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

Scheme of Examination
B.Sc. Food Science and Nutrition
(Programme Code: UGFS)
(Applicable to the students admitted during the year 2022-2023 and onwards)

Semester	Part	Course Code	Name of the Subject	Instruction hours/week	Duration of Examination	Examination Marks			Credits
						CIA	ESE	Total	
I	I	22U1TAM101/ 22U1HIN101/ 22U1MAL101/ 22U1FRN101	Language I	5	3	50	50	100	4
	II	22U2ENG101	English I	5	3	50	50	100	4
	III	22U3FSC101	Core Paper I- Basic Food Science	5	3	50	50	100	4
		22U3FSC102	Core Paper II- Food Chemistry	5	3	50	50	100	4
		22U3FSP103	Core Paper III- Basic Food science (Practical)	3	3	25	25	50	2
		22U3FSA101	Allied Paper I Chemistry-I	4	3	30	45	75	3
	IV	22U4ENV101	Ability Enhancement Compulsory Course-Environmental Studies	2	3	50	-	50	2
		22U4HVY201	Value Education – Human Values and Yoga Practice I	1	-	-	-	-	-
			Subtotal	30				575	23
II	I	22U1TAM202/ 22U1HIN202/ 22U1MAL202/ 220U1FRN202	Language II	5	3	50	50	100	4
	II	22U2ENG202	English II	5	3	50	50	100	4
	III	22U3FSC204	Core Paper IV- Human Physiology	5	3	50	50	100	4
		22U3FSC205	Core Paper V- Principles of Nutrition	5	3	50	50	100	4
		22U3FSP206	Core Paper VI- Principles of Nutrition (Practical)	3	3	25	25	50	2
		22U3FSA202	Allied Paper II Chemistry-II	4	3	30	45	75	3
	IV	22U4HRC202	Ability Enhancement Compulsory Course- Human Rights and Constitution of India	2	3	50	-	50	2
		22U4HVY201	Value Education-Human Values and Yoga practice I	1	2	50	-	50	2

			Subtotal	30				625	25

III	I	22U1TAM303/ 22U1HIN303/ 22U1MAL303/ 22U1FRN303	Language III	5	3	50	50	100	4
	II	22U2ENG303	English III	5	3	50	50	100	4
	III	22U3FSC307	Core Paper VII– Family Meal Management	5	3	50	50	100	4
		22U3FSP308	Core paper VIII- Family Meal Management (Practical)	3	3	25	25	50	2
		22U3FSA303	Allied Paper-III Biochemistry-I	4	3	30	45	75	3
	IV	22U4FSS301	Skill Based Subjects I Techniques of Food Evaluation	3	3	30	45	75	3
		22U4NM3CAF/ 22U4NM3GTS/ 22U4NM3WRT	#@BasicTamil I/ ##AdvancedTamil I/* NME: Consumer Affairs / Gandhian Thoughts/ Women's Rights	2	3	50		50	2
		22U4FS3ED1	Extra Departmental Course Diet and Health	2	3	-	50	50	2
		22U4HVY402	Value Education-Human values and Yoga Practice -II	1	-	-	-	-	-
		22U4FSVALC	**Skill Enhancement Add on Course-Institution Industry Linkage	-	-	-	-	-	-
				30				600	24
IV	I	22U1TAM404/ 22U1HIN404/ 22U1MAL404/ 22U1FRN404	Language IV	5	3	50	50	100	4
	II	22U2ENG404	English IV	5	3	50	50	100	4
	III	22U3FSC409	Core Paper IX–Clinical Nutrition and Dietetics-I	5	3	50	50	100	4
		22U3FSC410	Core Paper X-Bakery and Confectionery	5	3	50	50	100	4
		21U3FSA404	Allied Paper IV Biochemistry-II	4	3	30	45	75	3
	IV	21U4FSS402	Skill Based Paper II-Bakery and Confectionery (Practical)	3	3	25	25	50	2
		22U4NM4BT2/ 22U4NM4AT2/ 22U4NM4GEN	#@BasicTamil II/##Advanced Tamil II/General Awareness	2	3	50		50	2
		22U4HVY402	Value Education-Human Values and Yoga Practice II	1	2	50	-	50	2
		22U4FSNVALC	**Skill Enhancement Add on Course-Institution Industry Linkage						Grade
				30				625	25

