



**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**

### **(2022-23)**



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 Nehru Gardens, Thirumalayampalayam, Coimbatore - 641 105, Tamil Nadu



**Scheme of Examination M.Sc. Food Science and Nutrition**  
**(Programme Code: PGFN)**

(Applicable to the students admitted during the year 2022-2023 and onwards)

Semester	Sub. Code	Name of the Subject	Instruction hours / week	Duration of Examination	Examination Marks			Credits
					CIA	ESE	Total	
I	22PGFNC101	Paper-I Advanced Food Science	5	3	50	50	100	4
	22PGFNC102	Paper – II Nutrition Through Life Cycle	5	3	50	50	100	4
	22PGFNC103	Paper- III Nutritional Biochemistry	5	3	50	50	100	4
	22PGFNC104	Paper –IV Nutrition in Disease –I	5	3	50	50	100	4
	22PGFNE101/ 22PGFNE102/ 22PGFNE103	Elective Paper -I	4	3	50	50	100	4
	22PGFNQ101	Practical -I Food Analysis Practical	6	3	50	50	100	4
		<b>Sub total</b>	<b>30</b>			<b>600</b>	<b>24</b>	
II	22PGFNC205	Paper –V Food Processing and preservation Techniques	5	3	50	50	100	4
	22PGFNC206	Paper – VI Macronutrients	5	3	50	50	100	4
	22PGFNC207	Paper – VII Physiological Aspects of Nutrition	5	3	50	50	100	4
	22PGFNC208	Paper-VIII Nutrition in Disease-II	5	3	50	50	100	4
	-	Online course	-	-	-	-	-	-
	22PGFNE201/ 22PGFNE 202/ 22PGFNE 203	Elective Paper - II	4	3	50	50	100	4
	22PGFNQ202	Practical –II Dietetics	6	3	50	50	100	4
<b>30 days internship training in food processing industry /multispecialty hospital is compulsory</b>								

		<b>Sub total</b>	<b>30</b>				<b>600</b>	<b>24</b>	
III	22PGFNC309	Paper – IX Micronutrients	5	3	50	50	100	4	
	22PGFNC310	Paper – X Research Methodology and Statistics	5	3	50	50	100	4	
	22PGFNC311	Paper – XI Nutraceuticals and Functional Foods	5	3	50	50	100	4	
	22PGFNC312	Paper – XII Nanotechnology and IoT applications in Food Industry	6	3	50	50	100	4	
	22PGFNE301/ 22PGFNE302/ 22PGFNE303	Elective Paper -III	4	3	50	50	100	4	
	22PGFNT301	Internship*	-	-	-	-	50	2	
	22PGFNV401	Project Work & Viva voce	5	-	-	-	-	-	
	22PGFNONLC	Online course	-	3	-	-	100	4	
		<b>Sub total</b>	<b>30</b>				<b>650</b>	<b>26</b>	
IV	22PGFNC413	Paper – XII Community Nutrition	5	3	50	50	100	4	
	22PGFNC414	Paper – XIII Food Microbiology	5	3	50	50	100	4	
	22PGFNV401	Project Work & Viva voce	16	-	100	100	200	8	
	22PGFNY401/ 22PGFNY402/ 22PGFNE403	Elective Paper -IV	4	3	50	50	100	4	
			<b>Sub total</b>	<b>30</b>				<b>500</b>	<b>20</b>
							<b>Total</b>	<b>2350</b>	<b>94</b>

#### List of Elective Papers

<b>Paper/Sem</b>	<b>Group A</b>	<b>Group B</b>	<b>Group C</b>
Elective Paper I/Sem I	Convenience Foods (22PGFNE101)	Sports Nutrition (22PGFNE102)	Food Commodities (22PGFNE103)
Elective Paper II/Sem II	Food Packaging (22PGFNE201)	Nutrigenomics (22PGFNE202)	Instrumentation in Food Processing (22PGFNE203)
Elective Paper III/Sem III	Food Quality, Safety and Analysis (22PGFNE301)	Culinary Techniques (22PGFNE302)	Food Product Development and Marketing (22PGFNE303)
Elective Paper IV/Sem IV	Food Quality Control Practical (22PGFNY401)	Advanced Dietetics Practical (22PGFNY402)	Food Industrial Waste Management (22PGFNE403)

**List of Advanced Level Courses**

S. No.	Course Code	Name of the Course
1	22PGFNSS01	Food toxicology
2	22PGFNSS02	Bakery and Confectionery
3	22PGFNSS03	Food Quality Management
4	22PGFNSS04	Entrepreneurship in food processing

**List of Co-scholastic Courses\*\***

S. No.	Course Code	Name of the Course	Duration	Credit
1	22CCFN001	Dairy technology	60 hours	2
2	22CCFN002	Wellness and Fitness	60 hours	2

- Students shall complete any one of the courses before their fourth semester
- They shall be awarded with certificate by the institution on course completion

**\*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.

**CHAIRPERSON**

Board of Studies in Food Science and Nutrition  
Nehru Arts and Science College

Course Code		Title		
22PGFNC101 / 21PGFNC101		Core Paper I – Advanced Food Science		
Semester: I		Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To 1. Learn about different food groups and its nutritional compositions. 2. Gain knowledge on changes in the processing of foods			
Course Category	Employability			
Development Needs	Global			
Course Description	Advanced Food Science is an applied course designed to prepare students for further education and careers in food science			
Course Outcomes		Teaching Methods	Assessment Methods	
CO 1	Recall the physical and chemical properties of food	Interactive session	Quiz	
CO 2	Describe the structure and composition of cereals	E-modules, Lecture	Seminar	
CO 3	Apply appropriate processing methods for food groups.	E-modules, Lecture	Group activity	
CO 4	Examine the processing changes in vegetables and meat.	Demonstration	Assignment	
CO 5	Analyze the thermal changes in sugar, spices and condiments	Tutorials	Open book test	
Offered by	Food Science and Nutrition			
Course Content		Instructional Hours / Week: 5		
Unit	Description	Text Book	Chapters	
I	<b>Properties of Foods:</b> Physical properties -Chemical bonds in foods, chemical reactions in foods - Enzymatic reaction and non-enzymatic reaction. <b>Food Colloids</b> - Structure, formation, mechanisms, stabilization, factors affecting stabilization.	1	11	
			<b>Instructional Hours</b>	<b>15</b>
<b>Suggested Learning Methods:</b> Model based learning				<b>02 Hrs.</b>
II	<b>Cereal:</b> Structure, composition of seed parts, storage of grains. <b>Wheat:</b> Structure, composition, nutritive value, Wheat flour- types, functionality of components, baking qualities, Gluten formation, manufacture of bread, cakes, cookies, pastries, changes during baking <b>Rice:</b> Structure, nutritive value and composition Cereal cookery. <b>Millet:</b> Products, composition, structure and nutritive value.	1,2	15,16 & 2	
			<b>Instructional Hours</b>	<b>15</b>
<b>Suggested Learning Methods:</b> Visual learning				<b>02 Hrs</b>
III	<b>Pulses:</b> Composition, nutritive value, methods of processing, vegetable protein mixes protein, natural toxicants and pulse cookery. <b>Nuts and oilseeds:</b> Composition, nutritive value, nutritious food mixes from oil seeds. <b>Fats and oil:</b> Sources, nutritional composition, functions, physical and chemical properties, Rancidity - types and prevention, role of fat / oil in food preparations.	1,2	17&34 & 10	
			<b>Instructional Hours</b>	<b>15</b>
<b>Suggested Learning Methods:</b> Personalized learning, Article reviews				<b>02 Hrs.</b>
IV	<b>Fruits and Vegetables:</b> Classification, selection, storage, composition, structure, texture, pigments, browning reaction, pectic substances, ripening of fruits, changes on cooking and processing.	1&2	14 & 8	

