individual
CO4	Demonstrate diet planning for different health conditions
CO5	Evaluate the nutrient content of prepared diet

Offered by : Food Science and Nutrition

Course content : **Instructional Hours / week: 6**

Menu planning, portion preparation and computation for nutrients for
1. Children
2. Adolescents
3. Adults
4. Old age
5. Pregnant and lactating women

Menu planning, portion preparation and computation for nutrients for
1.Fever
2.Obesity and under nutrition
3.Diabetes
4. Hypertension
5.Liver disease
6.Kidney disease
7.Cancer

Total Instructional hours 90

Tools for Assessment (50 marks)

Test I (Mid term)	Test II (Models)	Observation notebook	Performance in lab experiments	Menu preparation and presentation	Viva voce	Total
10	10	6	8	8	8	50

Mapping

PSO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	M	L					H	H	H	L	L	L
CO2	L	L		H		L			H	H	M	L	M
CO3	H	L	L			L		H	M	H	M	M	M
CO4	H	H	H			L		L	H	H	M	M	M
CO5	H	M			L	L	L	H	H	H	M	M	H

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE301	Elective IIIA-Food Quality, Safety and Analysis		
Semester: III	Credits:4	CIA:50 Marks	ESE:50 Marks

Objectives: To

1. Gain Knowledge on Food Quality and Safety Practices
2. Understand the Regulatory Agencies and Its Regulations

Course Outcome

CO1	Recall the design of food quality assurance programme
CO2	Practice food safety in food processing industry
CO3	Demonstrate the rules and regulations in food quality control
CO4	Interpret the roles of regulatory bodies food quality and safety
CO5	Design food production strategies based on food standards

Course Offered by: Food Science Nutrition

Course Content **Hours of Instruction/week: 4**

Unit	Descriptions	Text book	Chapter
I	**Quality control** – Objectives, Importance, functions of quality control, methods quality analysis, Stages Quality control in the food industry. **Food quality analysis and assurance**–Methods of food quality analysis, Design of company quality assurance program, Microbiological concerns, Managing quality in supply chain and marketing of food products.	1	3
	Instructional Hours		12
II	**Food safety** – meaning of food safety. **Importance of food** quality and safety for developing countries. **Food Hazards**– Physical, Chemical, Biological hazards associated with foods – types, Metal contamination of food, Effect of processing, and storage on food safety. **Types of food toxicants**–Endogenous, natural, synthetic toxicants.	2	3
	Instructional Hours		12
III	**Government Regulations In Quality Control**–FAO/WHO codex Alimentarius Commission, AGMARK, BIS, fair average FS&SA :2006 quality (FAQ) specification for food grains, ISO 22000:2018 series. HACCP– background, current status, structured approach, principles, benefits and limitation, GLP, GMP, Food Hygiene Sanitation–personal hygiene and pest control in the food industry, Consumer Protection Act(CPA)	2	4
	Instructional Hours		12
IV	**International and National Food Agencies and Quality Practices** Organizational structure and functions of FSSAI: 2011, FoSoS, FoSTac, United States Food and Drug Administration (USFDA), Global Food Safety Initiative (GFSI), International		

	Consultative Groupon Food Irradiation (ICGFI), European Food Safety Authority (EFSA), British Retail Consortium (BRC) global standards		
	Role of Central and State Government in imparting quality control–WHO assisted activities–Role of control food laboratory and state food laboratories. Qualification and duties of public analyst and food inspector.	**3,4**	**8**
		Instructional hours	**12**
V	**Food Standards–Cereals products**–bread, biscuits, cakes, pasta products. **Fruit Products**–jam, juices, squashes, ketchup, sauce, **Oils Fats**–coconut oil, groundnut oil, palm oil, sunflower oil, vanaspati. **Sugar**-Refined sugar, Gur, Icing sugar, Honey **Milk & Milk products**–Skimmed Milk Powder, condensed sweetened milk, Cheese, Infant Formula **Patent**–definition, requirements, patent laws India, administrator, need for patent system, advantages, patent procedures. Research and review	**4**	**6**
		Instructional hours	**12**
		Total Instructional hours	**60**

References:

1. A first course in food Analysis–A.Y. Sathe, New Age Publications, 1999.
2. Harry T. Lawless, Hildegarde, Sensory Evaluation of Food Principles and Practices, Second Edition, Springer Science, 2010.
3. Joshi, V.K Sensory Science : Principles And Applications in Food Evaluation., 2016.
4. Technology of Food Preservation–Desrosier Desrosier, CBS Publishers, First Edition,1999.