V	III	22U3FSC511	Core paper XI-Post Harvest Technology and Food Preservation	5	3	50	50	100	4
		22U3FSC512	Core paper XII–Public Health and Nutrition	5	3	50	50	100	4
		22U3FSC513	Core paper XIII-Clinical Nutrition and Dietetics-II	5	3	50	50	100	4
		22U3FSC514	Core paper XIV- Fundamentals of Food Microbiology	5	3	50	50	100	4
		22U3FSP515	Core Paper XV-Dietetics (Practical)	3	3	25	25	50	2
		22U3FSE501/ 22U3FSE502/ 22U3FSE503	Discipline specific Elective-I	4	3	30	45	75	3
	IV	22U4FSS503	Skill Based Paper III-Mini Project	3	-	25	-	25	1
		22U4FST501	Internship	-	-	25	-	25	1
				30				575	23
VI	III	22U3FSC616	Core paper XVI- Food Biotechnology	5	3	50	50	100	4
		22U3FSC617	Core paper-XVII-Nutraceuticals and nutrigenomics	5	3	50	50	100	4
		22U3FSC618	Core paper XVIII-Food Quality Analysis Techniques	5	3	50	50	100	4
		212U3FSP619	Core paper XIX– Food Preservation and Quality Analysis (Practical)	4	3	25	25	50	2
		22U3FSE604/ 22U3FSE605/ 22U3FSE606	Discipline specific Elective II	4	3	30	45	75	3
		22U3FSE607/22U3FSE608/ 22U3FSE609	Discipline specific Elective III	4	3	30	4	75	3
	IV	22U4FSS604	Skill Based Paper IV- Computer Application in Food Science and Nutrition (Practical)	3	3	25	25	50	2
	V	22U5EXT601	Extension Activities	-	-	50	-	50	2
				30				600	24
			Total					3600	144
Additional Credit (Optional) Semester II-VI									8$

#BasicTamil-StudentswhohavenotstudiedTamilupto12th standard.
##**Advance Tamil** – Students who have studied Tamil language up to 12th standard and chosen other languages under part I of the programme but would like to advance their Tamil language skills.
***NME**–Student shall choose any one course out of three courses.
@-No End Semester Examinations. Only Continuous Internal Assessment (CIA)
$-Not included in Total marks & CGPA Calculation
** - Examination and evaluation for value added course shall be conducted by the industry and the marks shall be submitted to the CoE for the award of the grade

List of Discipline Specific Electives

Elective	Subject Code	Group	Title
Elective I	22U3FSE501	A	Food Safety, Sanitation and Hygiene
	22U3FSE502	B	Food Laws and Standards
	22U3FSE503	C	Food Additives
Elective II	22U3FSE604	A	Nutrition for Health& Fitness
	22U3FSE605	B	Nutrition Education and Counseling
	22U3FSE606	C	Food Service Management
Elective III	22U3FSE607	A	Food Packaging and Labelling
	22U3FSE608	B	Unit Operations
	22U3FSE609	C	Technology of Plantation Crops and Spices

Extra Departmental Course Offered by Department of Food Science and Nutrition

S. No.	Subject Code	Name of the Subject
1	22U4FS3ED1	Diet and Health

List of Self-Study Courses offered by Department of Food Science and Nutrition

S. No.	Semester	Subject Code	Name of the Subject
1	II to IV	22UFSSS01	Technology of Fruits, Vegetables and Plantation Crops
		22UFSSS02	Meat and Poultry Processing Technology

BoS Chairman

Department of Food Science and Nutrition

Course Code	Title		
22U3FSC101 /21U3FSC101	Core Paper I - Basic Food Science		
Semester: I	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	1. Learn the composition of different food groups and its nutritional value 2. Provide knowledge on changes during cooking		
Course Category	Entrepreneurship		
Development Needs	Global		
Course Description	It deals with basic food groups and its nutritional composition and its cooking changes.		

	Course Outcomes	Teaching Methods	Assessment Methods
CO 1	Enlist the food groups	Interactive session	Quiz
CO 2	Comprehend the nutritional composition of food groups	E-modules	Seminar
CO 3	Recall the changes in fruits and vegetables on storage	Activity based teaching	Group activity
CO 4	Summarize the changes in food composition on cooking	Experiment based teaching	Group activity
CO 5	Describe the preservation methods of meat and poultry	Interactive session	Assignment