	<b>Milk and milk products:</b> Composition, processing, heat changes, types of milk, milk beverages, fermented dairy products, storage												
	<b>Meat, poultry and Egg:</b> Structure and composition, types of Meat and poultry, post mortem changes, grading, cooking changes, curing, ageing, smoking and storage.												
<b>Instructional Hours</b>			<b>15</b>										
<b>Suggested Learning Methods:</b> Project based learning			<b>02 Hrs.</b>										
V	<b>Sugars and related products:</b> Sources, uses, reactions of sugar and sugar related products, Crystalline and non-crystalline candies. <b>Confectionary:</b> Ingredients, sugar boiled chocolate and Indian confectionary. <b>Beverages:</b> Fruit based and milk based, types and classification, composition. <b>Spices and Condiments:</b> Composition, common spices and condiments, nutraceutical properties, aroma components, types, changes during processing and storage		1&2	26&9									
<b>Instructional Hours</b>			<b>15</b>										
<b>Suggested Learning Methods:</b> Peer learning method			<b>02 Hrs.</b>										
<b>Total Hours</b>			<b>75 Hrs.</b>										
<b>Text Books</b>	<ol style="list-style-type: none"> <li>Shakuntala Manay, Shadaksharaswamy. M, Foods, Facts and Principles, New Age International Pvt Ltd Publishers, Sixth Edition, 2015.</li> <li>Srilakshmi, B, Food Science, New Age International Private Ltd., New Delhi, 7<sup>th</sup> edition, 2018</li> <li>Potter, N. and Hotchkiss, J.H. Food Science, CBS Publications and Distributors, Daryaganji, New Delhi, 5<sup>th</sup> Edition, 1998.</li> </ol>												
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>Brow, A., Understanding Food, Thomson Learning Publications, Wadsworth, 2000.</li> <li>Mehas, K.Y. and Rodgers, S.L. Food Science and You, McMillan McGraw Company, New York, 2000.</li> <li>Parker, R. Introduction to food Science, Delmer, Thomson Learning Co., Delma, 2000</li> </ol>												
<b>Journals</b>	<ol style="list-style-type: none"> <li>International journal of food science and nutrition</li> <li>Asian journal of agriculture and food science</li> <li>Indian journal of agriculture research</li> </ol>												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Seminar</b>	<b>Group activity</b>	<b>Open book test</b>	<b>Total</b>							
<b>8</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>50</b>							
<b>Mapping</b>													
<b>PO/PSO CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	L		M						M	M	M	M	L
<b>CO2</b>	L		L	H					M	M	M	L	L
<b>CO3</b>		L	L		L			H	M	M	H	H	H
<b>CO4</b>	H	H	H		M			H	H	H	H	H	L
<b>CO5</b>	H	H	M		H	H	L	H	H	H	H	H	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						



Course Code		Title		
22PGFNC102 / 21PGFNC102		Core Paper II: – Nutrition through Life Cycle		
Semester: I		Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	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 Category	Employability			
Development Needs	Global			
Course Description	It provides knowledge on physiology of nutritional requirements in normal development and health which in turn tunes the global employability skills.			
Course Outcomes		Teaching Methods	Assessment Methods	
CO 1	Identify nutrient requirements during each stage of the life cycle.	Interactive session	Seminar	
CO 2	Discuss the importance of nutrition during specific physiological stages.	E- modules	Open book test	
CO 3	Develop diet plan for different stages of the lifecycle.	Demonstration	Case study	
CO 4	Evaluate dietary intakes for individuals throughout the life cycle.	E- modules	Mini project	
CO 5	Modify diet to solve nutritional problems in different age groups.	Demonstration, case study	Group activity	
Offered by	Food Science and Nutrition			
Course Content		Instructional Hours / Week: 5		
Unit	Description	Text Book	Chapters	
I	<b>Recommended dietary allowances and Nutrition in pregnancy:</b> Concept of health recommended dietary allowances for Indians, basis for requirement, computation of allowance. ICMR - Indian recommended allowances <b>Nutrition in pregnancy:</b> 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	3,5 & 1	
<b>Instructional Hours</b>			<b>15</b>	
<b>Suggested Learning Methods:</b> Case study-based learning			<b>02 Hrs</b>	
II	<b>Nutrition in Lactation:</b> Physiological adjustments during lactation, physiology of milk production, Importance of breast feeding, nutritional components of breast milk, nutritional requirements in lactation <b>Nutrition in infants:</b> Rate of growth, weight as the indicator, low birthweight, premature infant, feeding premature infants, breast vs. bottlefeeding, nutritional allowances, supplementary feeding, weaning foods.	1,2	5 & 6	
<b>Instructional Hours</b>			<b>15</b>	
<b>Suggested Learning Methods:</b> Journal reviewing and Assignments			<b>02 Hrs.</b>	



III	<p><b>Nutrition in Preschool Children:</b> Growth and development of preschool children, prevalence of malnutrition (Vitamin A, deficiency, anemia, IDD) in preschool age, food habits, nutritional requirements, supplementary foods.</p> <p><b>Nutrition in School Age:</b> Early and middle childhood, physiological development, food habits, nutritional needs and feeding, RDA, feeding of children with special needs.</p>	1	7			
<b>Instructional Hours</b>			<b>15</b>			
<b>Suggested Learning Methods:</b> Group activity			<b>02 Hrs</b>			
IV	<p><b>Nutrition During Adolescence:</b> Physical growth and psychological changes, nutritional needs. <b>Eating disorders:</b> Anorexia nervosa, bulimia nervosa, Nutrition and Medical problems during adolescents. <b>Nutrition During Adulthood:</b> Nutrition and work efficiency, basis for requirements.</p> <p><b>Nutrition in Menopause:</b> Psychological changes and nutritional requirements.</p> <p><b>Nutrition for Old Age -</b> Socio economic and psychological factors, nutritional requirements, factors affecting food intake, clinical needs, institutionalized changes in old age, advances in geriatric nutrition.</p>	1,2,4	8,32,4			
<b>Instructional Hours</b>			<b>15</b>			
<b>Suggested Learning Methods:</b> Project based learning			<b>02 Hrs</b>			
V	<p><b>Nutrition in physical activity and exercise:</b> Body systems involved of Cardio-respiratory and musculo-skeletal system in physical activity, Nutrition requirements in space travel and high altitude <b>Benefits of an active lifestyle:</b> Cardiorespiratory, musculo-skeletal improvements and other health benefits of physical activity <b>Physical fitness assessment:</b> Cardio respiratory fitness, assessment of body composition, muscular fitness assessment, flexibility assessment.</p>	1,3	9,10,2			
<b>Instructional Hours</b>			<b>15</b>			
<b>Suggested Learning Methods:</b> Group learning, Personalized learning			<b>02 Hrs.</b>			
<b>Total Hours</b>			<b>75 Hrs.</b>			
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Srilakshmi, B, Dietetics, New Age International Pvt. Ltd, 7<sup>th</sup> edition, 2003.</li> <li>2. Nutrient requirements and Recommended Dietary Allowances for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2010</li> <li>3. Dietary guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2010</li> <li>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</li> </ol>					
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Krause, M.V and Hunsher, M.A, Food, Nutrition and Diet Therapy, 11<sup>th</sup> edition, W.B. Saunders company, Philadelphia, London, 2004.</li> </ol>					
<b>Journals</b>	<ol style="list-style-type: none"> <li>1. Indian Journal of Medical Research, ICMR, New Delhi</li> <li>2. Indian Journal of Pediatrics, Valley Nicro, Missouri, U.P.</li> <li>3. Indian Journal of Nutrition and Dietetics, Avinashilingam Deemed University, Coimbatore.</li> <li>4. Proceedings of the Nutrition Society of India, NSI, Hyderabad.</li> </ol>					
<b>Tools for Assessment (50 Marks)</b>						
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Seminar</b>	<b>Case study</b>	<b>Mini Project</b>	<b>Total</b>
<b>8</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>50</b>

Mapping													
PSO/PS O 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						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						

Course Code	Title		
22PGFNC103	Core Paper –III Nutritional Biochemistry		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To 1. To understand the application of biochemistry in the field of Foods and Nutrition. 2. To learn the metabolism and biosynthesis of essential nutrients.		
Course Category	Employability		
Development Needs	National		
Course Description	This course deals with the mechanism involved in the conversion of macro and micron nutrient to energy and other biologically active components which is essential requirement to analyze the nutrition al requirements		
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the structure and relationships of macronutrients.	E-Modules	Seminar
CO 2	Describe the biochemical pathways relevant in nutrient metabolism.	Videos lesson	Assignment
CO 3	Discuss the synthesis of biomolecules.	Model based teaching	Open book test
CO 4	Relate the biochemical metabolism and metabolic disorders.	Lecture	Case studies
CO 5	Apply relevant biochemical techniques in biomolecule analysis.	Hands on training	Practical
Offered by	Food science and Nutrition		
Course Content	Instructional Hours / Week: 5		
Unit	Description	Text Book	Chapters
I	<b>Carbohydrates:</b> Glucose metabolism, Glycolysis, TCA cycle, HMP shunt and energy production, Glycogenesis, Gluconeogenesis, Biosynthesis of ascorbic acid. Renal threshold for glucose	1	1 & 13, 16, 17, 18
Instructional Hours			15
Suggested Learning Methods: Model based learning			02 Hrs
II	<b>Fatty Acids:</b> Biosynthesis and oxidation of saturated and unsaturated fatty acids, cholesterol and phospholipids, Bilesalts and fatty liver	2	21, 22
Instructional Hours			15
Suggested Learning Methods: Model based learning			02 Hrs
III	<b>Protein:</b> General break down of amino-acids- 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
Suggested Learning Methods : Peer learning			02 Hrs
IV	<b>Nucleic acids:</b> Composition, function and classification Isolation, structure and properties of DNA and RNA. Biosynthesis and breakdown of purine and pyrimidine nucleotides	1	19
Instructional Hours			15
Suggested Learning Methods: Group learning			02 Hrs