Tools for Internal Assessment (50 marks)

CIAI	CIAII	CIAIII	Market survey	Seminar	Case studies	Total
8	8	10	8	8	8	50

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L			L				L	L	M	L	L
CO2	H	H	M		M	M			L	M	H	H	H
CO3	H	H	M		H	H			M	H	H	H	H
CO4	M	M			L	L			L	M	M	M	L
CO5	H	H	H		H	H			M	H	H	H	H

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE302	Elective III B-Culinary Techniques		
Semester: III	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective : To

1. To gain knowledge on culinary techniques
2. To study about other techniques related to culinary

Course Outcomes :

CO1	Recall the principles of culinary techniques
CO2	Demonstrate the rules and regulations of culinary techniques
CO3	Plan food production based on culinary techniques
CO4	Examine culinary techniques and improve it
CO5	Organize scheduled food productions

Offered by : Food Science and Nutrition

Course Content **Instructional hours / week: 4**

Unit	Descriptions	Text book	Chapter
I	**Equipments** – Identification, Description, Uses & handling ii) Hygiene – Kitchen etiquettes, Practices & knife handling iii) Safety and security in kitchen **Vegetables** – classification ii) Preliminary preparation and different shapes of cutting	1	3
	Instructional hours		**12**
II	Basic Cooking methods and pre-preparations ii) Blanching of Tomatoes and Capsicum iii) Broiling of egg iv) Boiling (potatoes, Beans, Cauliflower, etc) v) Frying – (deep frying, shallow frying, sautéing) Aubergines, Potatoes, etc. vi) Braising – Onions, Leeks, Cabbage vii) Starch cooking (Rice, Pasta, Potatoes) **Stocks** – Types of stocks (White and Brown stock) ii) Fish stock iii) Emergency stock iv) Fungi stock	2	4
	Instructional hours		**12**
III	Espagnole-Sauces – Basic mother sauces Béchamel, Tomato, Mayonnaise, Hollandaise, Veloute. Egg cookery – Preparation of variety of egg dishes Boiled (Soft & Hard) Fried (Sunny side up, Single fried, Bull‟s Eye, Omelette(Plain, Scrambled, fried) Poaches, Double, En cocotte (eggs Benedict) Stuffed, Spanish)	2	8
	Instructional hours		**12**
IV	Simple Salads & Potato salad; Beet root, Soups: Cole slaw, Consomsmé, Fruit salad, salad, Green salad, Assorted omelletes, Simple Egg preparations: Scotch egg, Oeuf, Oeuf Farci, Oeuf Benedict, Oeuf Florentine, Oeuf Deur Mayonnaise, Portugese	3	6
	Instructional hours		**12**

V	Mashed, Simple potato preparations, Baked potatoes, Boiled potatoes, Roasted potatoes, French fries, potatoes, Allumettes, Lyonnaise potatoes. Glazed, Vegetable preparations Boiled vegetables, Stewed vegetables, Fried vegetables, vegetables	3	5
	Instructional hours		**12**
	Total Instructional hours		**60**

References :

Text books:

1. Mrs. K.Arora, Theory of Catering, Frank Brothers Modern Cookery for Teaching & Trade, 2001
2. Ms. Thangam Philip, Orient Longman Chef Manual of Kitchen Management,2010
3. Jane Grigson Indian and neighboring countries Food, 2009

Reference books:

1. Brow, A., **Understanding Food**, Thomson Learning Publications, Wadsworth, 2000
2. Delfakis, H. Scanion, W.C. and Van Burch, J.B. Food service Management, SouthWestern Publication Co., cincinattti, Ohio, 1992

Journals

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.

Tools for Assessment (50 marks)

CIA I	CIA II	CIA III	Seminar	Assignment	Product preparation and display	Total
8	8	10	8	8	8	50

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	L			L				L	L	M	L	L
CO2	M	M	M		M	L	L		L	M	M	M	L
CO3	M	M	M		M	L	L		L	M	M	M	L
CO4	H	H	M		H	M	L		M	H	H	H	H
CO5	M	M	M		M	H			L	M	M	M	L

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE303	Elective III C-Food product development and Marketing		
Semester: III	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective: To

1. Identify new marketable, nutritionally and economically viable food products
2. Learn about marketing plan for the food products

Course Outcomes :

CO1	Analyse the trends and dimensions in food consumption pattern
CO2	Recall the types of food processing techniques
CO3	Apply the principles in product development and design
CO4	Demonstrate new recipe development
CO5	Exhibit entrepreneurship skills in food processing