<b>V</b>	<p><b>Techniques in nutritional biochemistry:</b> 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.</p> <p><b>Experiments:</b> Estimation of Glucose (Folin Wu Method), Hemoglobin (cynmet method), total proteins (biuret method), urea, creatinine in urine and lipid profile</p>							5	4,5				
<b>Instructional Hours</b>								<b>15</b>					
<b>Suggested Learning Methods:</b> Experiment based learning								<b>02 Hrs</b>					
<b>Total Hours</b>								<b>75 Hrs</b>					
<b>Text Books</b>	<ol style="list-style-type: none"> <li>Albert L. Lehninger, David Lee Nelson, Michael M. Cox, Lehninger Principles of Biochemistry, Published by W.H. Freeman, Edition: 5, 2008.</li> <li>Robert K. Murray, Darryl K. Granner, Peter A. Mayes, Victor W. Rodwell, Harper's Illustrated Biochemistry, Published by McGraw-Hill Professional, 2012, Edition: 29.</li> <li>Burtis et al., Teitz Text Book of Clinical Biochemistry, Published by William-Heinmann medical books, Ltd., 3<sup>rd</sup> edition, 1999.</li> <li>Singh, Fundamental Techniques in Biochemistry Principles and Practice, LAP Lambert Academic Publishing, 2010</li> </ol>												
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>Jeremy Mark Berg, John L. Tymoczko, Lubert Stryer, Biochemistry, Published by W.H. Freeman, Edition: 6, 2006.</li> <li>Donald Voet, Judith G. Voet, Biochemistry, Published by J. Wiley &amp; Sons, 4<sup>th</sup> edition, 2010.</li> <li>Geoffrey L. Zubay, Biochemistry, Published by Wm. C. Brown Publishers, 3<sup>rd</sup> edition, 1993.</li> <li>William J. Marshall and Stephen K. Bangert, Clinical Biochemistry – Metabolic and Clinical Aspects, Pearson Professional Ltd. 1995.</li> <li>Michael L. Bishop, Janet Duben-Engelkirk, Edward P. Fody., Clinical Chemistry – Principles, Procedures and Correlations, published by Philadelphia: Lippincott Williams &amp; Wilkins, 2000.</li> </ol>												
<b>Journals</b>	<ol style="list-style-type: none"> <li>International journal of biotechnology and biochemistry</li> <li>Indian journal of public health research</li> </ol>												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Seminar</b>	<b>Model preparation</b>	<b>Practical performance</b>	<b>Total</b>							
<b>8</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>50</b>							
<b>Mapping</b>													
<b>PSO/PSO CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	M			L					M	M	L	L	L
<b>CO2</b>	M	L	L	H					M	M	L	L	L
<b>CO3</b>	L		L	M					M	M	L	L	L
<b>CO4</b>	H	H	H			L		M	H	H	M	M	M
<b>CO5</b>	M	M	H	H	M	H	M	H	H	H	M	H	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						



Course Code		Title		
22PGFNC104 / 21PGFNC104		Core Paper – IV Nutrition in Disease -I		
Semester: I		Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To 1. Understand the etiology of various diseases 2. To gain knowledge in the dietary modifications in various disease conditions			
Course Category	Entrepreneurship			
Development Needs	Global			
Course Description	It focuses on modification of diet for endocrine disorders, gastrointestinal tract and liver diseases, diseases of heart and circulatory system and the nutrition in cancer.			
Course Outcomes			Teaching Methods	Assessment Methods
CO 1	Practice the role of dietician in hospital and community		Role play	Group activity
CO 2	Modify the diet for endocrine disorders		Demonstration	Assignment
CO 3	Apply principle of nutrition for the prevention and treatment of specific diseases		E-module	Seminar
CO 4	Execute nutrition care within the bounds of ethical, legal and professional practice standards		Interactive discussion	Open book test
CO 5	Provide competent nutrition service for cancer patients		Video lesson	Case study
Offered by	Food science and Nutrition			
Course Content			Instructional Hours / Week: 5	
Unit	Description		Text Book	Chapters
I	<b>Therapeutic Diets:</b> 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.		1	1,10,
	<b>Enteral and Parenteral nutrition:</b> Types, applications, nutrient composition of feeds, complications, merits and demerits. Functions of Indian Dietetic Association		2	20
			<b>Instructional Hours</b>	<b>15</b>
<b>Suggested Learning Methods:</b> Group learning				<b>02 Hrs</b>
II	<b>Endocrine disorders and fever: Diabetes Mellitus:</b> 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.		2	30
	<b>Obesity-</b> Etiology, theories on obesity, types, dietary modification, complications. <b>Under weight-</b> Etiology, nutritional and food requirement.		2	21
	<b>Fevers-</b> Causes, types, metabolic changes, fevers of short duration and chronic fever and infections		1	9
			<b>Instructional Hours</b>	<b>15</b>
<b>Suggested Learning Methods:</b> Collaborative learning -Group activity. E-content				<b>02 Hrs</b>
III	<b>Diseases of the gastrointestinal tract and liver Diseases</b> <b>Gastrointestinal tract:</b> Etiology, type, clinical, signs and symptoms, diagnosis. <b>Diet modifications-</b> Peptic ulcer, diarrhoea, dysentery, constipation and other GTI problem like gastritis, tropical sprue dumping syndrome, lactose intolerance, irritable bowel syndrome, diverticulosis		2	27, 2, 8

	<b>Diseases of liver:</b> Functions of liver, etiology, physiological and metabolic consequences, clinical signs and symptoms, Mode of treatment and diet modifications of jaundice, hepatitis, Cirrhosis, hepatic coma, cholecystitis, cholelithiasis and pancreatitis.												
<b>Instructional Hours</b>			15										
<b>Suggested Learning Methods :</b> Case study based learning			<b>02 Hrs</b>										
<b>IV</b>	<b>Diseases of the Heart and Circulatory System</b> – 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									
<b>Instructional Hours</b>			15										
<b>Suggested Learning Methods:</b> Group learning			<b>02 Hrs</b>										
<b>V</b>	<b>Nutrition in cancer</b> – 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									
<b>Instructional Hours</b>			15										
<b>Suggested Learning Methods:</b> Project based learning			<b>02 Hrs</b>										
<b>Total Hours</b>			<b>75 Hrs</b>										
<b>Text Books</b>	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, Philadelphia, 9th edition, 2010												
<b>Reference Books</b>	1. Robinson C.H. Normal and Therapeutic nutrition, Mac Millan Publishing Co. 12 <sup>th</sup> edition, 2007 2. Dietary Guidelines of Indians- A Manual, National Institute of Nutrition, Hyderabad, 2006.												
<b>Journals</b>	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, Avinashilingam Home Science College for Women, Coimbatore.												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Seminar</b>	<b>Case studies</b>	<b>Mini project</b>	<b>Total</b>							
8	8	10	8	8	8	50							
<b>Mapping</b>													
<b>PSO/PSO CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	M			L					M	M	L	L	L
<b>CO2</b>	M	L	L	H					M	M	L	L	L
<b>CO3</b>	L		L	M					M	M	L	L	L
<b>CO4</b>	H	H	H			L		M	H	H	M	M	M
<b>CO5</b>	M	M	H	H	M	H	M	H	H	H	M	H	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						





Course Code		Title	
22PGFNE101 / 21PGFNE101		Elective IA-Convenience Foods	
Semester: I	Credits:4	CIA:50Marks	ESE:50Marks
Course Objective	To 1. Gain knowledge on convenience foods 2. Acquire knowledge on food processing techniques		
Course Category	Entrepreneurship		
Development Needs	Global		
Course Description	It imbibes the knowledge and skills on different convenience foods and its market trends		
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Describe food product development strategies	Model based teaching	Assignment
CO 2	Classify different convenience foods in market	E-Modules	Mini survey
CO 3	Explain the principles of processing of convenience foods	E- Modules	Puzzle
CO 4	Develop innovative value-added convenient foods	Demonstration	Group activity
CO 5	Evaluate the quality and safety of convenient food	Tutorials	Group discussion
Offered by	Department of Food Science and Nutrition		
Course Content		Instructional Hours / Week : 4	
Unit	Description	Text Book	Chapters
I	<b>Food product development:</b> Development of new product, need for developing new products, Developing marketing strategy for new product, strategies in product development, success and failure factors for new products	2	1
<b>Instructional Hours</b>			<b>12</b>
<b>Suggested Learning Methods:</b> Experiential learning			<b>02 Hrs</b>
II	<b>Popped snacks:</b> Popcorn–popping procedures, loss during popping, measurement of expansion, factors affecting quality of popcorn, storage. <b>Puffed snacks:</b> Puffable materials, different puffed snacks <b>Baked snacks:</b> Sweet based plain cookies, wire cut cookies, Salt based– soda crackers and cheese crackers.	1	3
<b>Instructional Hours</b>			<b>12</b>
<b>Suggested Learning Methods:</b> Online materials, Market analysis			<b>02 Hrs</b>
III	<b>Convenience foods for defense services:</b> 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
<b>Instructional Hours</b>			<b>12</b>
<b>Suggested Learning Methods :</b> Personalized learning, Assignment			<b>02 Hrs</b>

<b>IV</b>	<b>Solutions types</b> – Liquid in Liquid. Raoult’s law- - Deviation from ideal behaviour –positive deviation-Negative deviation- Fractional distillation. <b>Kinetics</b> -Rate, order, molecularity, pseudo first order, determination of order. Effect of temperature on the rate. Energy of activation						1	1					
<b>Instructional Hours</b>							9						
<b>Suggested Learning Methods</b> : Peer learning							<b>02 Hrs</b>						
<b>V</b>	<b>Extruded foods:</b> 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 2 5					
<b>Instructional Hours</b>							12						
<b>Suggested Learning Methods</b> : Group activity, New product survey, Model preparation							<b>02 Hrs</b>						
<b>Instructional Hours</b>							60						
<b>Suggested learning method</b> : <b>Demonstration</b>													
<b>Text Books</b>	1. Richard Coles and Mark J. Kirwan, “Food and Beverage Packaging Technology”, 2 <sup>nd</sup> Edition, Blackwell Publishing Asia Pty Ltd, CRC press, USA, 2011.												
<b>Reference Books</b>	1. Han Jung H., “Innovations in Food Packaging”, 2 <sup>nd</sup> Edition, Academic Press, USA 2013. 2. Dong Sun Lee, Kit L. Yam and Luciano Piergiovanni, “Food Packaging Science and Technology”, CRC press, USA, 2008.												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Model preparation</b>	<b>Seminar</b>	<b>Mini product survey</b>	<b>Total</b>							
<b>8</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>50</b>							
<b>Mapping</b>													
<b>CO \ PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	M								M		M	M	
<b>CO2</b>	H	M								M	M	M	
<b>CO3</b>	H	L			M					L	H	H	H
<b>CO4</b>	H	H			L				L	L	H	H	H
<b>CO5</b>	H	M			H				M	M	H	H	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						

Course Code	Title		
22PGFNE102	Elective II A- Sports Nutrition		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	<b>To</b> 1.To gain the knowledge about the sports nutrition, physical fitness and energy source 2.To analyze the role of nutrition for adventure sports		
Course Category	Entrepreneurship		
Development Needs	National		
Course Description	Sports nutrition is the field of nutrition and dietetics that concerns with improving sport and exercise performance. A well-designed nutritional plan is essential to help active adults and athletes to perform at their best		
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the role of nutrition in sports person	E-module	Assignment
CO 2	Comprehend the physiology of physical fitness	E -Module	Model preparation
CO 3	Analyse the energy requirement of different sports	Videos	seminar
CO 4	Plan diet chart for different sports person	Case studies	Project
CO 5	Develop nutritious sports drinks for different sports person	Demonstration	Practical
Offered by	Department of Food Science and Nutrition		
Course Content	Instructional Hours / Week :4		
Unit	Description	Text Book	Chapters
I	<b>Introduction to Sports Nutrition and Exercise Physiology:</b> Definition and scope of Sports Nutrition and Performance, Importance of Nutrition in Sports, Organizations working for Sports Nutrition. <b>Exercise Physiology:</b> Adaptation of Skeletal Muscles to Exercise and Training, Principles of Exercise Training to Enhance Muscle Adaptation, Cardiopulmonary Adaptation to Exercise, Energy Production and Physical Activity	2	1
<b>Instructional Hours</b>			<b>12</b>
<b>Suggested Learning Methods:</b> Group discussion, Think-Pair-Share			<b>02 Hrs</b>
II	<b>Physical fitness:</b> Definition, Types of Physical Fitness, Components of Physical Fitness and Factors Affecting Physical Fitness <b>Physical Activity:</b> Types of Physical Activity, Determinants of Physical Activity, Benefits of physical activity, Classification of Exercise for Different Diseased Condition	1	3
<b>Instructional Hours</b>			<b>12</b>
<b>Suggested Learning Methods:</b> Group learning. Activity based learning			<b>02 Hrs</b>

III	<b>Protein:</b> General break down of amino acids- Denaturation, transamination, Deamination, decarboxylation, urea formation. Metabolism of individual amino acids – Glycine, phenylalanine, tyrosine, tryptophan, protein biosynthesis, Synthesis and break down of HB and bile pigments	2	3										
<b>Instructional Hours</b>			12										
<b>Suggested Learning Methods:</b> Critical article reviews, peer learning			<b>02 Hrs</b>										
IV	<b>Nutrition for performance enhancement:</b> Endurance sports, Diet Before Competition, Diet on the Day, Nutrient Timing, Pre-Event Meal. Diet for Different Group and Diet for Different Sports.	1	1										
<b>Instructional Hours</b>			9										
<b>Suggested Learning Methods:</b> Model based learning			<b>02 Hrs</b>										
V	<b>Diet Related Problem of Athletes:</b> Female Athletes Triad, Weight Control, Adjuncts of Weight Management, Travelling Athletes, Diabetic Athletes, Disabled Athletes, G.I Stress and Athletes, Cramps and Stitches. <b>Ergogenic aids:</b> Effect of ergogenic aids and other substances on physical activity; sports drinks for endurance activities; nutrition supplements available for athletes.	2	5 2 5										
<b>Instructional Hours</b>			12										
<b>Suggested Learning Methods:</b> Case studies, experiential learning			<b>02 Hrs</b>										
<b>Instructional Hours</b>			60										
<b>Text Books</b>	1. Antia. F.P. and Philip Abraham, Clinical dietetics and Nutrition, fourth edition, Oxford University Press. 2002. 2. Srilakshmi. B., Dietetics, seventh edition, New age international (P) Limited. 2014. 3. Asker Jeukendrup, Sports Nutrition, third Edition, Human Kinetics Publishers, 2019 4. Don Benordot, Advanced sports nutrition, second edition, Human Kinetics, 2012.												
<b>Reference Books</b>	1. Anita Bean, The Complete Guide to Sports Nutrition, eighth edition, blooms sports publishers, 2017												
<b>Web. URLs</b>	1. <a href="https://academic-accelerator.com/Journal-Abbreviation/International-Journal-of-Sport-Nutrition-and-Exercise-Metabolism">https://academic-accelerator.com/Journal-Abbreviation/International-Journal-of-Sport-Nutrition-and-Exercise-Metabolism</a> 2. <a href="https://www.sportsnutritionistsociety.org/jissn.html">https://www.sportsnutritionistsociety.org/jissn.html</a> 3. <a href="https://www.nutrition.gov/topics/basic-nutrition/eating-exercise-and-sports">https://www.nutrition.gov/topics/basic-nutrition/eating-exercise-and-sports</a>												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Group Discussion</b>	<b>Mini Survey</b>	<b>Seminar</b>	<b>Total</b>							
8	8	10	8	8	8	50							
<b>Mapping</b>													
<b>CO \ PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	H	L	L	L		L		H	H	M	L	L	L
<b>CO2</b>	H	M	L				L	M	H	M	L	L	L
<b>CO3</b>	H	H		M	H	L		L	H	M	L	L	L
<b>CO4</b>	H	L	L					M	H	M	L	L	L
<b>CO5</b>	H	L			L			H	M	M	L	L	L
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						



Course Code		Title	
22PGFNE103 / 21PGFNE103		Elective I C- Food Commodities	
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	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 Category	Entrepreneurship		
Development Needs	Regional		
Course Description	It offers knowledge on quality of raw materials, food products, processing, storage processes as well quality management and storage risk assessment process		
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Explain the different food commodities	Lecture	Seminar
CO 2	Analyze the different types of food products	Video lesson	Assignment
CO 3	Describe the types of processing of various foods	E-Modules	Open book test
CO 4	Examine the quality of various food products used	Sample reviews	Brain storming
CO 5	Interpret the usage of food commodities in Indian cookery.	Demonstration	Group activity
Offered by	Department of Food Science and Nutrition		
Course Content		Instructional Hours / Week :4(T)	
Unit	Description	Text Book	Chapters
I	<b>Perishable Food Commodities Milk, Meat, Fish, Egg and Poultry-</b> Introduction, composition, types, processing ,products, uses in Indian Cookery	1	5
Instructional Hours			12
Suggested Learning methods: Group learning			02 Hrs
II	<b>Semi Perishable Food Commodities Fruits and Vegetable, Fats and Oils</b> Introduction, composition, types, processing, products, uses in Indian Cookery	3	2
Instructional Hours			12
Suggested Learning methods: Peer learning			02 Hrs
III	<b>Non Perishable Food Commodities Cereals, Pulses, Legumes, Oil seeds and Spices</b> Introduction, composition ,types, processing, products, uses in Indian Cookery	4	3
Instructional Hours			12
Suggested Learning Methods: Project based learning			02 Hrs
IV	<b>Types Of Foods</b> Nutraceuticals, Probiotics, Prebiotics, GM Foods, Organic Foods, Traditional Foods, Fabricated Foods, Junk Foods, Fast Foods, Convenience Foods, RTS ,and RTE	1	5