Offered by : Food Science and Nutrition

Course content **Instructional Hours / week : 4**

Unit	Description	Text book	Chapter
I	**Food consumption pattern Trends in Food Consumption pattern-** Economical, Psychological and Sociological Dimensions of Food Consumption patterns. Trends in Social Change as a Base for New Product Development	1,2	6
	Instructional hours		**12**
II	**Introduction to Food Processing and Product Development** Food Components, Types of Food Processing, Status of Food Processing Industry in India and Scope of Growth in Future Principles and Purpose of New Product Development, Product Design and Specifications.	2	8
	Instructional hours		**12**
III	**Recipe Development** Traditional Foods, Weaning Foods, Convenience Foods, RTE, RTS, Extruded foods, IMF Foods, Specialty products, Health foods,Nutritional Supplements, Functional Foods, Nutraceuticals and Designer Foods, Sports Foods, Foods for Defense Services, Space foods	1,3	5
	Instructional hours		**12**
IV	**Testing, Evaluation and Packaging of Products** Standardization, Portion size, Portion Control, Quantity Cooking, Shelf Life Evaluation- Sensory and Microbial Testing of Processed Foods, Nutrient Analysis. Suitable Packaging Materials for Different Foods, SWOT Analysis .	2	5
	Instructional hours		**12**

V	**Financial Management and Marketing of Food Products** Institutional Support (Training and Finance) for Entrepreneurship Development. Financial Institutions (Central and State Government) banks/Funding Agencies, Financial Accounting Procedures, Book Keeping,Market Research, Marketing Strategies, Cost Calculation , Advertising Methods, Product sales, Product License, Legal specifications, Consumer Behaviour and Food Acceptance	3	1
	Instructional hours		**12**
	Total Instructional hours		**60**

References:

Text books:

1. Sudhir Gupta, Handbook of Packaging Technology, Engineers India Research Institute, New Delhi 2. Khanaka, S.S., Entrepreneurial Development, S. Chand and Company Ltd, New Delhi, 2016.
2. Suja, R. Nair, Consumer Behaviour and Marketing Research, 1st Edition, Himalaya Publishers, 2014.
3. Hmacfie, Consumer led Food Product Development, Weedhead Publishing Ltd., UK 3. Fuller, Gordon, W(2015) New Food Product Development, 2nd Edition, CRC Press, BocaRaton, Florida, 2017

Reference books:

1. Mehas, K.Y. and Rodgers, S.L. Food Science and You, McMillan McGraw Company, New York, 2000

Journals:

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore

Tools for Internal Assessment (25 marks)

CIA I	CIA II	CIA III	Seminar	Market survey	Mini project	Total
8	8	10	8	8	8	50

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H		L	M				H	H	L	M	H
CO2	L	L			L				L	L	M	L	L
CO3	H	H	M	L	M		M		L	L	H	H	H
CO4	M	M			M				M	H	H	H	H
CO5	H	H		H	H				M	M	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNC412	Paper-XII Community nutrition		
Semester: IV	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective: To

1. Gain insight into nutritional problems of the community
2. Understand the various nutrition intervention programmes for the vulnerable groups

Course Outcomes :

CO1	Demonstrate nutrition assessment and infer the malnutrition status
CO2	Take part in national nutritional intervention programmes
CO3	Develop nutrition education programmes with effective tools
CO4	Analyze the challenges and prospects of community health programmes
CO5	Execute the role of nutritionist in emergency situations

Offered by: Food Science and Nutrition

Course content **Instructional Hours / week: 5**

Unit	Descriptions	Text book	Chapter number
I	**Malnutrition:** Relation of nutrition to national development, Consequences of malnutrition, IMR, NMR,MMR and prevalence of common nutritional problems- PEM, Anaemia, Iodine Deficiency, Fluorosis, Vitamin A deficiency, B complex deficiency Ecological factors leading to malnutrition, synergism between malnutrition and infection, measures to overcome malnutrition **Assessment of Nutritional Status:** Anthropometric survey, dietary survey, biochemical methods, growth monitoring methods, food consumption survey, body composition studies. Test of intelligence related to nutrition	1,2	7,1 3
	Instructional hours		**15**
II	**Nutrition Intervention Programmes:** Objectives, Special nutrition programme (SNP), Modified Applied Nutrition Programmes (ANP), Integrated Child Development Services (ICDS), Tamil Nadu Integrated Nutrition programme (TFNP) and Noon Meal Scheme, Poshan abhiyan, Nutritional programmes for adolescents **Role of International Organizations** - Food and Agriculture Organization (FAO), World Health Organisation (WHO), United Nations International Children's Emergency Fund (UNICEF), Co- operative American Relief Everywhere (CARE) and World Bank. **National Organizations** National Institute of Nutrition (NIN), National Nutrition Monitoring Bureau (NNMB), Indian Council of Agriculture Research (ICAR), Indian Council of Medical Research (ICMR), Central Food Technological Research Institute (CFTRI)	2 1	17-21 22
	Instructional hours		**15**
III	**Nutrition Education** - Objectives, definitions, importance of nutrition education to the community. **Methods of nutrition education and nutrition education programmes**: Planning, implementation and evaluation, training workers in nutrition education programmes, integration of nutrition education with education and extension of works, nutrition and health education for adolescent girls, lactating and pregnant women. Nutrition education in schools and community.	1 2	23 32
	Instructional hour		**15**