		<b>Instructional Hours</b>		9									
<b>Suggested Learning Methods:</b> Hands on skills				<b>02 Hrs</b>									
<b>v</b>	<b>Sugar and Confectionary</b> Different types of sugar (sugar, Jaggery, honey, syrup), Manufacture, selection, storage and use as preservative	2	5	4									
		<b>Instructional Hours</b>		12									
<b>Suggested Learning Methods:</b> Case studies, experiential learning				<b>02 Hrs</b>									
		<b>Instructional Hours</b>		60									
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Srilakshmi, B..Food Science (3rd edition), New Age International (P) Limited Publishers, New Delhi, 2003.</li> <li>2. National Institute of Industrial Research Board, Hand Book on SPICES Asia Pacific Business press Inc. New Delhi.</li> <li>3. Potter ,N.N. Food Science (5th edition), CBS publishers and Distributors, New Delhi, 1995.</li> <li>4. Manay, N.S, Shadaksharaswamy, M., Foods- Facts and Principles., New Age International. New Delhi., 2004.</li> </ol>												
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Anita Bean, The Complete Guide to Sports Nutrition, eighth edition, blooms sports publishers, 2017</li> </ol>												
<b>Web. URLs</b>													
<b>Tools for Assessment (50 Marks)</b>													
<b>CIAI</b>	<b>CIAII</b>	<b>CIAIII</b>	<b>Seminar</b>	<b>Group activity</b>	<b>Open book test</b>	<b>Total</b>							
8	8	10	8	8	8	50							
<b>Mapping</b>													
<b>CO \ PO/PSO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	M								M	L	M	M	L
<b>CO2</b>	M	M							L	M	M	M	L
<b>CO3</b>	M	L			M				L	L	H	H	H
<b>CO4</b>	H	H			L				L	L	H	H	H
<b>CO5</b>	H	M			H				M	M	H	H	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						

Course Code	Title					
22PGFNQ101	Practical I -Food Analysis					
Semester: I	Credits:4		CIA: 50 Marks		ESE: 50 Marks	
Course Objective	To 1. Know the various techniques in food analysis 2. Select appropriate techniques for food analysis					
Course Category	Skill development					
Development Needs	National					
Course Description	It imparts knowledge and skills on principles and techniques of food analysis by physical, chemical, biological methods and to apply their knowledge and skills acquired to solve real-world problems associated with food analysis.					
Course Outcomes			Teaching Methods	Assessment Methods		
CO 1	Relate the theoretical concepts with analytical techniques associated with food.		Experiential learning	Practical		
CO 2	Describe the procedure for the food analysis		Experiential learning	Practical		
CO 3	Choose relevant techniques for different nutrient analysis		Experiential learning	Practical		
CO 4	Analyze different nutrients present in foods		Experiential learning	Practical		
CO 5	Interpret the results of food analysis		Experiential learning	Mini Project		
Offered by	Department of Food Science and Nutrition					
Course Content			Instructional Hours / Week :6			
Food sample analysis for						
<ol style="list-style-type: none"> <li>1. pH &amp; Titratable acidity (%)</li> <li>2. Moisture</li> <li>3. Carbohydrate</li> <li>4. Water Soluble Protein-By Lowry's Method</li> <li>5. Crude Fat – by Soxhlet method</li> <li>6. Total energy content (calculation and bomb calorimetry methods)</li> <li>7. Crude Ash</li> <li>8. Crude fiber</li> <li>9. Estimation of Pectin</li> <li>10. Estimation of gluten</li> <li>11. Estimation of Free Fatty Acids</li> <li>12. pH &amp; Titratable acidity (%)</li> </ol>						
Instructional Hours						90
Tools for Assessment (50 Marks)						
Test I (Mid term)	Test II (Models)	Observation note book	Performance in lab experiments	Problem solving and critical thinking	Mini Project	Total
10	10	6	8	8	8	50



Mapping													
CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
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
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						

Course Code		Title		
22PGFNC205		Paper V-Food Processing and Preservation Techniques		
Semester: II		Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective		To 1. Learn different food processing and preservation techniques 2. Provide knowledge on processed food products		
Course Category		Skill Development		
Development Needs		National		
Course Description		Practical inbuilt theory paper which provides skills in food processing.		
Course Outcomes		Teaching Methods	Assessment Methods	
CO 1	Define the principles and application of thermal processing of food	Interactive discussion	Assignment	
CO 2	Identify the various methods in low temperature processing	E-module	Seminar	
CO 3	Summarize the significance of drying process and the equipment used	Group Discussion	Seminar	
CO 4	Enumerate the applications of non-thermal processing techniques in food industry	Video lesson	Group activity	
CO 5	Apply critical thinking and problem-solving skills to address current challenges in the processing of food	Hands on training	Mini project	
Offered by	Food Science and Nutrition			
Course Content		Instructional Hours / Week: 5		
Unit	Description	Text Book	Chapters	
I	<b>Thermal processing of foods:</b> 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 <b>Experiments:</b> Thermal processing of fruit and vegetable -Blanching, Canning, Baking, Retort processing	1, 3	1 & 5	
<b>Instructional Hours</b>				<b>15</b>
<b>Suggested Learning Methods:</b> Learning through experiments, Group learning				<b>02 Hrs</b>
II	Introduction, freezing point and freezing rate, comparison of freezing and thawing process. <b>Freezing methods-</b> Chilling, Air freezing, plate freezing, liquid immersion freezing and cryogenic freezing, advantages and disadvantages of freezing and changes in food during freezing storage. <b>Food irradiation-</b> 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. Layout and safety of irradiation plant <b>Experiments:</b> Perishable and minimal processed product	5,2	4 & 6	
<b>Instructional Hours</b>				<b>15</b>
<b>Suggested Learning Methods:</b> Learning through experiments, Group learning				<b>02 Hrs.</b>
III	<b>Food Drying/Dehydration:</b> 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. <b>Drying methods and equipments:</b> sun/solar drying, Cabinet drying, tunnel dryer, spray dryer, freeze dryer, fluidized bed dryer, nutritional,	3	7	

	physio-chemical changes during drying. <b>Experiments:</b> Moisture content, Drying rate, Drying methods of -Tray drying, Oven drying, Sun drying												
<b>Instructional Hours</b>											<b>15</b>		
<b>Suggested Learning Methods:</b> Learning through Experiments, Personalized learning											<b>02 Hrs</b>		
<b>IV</b>	<b>Processing and preservation by non-thermal methods:</b> High pressure, pulsed electric field, hurdle technology, permissible limits for chemical preservatives, use and application of enzymes and microorganism in processing and preservation of foods, food fermentations, pickling, smoking. <b>Food additives:</b> Definition, types and functions, permissible limits and safety aspects. Chemical Preservatives- type I and type II <b>Experiments:</b> Pickling, Jam, Jellies, Squash, Sauce, Fermentation										<b>5,3</b>	<b>5 &amp; 8,9,10</b>	
<b>Instructional Hours</b>											<b>15</b>		
<b>Suggested Learning Methods:</b> Learning through Experiments, Peer learning											<b>02 Hrs</b>		
<b>V</b>	<b>Membrane Processing:</b> General principles and advantages, dead end and cross flow. <b>Classification of membrane system-</b> 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. <b>Experiments:</b> Osmotic dehydration of fruits and vegetables, Membrane filtration and, New Product Development using thermal and non-thermal processing techniques										<b>4,5</b>	<b>3,7</b>	
<b>Instructional Hours</b>											<b>15</b>		
<b>Suggested Learning Methods:</b> Learning through Experiments, Learning through article reviews											<b>02 Hrs.</b>		
<b>Total Hours</b>											<b>75 Hrs.</b>		
<b>Text Books</b>	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., 3 <sup>rd</sup> Edn Food processing technology, Woodhead publishing company, 2015												
<b>Reference Books</b>	1.Zeuthen, Peter, Food preservation techniques. Woodhead publishing ltd, 2005												
<b>Journals</b>	1. Journal of advancement in food technology 2. Journal of food processing and technology												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>			<b>CIA III</b>			<b>Seminar</b>	<b>Practical performance</b>		<b>Mini project</b>	<b>Total</b>		
<b>8</b>	<b>8</b>			<b>10</b>			<b>8</b>	<b>8</b>		<b>8</b>	<b>50</b>		
<b>Mapping</b>													
<b>PSO/PSO CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	L			L					L	L	M	M	L
<b>CO2</b>	M	L		H					L	L	M	M	L
<b>CO3</b>	M	H	L			L			M	M	M	M	M
<b>CO4</b>	H	H	L			L		H	M	M	H	H	M
<b>CO5</b>	H	H	H	H		H		H	L	M	H	H	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						



Course Code		Title	
22PGFNC206 / 21PGFNC206		Core Paper VI -Macronutrients	
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To 1. Learn about macro nutrients and its functional importance 2. Acquire knowledge on findings in the study		
Course Category	Employability		
Development Needs	Global		
Course Description	Major nutrients in food groups available globally which is important to take up career in food and health sector.		
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Describe the energy requirements and its utilization process	Interactive session	Seminar
CO 2	Discuss the metabolism of carbohydrates and dietary fibre	Lecture, video lesson	Group activity
CO 3	Analyze the physiology of fats and lipids	Lecture, E-module	Group discussion
CO 4	Examine food protein quality and its bioavailability	Model based teaching	Assignment
CO 5	Relate the role of hormone with nutrient metabolism	Case studies	Open book test
Offered by	Department of Food Science and Nutrition		
Course Content		Instructional Hours / Week: 5	
Unit	Description	Text Book	Chapters
I	<b>Energy:</b> 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
Suggested Learning Methods: Personalized learning			02 Hrs
II	<b>Carbohydrates:</b> Classification, digestion, absorption and utilization of carbohydrates, nutritional importance of carbohydrates, Concept of Glycemic Index and Glycemic Load <b>Dietary fibre:</b> 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
Suggested Learning Methods: Group learning, Individual learning			02 Hrs.
III	<b>Fats and lipids:</b> 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 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	1	4

	Lipid Nutrition - saturated, poly unsaturated, mono unsaturated and trans-fat, Fat Burners and Replacers												
<b>Instructional Hours</b>				<b>15</b>									
<b>Suggested Learning Methods:</b> Group learning				<b>02 Hrs</b>									
<b>IV</b>	<b>Protein:</b> 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.		<b>1</b>	<b>5</b>									
<b>Instructional Hours</b>				<b>15</b>									
<b>Suggested Learning Methods:</b> Peer learning, Online courses				<b>02 Hrs</b>									
<b>V</b>	<b>Hormone and Nutrient Interactions:</b> 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.		<b>3</b>	<b>5</b>									
<b>Instructional Hours</b>				<b>15</b>									
<b>Suggested Learning Methods:</b> Peer learning, Online courses				<b>02 Hrs.</b>									
<b>Total Hours</b>				<b>75 Hrs.</b>									
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Srilakshmi, B., Nutrition Science, New Age International Publications, 6<sup>th</sup> edition, 2017.</li> <li>2. Swaminathan, M. Advanced Textbook on Food Science and Nutrition, Vol:2, Second edition, Reprinted, Bangalore Printing and Publishing Co Inc, Bangalore, 2012.</li> <li>3. Recommended dietary allowances, ICMR, National Institute of Nutrition, Hyderabad, 2010.</li> </ol>												
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Berdanier, C and Zempline, J, Advanced nutrition-macronutrient, micronutrient and metabolism, CRC press, United States of America, 2009</li> <li>2. Krause, M.V and Hunsher, M.A, Food, Nutrition and Diet Therapy, 11th edition, W.B.Saunders company, Philadelphia, London, 2007.</li> </ol>												
<b>Journals</b>	<ol style="list-style-type: none"> <li>1. Annual Reports, National Institute of Nutrition, Hyderabad.</li> <li>2. Indian Journal of Medical Research, Indian Council of Medical Research, New Delhi.</li> <li>3. Proceedings of the Nutrition Society of India, Nutrition Society of India, Hyderabad.</li> <li>4. The Indian Journal of Nutrition and Dietetics, Sri Avinashilingam Education Trust Institutions for Women, Coimbatore.</li> </ol>												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Seminar</b>	<b>Model preparation</b>	<b>Group discussion</b>	<b>Total</b>							
<b>8</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>50</b>							
<b>Mapping</b>													
<b>PSO/PSO CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	L	H						L	M	M	L	L	L
<b>CO2</b>	L	H	L	M					M	M	L	L	L
<b>CO3</b>	H	H	L			L		H	M	M	L	L	M
<b>CO4</b>	H	H	L	L					H	H	H	H	H
<b>CO5</b>	M		L	H				L	M	M	L	L	M
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						

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Course Code		Title	
22PGFSC207 / 21PGFSC207		Core Paper VII-Physiological Aspects of Nutrition	
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To 1. Gain knowledge on blood components and immunological aspects 2. Understand the physiological aspects of hormones, drugs, etc.		
Course Category	Employability		
Development Needs	Global		
Course Description	It provides human physiology of fluids, hormones and nutrients action and interactions which inbuilt employability skills globally.		
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Outline the physiological of blood	E-Modules	Seminar
CO 2	Discuss the mechanism of immunity and electrolyte balance in body	Flipped classroom	Quiz
CO 3	Relate the functions of hormone and its biological effects	Interactive discussion	Assignment
CO 4	Outline the water and electrolyte balance in body	Video lesson	Assignment
CO 5	Interpret the drug and nutrient interaction in the body	Case study	Group discussion
Offered by	Department of Food Science and Nutrition		
Course Content		Instructional Hours / Week: 5	
Unit	Description	Text Book	Chapters
I	<b>Blood</b> - 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
Suggested Learning Methods: Team learning through reference materials			02 Hrs
II	<b>Immunity</b> - 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
Suggested Learning Methods: Personalized Visual learning			02 Hrs.
III	<b>Hormones</b> - 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
Suggested Learning Methods: Participatory learning, Article reviewing			02 Hrs
IV	<b>Water and Electrolyte Balance</b> - 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. <b>Function tests</b> – Gastric function test, liver function test, renal function test and endocrine	3,4	4



function test.													
<b>Instructional Hours</b>										<b>15</b>			
<b>Suggested Learning Methods:</b> Peer learning										<b>02 Hrs</b>			
<b>V</b>	<b>Drug and Nutrient interaction</b> 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.								<b>2</b>		<b>5</b>		
	<b>Instructional Hours</b>										<b>15</b>		
<b>Suggested Learning Methods:</b> Group learning and individual learning										<b>02 Hrs.</b>			
<b>Total Hours</b>										<b>75 Hrs.</b>			
<b>Text Books</b>		<ol style="list-style-type: none"> <li>Chakrabarti., Ghosh and Sahara., Human Physiology, The New Book Stall, Second Edition, 1984.</li> <li>Maurice E.S., and Vernon, R., Modern Nutrition in Health and Disease- Indian Edition, Seventh Edition, The new age publications, 1980.</li> <li>Muthayya, M., Essentials of physiology, Emerald Publishers, Second Edition, 1986.</li> <li>Parimoo, P., A textbook of Medicinal Chemistry, CBS Publishers and Distributors, 1995.</li> </ol>											
<b>Reference Books</b>		<ol style="list-style-type: none"> <li>Sukkar, M Y., El-Murshid, H A., and Ardawi, C., Human Physiology, Blackwell Scientific Publications, 1993.</li> </ol>											
<b>Journals</b>		<ol style="list-style-type: none"> <li>Indian journal of public health and research</li> <li>Journal of medicine toxicology</li> </ol>											
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>		<b>CIA II</b>		<b>CIA III</b>		<b>Assignment-Poster presentation</b>		<b>Group discussion</b>		<b>Seminar</b>		<b>Total</b>	
<b>8</b>		<b>8</b>		<b>10</b>		<b>8</b>		<b>8</b>		<b>8</b>		<b>50</b>	
<b>Mapping</b>													
<b>PSO/PSO CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>P PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>
<b>CO1</b>	L	L						L	L	L	L	L	L
<b>CO2</b>	L	L							M	M	L	L	L
<b>CO3</b>	H	H	L						H	M	L	L	M
<b>CO4</b>	M			L					H	H	L	L	L
<b>CO5</b>	M	M		L				L	H	L	M	M	M
H-High; M-Medium; L-Low													
<b>Course designed by</b>								<b>Verified by</b>					
Signature of the Staff								Signature of the Chairman-BoS					
Name and Department								Name and BoS Chairman SEAL					

Course Code	Title		
22PGFNC208 /21PGFNC208	Core Paper VIII- Nutrition in Disease -II		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To 1. Understand the etiology of various diseases 2. Gain knowledge in the dietary modifications in various disease conditions		
Course Category	Entrepreneurship		
Development Needs	Global		
Course Description	It provides knowledge and skills to execute diet planning and counselling globally		
Course Outcomes	Teaching Methods	Assessment Methods	
CO 1	Develop dietary plan to overcome nutrition deficiency diseases	Group discussion	Assignments
CO 2	Summarize the dietary management in allergy and bone diseases	E- modules	Seminar
CO 3	Explain the inborn errors of metabolism and its dietary treatment	Lecture	Open book test
CO 4	Plan nutritional care for the kidney disorders and HIV infected person	Demonstration	Group activity
CO 5	Execute therapeutic diets for disease management and control	E-modules	Case studies
Offered by	Food Science and Nutrition		
Course Content	Instructional Hours / Week: 5		
Unit	Description	Text Book	Chapters
I	<b>Injury, burns and deficiency diseases</b> 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 Periodontitis	1,2	4
<b>Instructional Hours</b>			<b>15</b>
<b>Suggested Learning Methods:</b> Collaborative learning -Peer learning, Group activity			<b>02 Hrs</b>
II	<b>Food allergy</b> Food allergy and food intolerance, Etiology, clinical features, diagnosis and nutritional management, Diet in allergy <b>Respiratory and Musculo-skeletal Systems</b> Arthritis, rheumatoid and osteo arthritis, asthma, chronic pulmonary diseases	1,2	5
<b>Instructional Hours</b>			<b>15</b>
<b>Suggested Learning Methods:</b> Team based learning			<b>02 Hrs.</b>
III	<b>Inborn errors of Metabolism.</b> 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
<b>Instructional Hours</b>			<b>15</b>
<b>Suggested Learning Methods:</b> Case study based Personalized learning			<b>02 Hrs.</b>
IV	<b>Diseases of Kidney</b> Etiology, dietary Management in kidney, urinary tract disorders, acute and chronic glomerulonephritis, nephrosis, acute renal failure, chronic renal failure, end stage renal disease, uremia, nephrosclerosis, nephrolithiasis, kidney transplants, maintenance of an artificial kidney (dialysis)	2	13