IV	**Community Health:** Concepts of community Health, National Health Policy, Primary Health Center (PHC)- Concept, organization, current status in India and delivery of service, Taluk level hospitals, Employees State Insurance (ESI) **Epidemiology of Communicable Diseases** Factors responsible for the spread of communicable diseases, mode of transmission — chicken pox, typhoid fever, tuberculosis, malaria, leprosy, filariasis and AIDS. Prophylaxis and Immunization schedule. Waste disposal system in India.	1	25
	Instructional hours		**15**
V	**Emergency situations** Types of disasters -Famine, drought, flood, earthquake, cyclone, Tsunamis, coastal hazards, war, civil and political emergencies. **Disasters management**- mitigation strategies, role of NGOs and GOs and nutritionists, prevention, warning systems and relief, Major nutritional and health considerations in disaster, emergency feeding, mass and supplementary feedings, management of feeding operations, water and food safety.	3	12
	Instructional hours		**15**
	Total instructional hours		**75**

Text Books:

1. Srilakshmi. E., Nutrition Science, New Age International Publishers, 2012.
2. Bamji M.S., Prahlad Rao N., Reddy V., Textbook of Human Nutrition II Edition, Oxford and PBH Publishing Co. Pvt. Ltd, New Delhi, 2004.
3. Michael. J. Libney , Public Health Nutrition , Nutritional Society 2004

Reference Books:

1. Bhatt D.P., Health Education, Khel Sahitya Kendra, New Delhi, 2008.
2. Gibney M J., Margetts BM., Kearney JM., Arab, L., Public Health Nutrition Blackwell Publishing Co. UK, 2004.
3. Jelliffee, D.D., Pathes, Assessment of Nutritional Status of community, WHO Geneva, 1989.

Journals:

1. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.
2. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.

Tools for Assessment (50 marks)

CIA I	CIA II	CIA III	Preparation of education materials	Seminar	Mini Community nutrition survey	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	L	L	M	M			H	H	L	L	H
CO2	M	M		M	M	M			L	M			L
CO3	M	L	H	H	M	L	L	L	M	M			M
CO4	H	H	H		H				H	H	M	L	H
CO5	H	H	H		H				H	H	M	H	H

H-High; M- Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNC413	Paper-XIII–Food Microbiology		
Semester: IV	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Objectives: To

1. Acquire knowledge eon microbes and its application in food industry
2. Understand the importance of microbial safety and quality management in food processing.

Course Outcomes:

CO1	Identify the types of microorganism and its growth pattern
CO2	Explain the role of microbes in food spoilage and preservation
CO3	Examine the microbial load in given food sample
CO4	Describe the methods to prevent microbial growth in food
CO5	Discuss the causes and symptoms of food borne diseases

Offered by: Dept. of Food Science and Nutrition

Course content **Hours of Instructions/week:5**

Unit	Description	Text Book	Chapter number
1	**Introduction to Microbiology** -Structure, Growth and Multiplication of micro-organisms Definition and History: Microscopy, General Morphology and Types of microorganisms, Bacteria, Fungi, Algae, Yeast and Virus– Bacteriophage, growth curve, batch and continuous culture, factors affecting growth, intrinsic factors and extrinsic factors	1,3	**2, 4**
	Instructional hours	**12**	
II	**Microbiology of Foods**-Contamination, spoilage and preservation of cereal and cereal products, sugar and sugar, vegetables and fruits, milk and milk products and canned foods, meat and meat products, egg and poultry, fish, food fermentation-types, fermented food products	2	**5**
	Instructional hours	**12**	
III	**Microbiology assessment:** Determination of microorganisms and their products in food: Sampling, sample collection, transport and storage, sample preparation for analysis. **Microscopic and culture dependent methods**-Direct microscopic observation, culture, enumeration and isolation methods **Chemical and Physical methods**-Chemical, immunological and nucleic acid based methods **Culture independent techniques** – PCR Based, DGGE, Metagenomics, etc., Analytical methods for microbial metabolites-microbial toxins and Metabolites, Rapid test	3	**7**
	Instructional hours	**12**	
IV	**Protection and preservation of Foods** - Chemical, Modified atmosphere, Radiation in foods from the microbiological angle. Indicators of water and food safety and quality on microbial safety, Microbiological criteria of foods and their Significance, Microbiological standards for foods	3	9
	Instructional hours	**12**	
V	**Food borne diseases** **Bacterial food borne diseases-** Staphylococcal in-toxification,	2	**8**