<b>Instructional Hours</b>													<b>15</b>	
<b>Suggested Learning Methods:</b> Visual based learning, team learning, Experiential learning													<b>02 Hrs</b>	
<b>V</b>	<b>HIV Infection and AIDS</b> Epidemiology, transmission of HIV, pathophysiology, clinical manifestations, HIV infection and other diseases, Immunity and AIDS virus, COVID-19, dietary management, Prevention and Control.										<b>1</b>	<b>6</b>		
<b>Instructional Hours</b>													<b>15</b>	
<b>Suggested Learning Methods:</b> Personalized learning													<b>02 Hrs.</b>	
<b>Total Hours</b>													<b>75 Hrs.</b>	
<b>Text Books</b>		<ol style="list-style-type: none"> <li>1. Srilakshmi. B, <b>Dietetics</b>, New Age International Pvt Ltd, New Delhi, 2012</li> <li>2. Krause M.V and Mahan L.K, <b>Food, Nutrition and Diet therapy</b>, W.B. Saunder Co, Philadeephia, 9th edition, 2010</li> </ol>												
<b>Reference Books</b>		<ol style="list-style-type: none"> <li>1. Robinson C.H. Normal and Therapeutic nutrition, , Mac Millan Publishing Co. 12th edition, 2007</li> <li>2. Dietary Guidelines of Indians- A Manual, National Institute of Nutrition, Hyderabad, 2006.</li> </ol>												
<b>Journals</b>		<ol style="list-style-type: none"> <li>1. Journal of American Dietetic Association. The American Dietetic Association Mount Arris, Illinois-61054, USA.</li> <li>2. The American Journal of Clinical Nutrition Published by the American society for Clinical Nutrition, Inc., USA.</li> <li>3. The Indian Journal of Nutrition and Dietetics, Avinashilingam Home Science College for Women, Coimbatore.</li> </ol>												
<b>Tools for Assessment (50 Marks)</b>														
<b>CIA I</b>		<b>CIA II</b>		<b>CIA III</b>		<b>Seminar</b>		<b>Case studies</b>		<b>Open book test</b>		<b>Total</b>		
<b>8</b>		<b>8</b>		<b>10</b>		<b>8</b>		<b>8</b>		<b>8</b>		<b>50</b>		
<b>Mapping</b>														
<b>PSO/PS O CO</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>P PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>	
<b>CO1</b>	M				M		L		M	M	L	L	L	
<b>CO2</b>	M	M	L			L		H	H	H	L	L	M	
<b>CO3</b>	M	L				L		H	H	H	L	L	H	
<b>CO4</b>	H	M	L			M		H	H	H	L	M	H	
<b>CO5</b>	H		M	M		L		M	H	H	M	M	H	
H-High; M-Medium; L-Low														
<b>Course designed by</b>								<b>Verified by</b>						
Signature of the Staff								Signature of the Chairman-BoS						
Name and Department								Name and BoS Chairman SEAL						

Course Code		Title	
22PGFNE201 / 21PGFNE201		Elective Paper II: A Food Packaging	
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To 1. Enable to students understand the need for food packaging. 2. Explore recent packaging materials and labeling.		
Course Category	Entrepreneurship		
Development Needs	Global		
Course Description	It provides knowledge and skills on different food packaging and its advancements in industries.		
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the types and characteristics of materials used for food packaging	Group discussion	Quiz
CO 2	Identify application of different food packaging methods	E- module	Seminar
CO 3	Develop eco-friendly and innovative packaging materials for different foods	Model based teaching	Designing food packaging
CO 4	Apply standards of labelling for food packaging	Case studies	Model preparation
CO 5	Analyze different types of packaging and labelling in commercial food products	E-Module	Mini project
Offered by	Information Technology		
Course Content		Instructional Hours / Week : 4	
Unit	Description	Text Book	Chapters
I	Definition, functions of packaging materials for different foods, characteristics of packaging material, food packages-bags, pouches, wrappers, tetra packs.	1	4
<b>Instructional Hours</b>			<b>12</b>
<b>Suggested Learning Methods : Group learning</b>			<b>02 Hrs</b>
II	Types of packaging materials – characteristics, applications in food industry, merits and demerits, textiles and wood, metal, glass, flexible films, rigid and semirigid plastic containers, paper and boards.	2	4
<b>Instructional Hours</b>			<b>12</b>
<b>Suggested Learning Methods : Sample identification, Group discussion</b>			<b>02 Hrs</b>
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
<b>Instructional Hours</b>			<b>12</b>
<b>Suggested Learning Methods : Experiment based learning, assignments</b>			<b>02 Hrs</b>

<b>IV</b>	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, labelling, marking and trapping.							2	5				
<b>Instructional Hours</b>													
<b>Suggested Learning Methods</b> : Peer group learning and journal reviewing													
<b>02 Hrs</b>													
<b>V</b>	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				
<b>Instructional Hours</b>													
12													
<b>Suggested Learning Methods</b> : Mini project, class presentation													
<b>02 Hrs</b>													
<b>Total Hours</b>													
60 Hrs													
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Richard Coles and Mark J. Kirwan, “Food and Beverage Packaging Technology”, 2<sup>nd</sup> Edition, Blackwell Publishing Asia Pty Ltd, CRC press, USA, 2011.</li> <li>2. Robertson Gordon L., “Food Packaging: Principles and Practice”, 3rd Edition, Marcel Dekker Inc, USA, 2012.</li> </ol>												
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Han Jung H., “Innovations in Food Packaging”, 2nd Edition, Academic Press, USA 2013.</li> <li>2. Dong Sun Lee, Kit L. Yam and Luciano Piergiovanni, “Food Packaging Science and Technology”, CRC press, USA, 2008.</li> </ol>												
<b>Journals</b>	<ol style="list-style-type: none"> <li>1. Food Packaging technology Hand book-NIIR, Delhi</li> <li>2. Food processing technology- Fellows, Second edition, Woodhead Publ, England, 2000.</li> <li>3. Indian Food industry</li> <li>4. Food Processed Industry</li> <li>5. Food and nutrition World</li> </ol>												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>		<b>CIA II</b>		<b>CIA III</b>		<b>Assignment</b>	<b>Seminar</b>	<b>Quiz</b>	<b>Total</b>				
8		8		10		8	8	8	50				
<b>Mapping</b>													
<b>CO \ PO/PSO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	H	H							L	L	L	L	L
<b>CO2</b>	M	M							L	M	M	M	L
<b>CO3</b>	H	L		M	M		L		M	M	M	M	M
<b>CO4</b>	H	H	M						M	M	H	H	H
<b>CO5</b>	H	H	M				L		M	H	H	M	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						

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Course Code		Title	
22PGFNE202		Elective Paper II: Nutrigenomics	
Semester: II		Credits: 4	CIA: 50 Marks
ESE: 50 Marks			
Course Objective		To learn about role of diet on the gene expressions and proteomics.	
Course Category		Entrepreneurship	
Development Needs		Global	
Course Description		It gives an insight into the role of genes in nutritional requirements and modification disease risk through nutrigenomics.	
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Distinguish the DNA, RNA, and its role in the physiological functions	E- module	Assignment
CO 2	Identify the mechanisms involved in the proteomics	Video lesson	Seminar
CO 3	Describe the diet and gene interactions and its role in disease conditions	Group discussion	Model preparation
CO 4	Apply the knowledge to modulate various disease condition through nutrigenomics	Group presentations	Mini project
CO 5	Detect the appropriate nutrigenomics techniques to evaluate the disease conditions	Model preparation	Mini Project
Offered by		Information Technology	
Course Content		Instructional Hours / Week : 4	
Unit	Description	Text Book	Chapters
I	<b>Molecular Biology:</b> Structure and functions of Nucleic Acids: The beginning of Molecular Biology: DNA: A carrier of genetic information, chemical structure of DNA and base composition, biologically important nucleotides, Watson Crick Model, structure of different types of nucleic acids.	1	1,3
Instructional Hours			12
Suggested Learning Methods : Model preparation Group learning			02 Hrs
II	<b>DNA Replication and Repair:</b> Unit of replication, enzymes involved, fidelity of replication, DNA damage and repair mechanisms. RNA synthesis and processing: Structure and function of RNA polymerases. Transcription factors and machinery, formation of initiation complex, transcription activators and repressors, RNA processing, editing, and splicing. Structure and functions of different types of RNA, RNA transport.	2	5,6
Instructional Hours			12
Suggested Learning Methods : Personalised learning			02 Hrs
III	<b>Introduction to Gene-diet interactions:</b> Nutrigenomics - Scope and Importance to Human Health and Industry. Transporter gene polymorphisms - interaction with effects of micronutrients in humans. Polymorphisms in genes affecting the uptake and transport of omega-6 and omega-3 polyunsaturated fatty acids: interactions with dietary lipids and chronic disease risk. Nutrigenomics approaches to unraveling physiological effects of complex foods. The intestinal microbiota - role in nutrigenomics	1,2	1,3,4,7
Instructional Hours			12
Suggested Learning Methods : Case studies, Online content analysis			02 Hrs

IV	<b>Modifying disease risk through nutrigenomics:</b> Modulating the risk of following diseases through Nutrigenomics: Cardiovascular disease, Diabetes, Inflammatory bowel diseases, Obesity, Cancer, Malnutrition		1	3,4									
<b>Instructional Hours</b>				<b>12</b>									
<b>Suggested Learning Methods :</b> Case studies, personalised learning				<b>02 Hrs</b>									
V	<p><b>Technologies in Nutrigenomics: Genomics techniques:</b> Different sequencing approaches, Microarray, Mass array, SNP genotyping, PCR and RT-PCR techniques.</p> <p><b>Proteomics techniques:</b> 1-D, 2-D gel electrophoresis, DIGE, novel peptide identification, peptide sequencing methods.</p> <p><b>Metabolomics techniques:</b> Chromatography and mass spectrometry techniques, Discovery, and validation of biomarkers for important diseases and disorders</p> <p><b>Computational approaches:</b> Introduction to different types of public domain databases, data mining strategies, primer designing.</p>		1	4,5									
<b>Instructional Hours</b>				<b>12</b>									
<b>Suggested Learning Methods :</b> Model based learning				<b>02 Hrs</b>									
<b>Total Hours</b>				<b>60 Hrs</b>									
<b>Text Books</b>	<ol style="list-style-type: none"> <li>Carsten Carlberg, Stine marie, Ulven, Ferdinand Malnar “Nutrigenomics” Springer international publishing, Switzerland, (2016)</li> <li>Raffaele Caterina, Alfredo Martinez, Martin Kohlmeier “ Principles of Nutrigenetics and Nutrigenomics” Elsevier publications, USA (2019)</li> <li>Nutrigenetics and Nutrigenomics. 1st ed. S. Karger, 2004.</li> </ol>												
<b>Journals</b>	<ol style="list-style-type: none"> <li>Journal Nutrients 2012, 4, 1898-1944; Molecular Nutrition Research—The Modern Way Of Performing Nutritional Science.</li> <li>Journal Nutrients 2013, 5, 32-57; Nutrigenetics and Metabolic Disease: Current Status and Implications for Personalized Nutrition</li> <li>J Nutrigenetics Nutrigenomics 2011; 4:69–89; Nutrigenetics and Nutrigenomics: Viewpoints on the Current Status and Applications in Nutrition Research and Practice</li> </ol>												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Assignment</b>	<b>Seminar</b>	<b>Quiz</b>	<b>Total</b>							
<b>8</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>50</b>							
<b>Mapping</b>													
<b>CO \ PO/PSO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	H	H	H	L	M	M	L	M	M	H	H	M	M
<b>CO2</b>	M	M	M	M	H	M	M	M	H	H	H	M	H
<b>CO3</b>	H	L	M	H	M	M	L	H	M	H	H	M	M
<b>CO4</b>	M	H	L	M	L	L	H	M	H	M	H	H	M
<b>CO5</b>	M	M	H	H	M	H	M	H	H	H	M	H	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						



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Course Code		Title	
22PGFNE203 / 21PGFNE203		Elective II C- Instrumentation in Food Processing	
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To Learn about different instruments used in food processing Develop the skill on operation techniques in food processing equipment		
Course Category	Entrepreneurship		
Development Needs	Regional		
Course Description	It deals with the unit operations principles and applications in industries		
Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the principles of food processing and unit operation analysis of food	Group discussion	Assignment
CO 2	Comprehend the equipment for mechanical separation	E- Module	Seminar
CO 3	Summarize the principles in crushing and mixing of food	Video lesson	Group discussion
CO 4	Identify different types of refrigerators and its mechanism of working	Model based teaching	Rapid questions
CO 5	Explain advanced techniques in quality	E- Module	Model preparation
Offered by	Department of Food Science and Nutrition		
Course Content		Instructional Hours / Week :4	
Unit	Description	Text Book	Chapters
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	5
Instructional Hours			12
Suggested Learning methods: Personalized learning			02 Hrs
II	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.	4, 5	6,2
Instructional Hours			12
Suggested Learning methods: : Visual Learning			02 Hrs
III	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.	3	7
Instructional Hours			12
Suggested Learning Methods: Project based learning			02 Hrs

<b>IV</b>	<b>Types Of Foods</b> Nutraceuticals, Probiotics, Prebiotics, GM Foods, Organic Foods, Traditional Foods, Fabricated Foods, Junk Foods, Fast Foods, Convenience Foods, RTS ,and RTE							1	5				
<b>Instructional Hours</b>								9					
<b>Suggested Learning Methods:</b> Model based learning								02 Hrs					
<b>V</b>	Principles and uses of Gas chromatography, Gas liquid chromatography, Electrophoresis, High performance liquid chromatography and Atomic Absorption, Spectro photometry, pH meter, Photoelectric calorimeter.							5	3				
<b>Instructional Hours</b>								12					
<b>Suggested Learning Methods:</b> Experiential learning								02 Hrs					
<b>Instructional Hours</b>								60					
<b>Suggested learning method : Demonstration</b>													
<b>Text Books</b>	<ol style="list-style-type: none"> <li>1. Coulson, J.M. and J.F.Richardson, chemical Engineering. Volume I to V the Pergamon press New York. 1977.</li> <li>2. Henderson, S.M. and R.L. Perry. Agricultural process Engineering, John Wiley and sons, New York. 1955</li> </ol>												
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. McCabe, W.L. and J.C.Smith unit operations of chemical Engineering. McGraw – Hill, Inc. Kosaido printing Ltd. Tokyo, Japan. 1976</li> <li>2. Pande, P.H. Principles of Agricultural Processing –A Text Book, Kalyan Publishers, Ludhiana. 1994</li> <li>3. Sahay, K.M. and K.K. Singh, Unit operation of Agricultural Processing, Vikas Publishing, House Pvt., Ltd., New Delhi. 1994</li> </ol>												
<b>Tools for Assessment (50 Marks)</b>													
<b>CIA I</b>	<b>CIA II</b>	<b>CIA III</b>	<b>Seminar</b>	<b>Model preparation</b>	<b>Assignment</b>	<b>Total</b>							
<b>8</b>	<b>8</b>	<b>10</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>50</b>							
<b>Mapping</b>													
<b>CO \ PO/PSO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	H	H	L	L	M	M			H	H	L	L	H
<b>CO2</b>	M	M		M	M	M			L	M			L
<b>CO3</b>	M	L	H	H	M	L	L	L	M	M			M
<b>CO4</b>	H	H	H		H				H	H	M	L	H
<b>CO5</b>	H	H	H		H				H	H	M	H	H
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						

Course Code		Title				
22PGFNQ202 / 21PGFNQ202		Practical II -Dietetics				
Semester: II	Credit: 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 Category	Skill development					
Development Needs	National					
Course Description	It relates the theoretical concepts and applications in planning and preparing diet based on individual requirements					
Course Outcomes		Teaching Methods	Assessment Methods			
CO 1	Recall the principles of diet planning for normal and disease conditions	Experiential learning	Practical			
CO 2	Identify right food choices to plan menu	Experiential learning	Practical			
CO 3	Assess the nutritional and health status of individual	Experiential learning	Practical			
CO 4	Demonstrate diet planning for different health conditions	Experiential learning	Practical			
CO 5	Evaluate the nutrient content of prepared diet	Experiential learning	Practical			
Offered by	Department of 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.Oldage 5. Pregnant and lactating women Therapeutic menu planning, portion preparation and computation for nutrients for 1.Fever 2.Obesityandundernutrition 3.Diabetes 4. Hypertension 5.Liver disease 6.Kidneydisease 7.Cancer						
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													
CO \ PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
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
H-High; M-Medium; L-Low													
<b>Course designed by</b>							<b>Verified by</b>						
Signature of the Staff							Signature of the Chairman-BoS						
Name and Department							Name and BoS Chairman SEAL						