	Botulism, Clostridium Perfringens gastroenteritis, Bacilluscereus Gastroenteritics) **Food Borne Viral Pathogens-** (Norwalkvirus, Norovirus, Reovirus, Rotavirus, Astrovirus, Adenovirus, Parvovirus, Hepatitis A Virus) **Food Borne Animal Parasites -** Protozoa –Giardiasis, Amebiasis, Toxoplasmosis, Sarcocystosis, Crypotosporiodiosis. Cysticercosis/Taeniasis. Round worm –Trichinosis, Anisakiasis. Mycotoxins: Aflatoxicosis, Deoxynivalenol Mycotoxicosis, Ergotism, Sanitary and Phyto-Sanitary measures, Plant Quarantine Act.	
Instructional hours		**12**
Related Practical Experiences 1. Preparation of culture media and sterilization techniques 2. Isolation of bacteria using spread plate and streak plate method.. 3. TPC, Yeast , mould and Coliform counting 4. Preparation of smear. **5.** Simple staining & Gram staining		
		10
Total instructional hours		**75**

References

Text Books:

1. Adams M.R and Moss M.O., Food Microbiology, New Age International(P)Ltd., New Delhi, 2005.
2. Frazier. W., Food Microbiology, Mc, Grawhillcoltd,NewDelhi,2005.
3. Curricula on Food Safety, Directorate of General of health Services, Ministry of health & Welfare, Govt of India, NewDelhi,2003.

Reference Book

1. David A. Shapton, Naroh F., Shapton, Principles and practices for the safe processing of foods, Heineman ltd, Oxford, 1991
2. Singh, S.P., Food Safety, Quality Assurance, and Global Trade: Concerns and Strategies, International Book Distributing Company, Lucknow, 2009

Journals

1. Indian Journal of Medical Research, Indian Council of Medical ResearcNew Delhi.
2. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore.

Tools for Internal Assessment (50 marks)

CIAI	CIAII	CIAIII	Seminar	Performance in practical	Mini project	Total
8	8	10	8	8	8	50

Mapping

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M			M	L			L	L	M	M	L
CO2	M	M	L	M	L				L	L	M	M	L
CO3	H	H	H		H	M	L		L	L	H	H	H
CO4	M	M	M	L	L				M	M	H	H	H
CO5	M	M	L		L				H	H	M	M	M

H- High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNV401	Project Work &Viva voce		
Semester : IV	Credits : 8	CIA : 80 Marks	ESE : 120 Marks

Course Objective : To

1. Acquire practical knowledge on the implementation of the concept studied
2. Learn to develop research strategies in a systematic way

Course Outcomes :

CO1	Apply scientific research, including microbiology, food science and food safety to functions of ingredients in food and process controls
CO2	Develop method to analyse the nutritional related problems in the society
CO3	Develop qualitative and quantitative research strategy to estimate the existing issues
CO4	Utilize outcomes based research and statistics to interpret a nutrition and food processing issue
CO5	Design a community intervention based upon a needs assessment

Offered by : Food Science and Nutrition

Course Content : **Instructional Hour/Week : 21**

Project work &

PROJECT WORK

TITLE OF THE PROJECT

Bonafide Work Done by

STUDENT NAME

REG. NO.

Dissertation submitted in partial fulfillment of the requirements for the award of <Name of the Degree>of Bharathiar University, Coimbatore-46.

College emblem

Guide HoD

Submitted for the Viva-Voce Examination held on _____

Internal Examiner External Examiner

Counter Signature

Dean Principal

Month – Year

CONTENTS

Viva Voce

Viva-Voce will be conducted at the end of the semester by both Internal (Respective Guides) and External Examiners, after duly verifying the Project Report available in the College, for a

Total 315

Continuous Internal Assessment (CIA):80 Marks

S.No.	Distribution Details	Marks
1	Review-I (Last Week of December)	20
2	Review-II (Last Week of January)	20
3	Review-III (Last Week of February)	20
	Document, Preparation and Implementation (First Week of March)	20
	Total Marks	**80**

Mapping

PO/PSO /CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H			M	L			M	M	M	M	H
CO2	M	M	L	M	L				M	M	M	M	H
CO3	H	H	H		H	M	L		M	M	H	H	H
CO4	H	H	M	L	L				M	M	H	H	H
CO5	H	H	L		L				H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNY401	Elective IV A-Food Quality Control practical		
Semester : IV	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective: To

1. Equip the students with application of techniques
2. To understand the quality analysis of food products

Course Outcomes :

CO1	Distinguish different quality analysis techniques
CO2	Identify the elements that are part of the quality measuring process in the industry
CO3	Predict the errors in the measuring process, distinguishing its nature and the root causes.
CO4	Apply relevant techniques for different foods
CO5	Standardize the formulated foods

Offered by : Food Science and Nutrition

Course content **Instructional Hours / week : 4**

S. No	Description
1	Estimation of titrable acidity.
2	Estimation of total solids
3	Estimation of specific gravity in foods.
4	Estimation of fat content in food by volumetric Gerber method.
5	Analysis of pectin in foods.
6	Estimation of lactose in milk.
7	Test for rancidity in oils – Kries test
8	Food adulteration test of processed food
9	Thousand kernel weight
10	Preparation and inoculation of growth media –counting of microbes.
11	Product formulation and standardization
12	Evaluation of sensory characteristics – development of score cards
13	Consumer acceptability and popularization of formulated product
	Total hours of instructions 60

Tools for Assessment (50 marks)

Test I (Mid term)	Test II (Models)	Observation notebook	Performance in lab experiments	Product formulation	Results and presentations	Total
10	10	6	8	8	8	50

Mapping

PO/PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	L	M						L	L	M	M	L
CO2	H	M							L	M	M	M	M
CO3	H	H	M						L	M	M	M	H
CO4	H	H	H			M			M	M	H	H	H
CO5	H	H	H			H			M	M	H	H	H

H-High; M-Medium; L-Low

Course Code	Title		
21PGFNY402	Elective IV B-Food Service Management Practical		
Semester : IV	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective : To

1. Equip the students with application of techniques
2. To understand the food service management concepts

Course Outcomes :

CO1	Relate concept of changes in food and food product formulation
CO2	Plan menu for different occasions
CO3	Select food products based on economical consideration
CO4	Demonstrate quantitative cooking and portion control
CO5	Standardize the new food products

Offered by: Food Science and Nutrition

Course content **Instructional Hours / week: 4**

S.No	Description
1	Standardization of at least 2 recipes in each of the following category • Cereal and cereal products • Fruits/Vegetables
2	Planning and preparation of menu for various occasions. • Simple wedding • Birthday party • Grand wedding • Different religion wedding • International conference
3	Preparation of quantity recipes for 20 persons with a main dish, 2side accompaniments and a dessert/soup.
4	Visit to catering establishments (1 in each category) welfare, commercial and transportcatering.

Tools for Assessment (50 marks)

Test I (Mid term)	Test II (Models)	Observation notebook	Performance in lab experiments	Menu planning and product presentation	Visit to catering institution	Total
10	10	6	8	8	8	50

Mapping

PO/PSO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	H	H			M	L			M	M	M	M	H
CO2	M	M	L	M	L				M	M	M	M	H
CO3	H	H	H		H	M	L		M	M	H	H	H
CO4	H	H	M	L	L				M	M	H	H	H
CO5	H	H	L		L				H	H	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNE403	Elective IV C-Food Industrial Waste Management		
Semester : IV	Credits : 4	CIA : 50 Marks	ESE : 50 Marks

Course Objective : To

1. Develop the skill about Food Industrial waste management
2. Learn about how to segregate waste

Course Outcomes :

CO1	Explain the principles of food waste management
CO2	Demonstrate the techniques for food waste management
CO3	Plan food industrial management programme
CO4	Discuss on action plan for industrial food waste management
CO5	Apply appropriate techniques to dispose food waste

Offered by : Food Science and Nutrition

Course content **Instructional Hours / week: 4**

Unit	Description	Text book	Chapter
I	Introduction; Classification & characterization of food industrial wastes from fruit and vegetable processing industry, beverage industry, fish, meat and poultry industry, sugar industry and dairy industry.	1	2
	Instructional hours		**12**
II	Waste disposal methods- physical, chemical and biological; Economical aspects of waste treatment and disposal.	3	10
	Instructional hours		**12**
III	Treatment methods for liquid wastes from food process industries; Design of activates sludge process, Rotating biological contactors, Trickling filters, UASB, Biogas plant.	4	8
	Instructional hours		**12**
IV	Treatment methods of solid wastes; Biological compositing, drying and incineration; Design of solid waste management system; Landfill digester, Vermi composting pit.	5	7
	Instructional hours		**12**
V	Biofilters and bioclarifiers, Ion exchange treatment of waste water, Drinking– water treatment, Recovery of useful materials from effluents by different methods.	5	15
	Instructional hours		**12**
	Total Instructional hours		**60**

References :

Text books :

1. Food Industry Wastes: Disposal and Recovery; Herzka A & Booth RG;, Applied Science Pub Ltd, 1981
2. Water & Wastewater Engineering; Fair GM, Geyer JC & Okun DA; John Wiley & Sons, Inc., 1986,

Reference books :

1. Symposium: Processing Agricultural & Municipal Wastes; Inglett GE; AVI. 1973,
2. Food Processing Waste Management; Green JH & Kramer A; 1979
3. Environmental Biotechnology: Principles and Applications; Rittmann BE & Mc Carty PL;, Mc-Grow-Hill International editions, 2001

Tools for Assessment (50 marks)

CIA I	CIA II	CIA III	Model preparation	Seminar	Mini project	Total
8	8	10	8	8	8	50

Mapping

PO&PSO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M			M	L			L	L	M	M	L
CO2	M	M	L	M	L				L	L	M	M	L
CO3	H	H	H		H	M	L		L	L	H	H	H
CO4	M	M	M	L	L				M	M	H	H	H
CO5	M	M	L		L				H	H	M	M	M

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course	Title
21PGFNSS01	**Food Toxicology**

Objectives: To

1. Understand the basic concept of food toxicology
2. Learn the impact and risk of dietary chemicals to human health

Course outcomes:

CO1	Explain the principles of toxicology
CO2	Recall the natural toxicants in foods
CO3	Identify the natural allergens present in foods
CO4	Comprehend the environmental contamination in foods
CO5	State the ways of contamination of foods during processing

Offered by: Food Science and Nutrition

Course content

Unit	Descriptions
I	**Principles of Toxicology:** Classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity. Evaluation of toxicity
II	**Natural toxins in food:** Natural toxins of importance in food- toxins of plant and animal origin; microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins), natural occurrence, toxicity and significance, determination of toxicants in foods and their management.
III	**Food allergies and sensitivities:** Natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions.
IV	**Environmental contaminants and drug residues in food:** Fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g. Malachite green in fish and βagonists in pork); other contaminants in food, radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.
V	**Toxicants added or formed during food processing:** Food processing generated toxicants: nitroso-compounds, heterocyclic amines, dietary Supplements and toxicity related to dose: common dietary supplements; relevance of the dose; possible toxic effects.

References:

1. Klaassen, Curtis; Watkins III, John B., Casarett & Doull's Essentials of Toxicology, Third Edition, McGraw-Hill Medical, 2015
2. Tõnu Püssa, Principles of Food Toxicology, Second Edition, CRC Press, 2013

3. S.S. Deshpande Ed, Handbook of Food Toxicology, CRC Press, 2013
4. Helferich, W., and Winter, C.K., Food Toxicology, CRC Press, LLC. Boca Raton, FL, 2001

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M								M		M	M	
CO2	H	M								M	M	M	
CO3	H	L			M					L	H	H	H
CO4	H	H			L				L	L	H	H	H
CO5	H	M			H				M	M	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title
21PGFNSS02	Bakery and Confectionery

Objectives: To

1. Know the basic science in bakery and confectionery
2. Learn about role of ingredients in bakery product preparations

Course outcomes:

CO1	State the role of ingredients in the bakery
CO2	Explain the procedure of bread and pie making
CO3	Exhibit skills in cake decoration
CO4	Discuss the methods of preparation of cookies making
CO5	Summarize the sugar confectioneries and its manufacturing process

Offered by: Food Science and Nutrition

Course Content

Unit	Description
I	**Role of raw materials in bakery:** Raw materials, essential ingredients, other ingredients, Functions of various raw materials used in baking industries materials of baking. leaveners and yeast foods, shortenings, emulsifiers and antioxidants, sweeteners, water and salt, ingredients from milk and eggs, fruits, vegetables, and nuts, spices, flavors and colors. Preservation methods
II	**Bread:** Straight dough fermentation, sponge and dough, accelerated processing, chorley wood bread process, dough retarding and freezing, Stages in processing of bread and bread making methods Characteristics of good bread and Bread defects/faults and remedies. **Preparation pastries and pie** – types of pastries – different methods of making pastries – methods of lamination process in pastries
III	**Cakes and cake decoration:** Production of cakes, Types, Ingredients and their function structure builders. Tenderizers, moisteners and flavor enhancers – Selection and preparation of mould Temperature and time required for different type of cake, problems of baking.
IV	**Biscuits and cookies:** Ingredients selection, production of cookies/biscuits. Types of biscuit dough's – Developed dough, short dough's, semi-sweet, baking.
V	**Confectionery products:** Definition, importance of sugar confectionery and flour confectioner. Types of confectionery products-chocolate boiled sweets caramels toffees, fondants, manufacturing process

References

1. Matz, Samuel A., "Bakery Technology and Engineering", Third Edition, Chapman & Hall, London, 2007
2. Cauvain, Stanley P, and Yound, Linda S., " Technology of Bread Making", Second Edition Aspen publication, Maryland, 2005.
3. Pomeranz. Y. "Modern Cereal Science and Technology". MVCH Publications, New York.2003.
4. Samuel A., Matz., " Equipment for Bakers", Pan Tech International Publication, 2009

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M								M		M	M	
CO2	H	M								M	M	M	
CO3	H	L			M					L	H	H	H
CO4	H	H			L				L	L	H	H	H
CO5	H	M			H				M	M	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course Code	Title		
21PGFNSS03	Food Safety Management		
Semester : I -IV	Credits : 2	CIA : -	ESE : 100 Marks

Course Objective: To

1. Acquire knowledge in the role of micronutrients in health and disease.
2. Understand the recent advance in the study of micro-nutrient

Course Outcomes:

CO1	Recall the food safety standards and laws
CO2	Practice the guidelines of FSSAI
CO3	Identify the nutrients and causes of food spoilage
CO4	Summarize the food preservation methods
CO5	Execute food safety and standards in industry

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Course content

Unit	Content
I	**Indian and International Food Laws** Indian and International Food Laws (An Overview), Food Safety and Standards Act of India, 2006 Provision, definitions and different sections of the Act and implementation. FSS Rules and Regulations, Overview of other relevant national bodies (e.g. APEDA, BIS EIC, MPEDA, Spice Board etc.) International Food Control Systems/Laws, Regulations and Standards/Guidelines with regard to Food Safety– (i) Overview of CODEX Alimentarius. Commission (History, Members, Standard setting and Advisory mechanisms: JECFA, JEMRA, JMPR): WTO agreements (SPS/TBT). Important national and international accreditation bodies
II	**FSSAI-Role, Functions, Initiatives** (A General Understanding) Genesis and evolution of FSSAI, structure and functions of food authority, overview of systems and processes in standards, enforcement, laboratory ecosystem, imports, third party audit etc. Promoting safe and wholesome food (eat right India, food fortification, SNF, clean street food hub, RUCO and various other social and behavioural change initiatives),training and capacity building, role of state food authorities.
III	**Food Chemistry and Food Microbiology** Role, Structure and functions and roles of macro-and micro nutrients in human nutrition, antinutritional factors and their removal from foods, enzymes as food processing aids, nutraceuticals and functions foods, food fortification. General principles of food microbiology, sources of microorganisms, microbiological quality of foods, food borne pathogens Microbial food spoilage and Food borne diseases, beneficial microorganisms and their role in food processing and human nutrition.

IV	**Food processing, Preservation and Packaging** Basic principles and methods of food Preservation: Heat processing, pasteurization, canning, dehydration, freezing, irradiation and chemical additives. Modified atmosphere storage,. Aseptic processing, hurdle technology, non thermal processing, food packaging methods including novel packaging materials/ techniques.
V	**Food safety management and Food quality** General principles, systems including traceability and recall, HACCP, Good production and processing practices GMP, GAP, GHP, GLP, BAP. Food Surveillance, Food Recall, Quality control, Safety issues in food packaging materials, Sampling techniques, non destructive food quality evaluation methods.

References

1. A first course in food analysis – A. Y. Sathe, New Age Publications, 1999
2. Technology of food preservation – Desrosier and Desrosier, CBS Publishers, Fourth edition,1999
3. Adams M. R and Moss M. O., Food Microbiology, New Age International (P) Ltd., New Delhi, 2005
4. Vijaya Ramesh, K., Food Microbiology, MJP Publishers, Chennai, 2007

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M								M		M	M	
CO2	H	M								M	M	M	
CO3	H	L			M					L	H	H	H
CO4	H	H			L				L	L	H	H	H
CO5	H	M			H				M	M	H	H	H

H-High; M-Medium; L-Low

Course designed by	Verified by	Checked by	Approved by

Course	Title
21PGFNSS04	Entrepreneurship in Food Processing

Objectives: To

1. Create entrepreneurial spirit among students
2. Know the business opportunities in food processing

Course outcomes:

CO1	State the types of entrepreneurship
CO2	Comprehend the types of creativity and innovations
CO3	Explain the concept of marketing
CO4	Illustrate the layout of food processingindustry
CO5	Summarize the elements of businessplan

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Course content

Unit	Descriptions
I	**Entrepreneurship in Food processing:** Definition, Entrepreneurship and entrepreneur, types of entrepreneurship, qualities of an entrepreneur, identification of opportunities in food processing sector
II	**Innovation and Product development** Nature of creativity, types of creativity, types of innovation, phases of innovatio dentification, product development cycle, market survey, pricing.
III	**Marketing** Introduction to marketing, concept of marketing, marketing strategies, e-business
IV	**Food processing factory and plant lay out** Concept of factory design, factors affecting factory design, plant layout, floor plan sequence in food processing, different types of food industries lay outs, safety measures
V	**Unit V Business plan** Elements of business plan, business plan preparation, break event analysis, preparation of bankable project proposals

References:

1 Poornima M. Charantimath, Entrepreneurship Development and SmallBusiness Enterprise,Dorllingkendersley publisher, Delhi, 2006

2 SelchoukSami, The Book on Entrepreneurship and Property: The Guide to Successful Entrepreneurship and Property, Investment,Author house publisher, 2013

3 Plant Layout and Design by J.M. Moore Published by The Mcmillan company, 2006

Mapping

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M								M		M	M	
CO2	H	M								M	M	M	
CO3	H	L			M					L	H	H	H
CO4	H	H			L				L	L	H	H	H
CO5	H	M			H				M	M	H	H	H

H-High; M-Medium; L-Low

Prepared by	Verified by	Checked by	Approved by