Offered by	Department of Food Science and Nutrition
Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	**Food group:** Basic 4, 5 and7 food groups, functional food groups-energy yielding, bodybuilding and protective foods (only sources), food pyramid. preliminary processing of foods, study of various cooking methods - boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure. Merits and demerits of cooking methods	1	1
	Instructional Hours		15
Suggested Learning Methods: Group activity, Real time experience based reviews			02 Hrs
II	**Cereals, Pulses and Nuts and oil seeds:** **Cereals**: Composition of rice, wheat, structure of wheat, nutritional importance, wheat and rice processing, effects of cooking on parboiled and raw rice, principles of starch cookery, gelatinization, dextrinization. **Pulses:** Varieties of pulses and grams, composition, nutritive value, antinutritional factors, cooking quality of pulses, processing, germination, soaking, fermentation and its advantages and disadvantages	1,2	2,3,4
	Instructional Hours		15
Suggested Learning Methods: Collaborative Learning-Visual learning, Peer learning			02 Hrs
III	**Vegetables**: Classification, composition, nutritive value, selection, and changes during cooking **Fruits**: Classification, composition, nutritive value, methods and effects ofcooking, enzymatic browning, ripening changes, pectin content of fruits andits importance, pigments in fruits and vegetables and storage	2	8
	Instructional Hours		15
Suggested Learning Methods: Group discussion, Peer learning			02 Hrs
IV	**Milk, egg, fats and oils:** Composition, nutritive value, kinds of milk, different milk products,- fermented and non-fermented products pasteurization and homogenization of milk, changes in milk	1	5,6,9

	during heat processing **Egg:** Structure, composition, selection, nutritive value, uses of egg in cookery, methods of cooking, foam formation and factors affecting foam formation, role of egg in cookery and egg quality **Fats and Oils**: Nutritional importance, types of fats, rancidity, changes on heating and role of fat in cookery		
		Instructional Hours	**15**
Suggested Learning Methods: Experimental learning, Group activity			02 Hrs
V	**Meat and meat products**: Classification of meat and poultry, structure, composition, nutritive value, selection, post mortem changes, Changes during cooking, cooking of meat, poultry and fish, preservation and storage of meat, fish and poultry	1	7
		Instructional Hours	15
Suggested Learning Methods: Assignment, Model preparation			02 Hrs
		Total Hours	**75 Hrs**

Text Books	1. Srilakshmi, B., Food Science, (2016), 5 th edition, New Age Publishers, India, New Delhi. 2. Many, S and Shadaksharaswami, M. (2008) Food: Facts and Principles, 3rd edition, New AgePublishers.
Reference Books	1. Swaminathan, M., (2012) Food science, Chemistry and Experimental foods, Bangalore Printing and Publishing Company. 2. Potter M,N. and Hotchkiss, J.H. (2007) Food Science, 5th edition, CBS Publications and Distributors, Daryaganji, New Delhi. 3. Philip, T. (2010). Modern Cookery for teaching and trade, 6th edition, Orient Longmans Ltd.
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	Assignment	Seminar	Group activity	Total
8	8	10	8	8	8	50

Mapping

PO /PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO 4	PSO 5
CO1	M	L	L	M			M	L	H	M	L	M	L
CO2	H	M			M		L	H	M	L	M	L	L
CO3	M	H	L	H	H	L	M	L	M	L	H	L	M
CO4	L	M		L	M	M	L		L	M	L	M	L
CO5	H	H	L	M	H	L	M	H	M	L	H	M	H

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		
22U3FSC102/21U3FSC102	Core Paper II - Food Chemistry		
Semester: I	Credits : 4	CIA : 50Marks	ESE : 50 Marks
Course Objective	To 1. Understand the chemical components of foods 2. Provide insight into chemical changes in food components		
Course Category	Entrepreneurship		
Development Needs	Global		
Course Description	This course discusses the chemical changes in food composition during processing		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the physical and chemical properties of food	Interactive discussion	Quiz
CO 2	Examine the changes in carbohydrates during processing	E-module	Poster presentation
CO 3	Analyze the changes in protein in different foods	Flipped classroom	Brain storming
CO 4	Comprehend the chemical changes in fats and oils	Lecture, Group discussion	Quiz
CO 5	Discuss the aromatic components of foods	E-Module	Group activity

Offered by	Department Food Science and Nutrition

Course Content	Instructional Hours / Week : 5

Unit	Description	Text Book	Chapters
I	**Physio-chemical properties of foods:** Moisture in foods, hydrogen bonding, bound water, water activity in foods, determination of moisture content in foods, true solutions, dispersions, sols, gels, foams, colloids and emulsions	1	1
	Instructional Hours		15
Suggested Learning Methods: Project based learning			02 Hrs
II	**Chemistry of Starch and Sugars:** Components of Starch, starch hydration, gel formation, retrogradation, syneresis, effect of sugar, acid, alkali, fat and surface-active agents on starch, stages of sugar cookery, crystal formation and factors affecting it. types of candies, action of acid, alkali and enzymes. chemistry of milk sugar, Non enzymatic browning	1,2	3
	Instructional Hours		15
Suggested Learning Methods : Learning using Flow Chart models			02 Hrs
III	**Chemistry of Proteins**: Components of wheat proteins, structure, gluten formation and its properties, effect of soaking, fermentation and germination on pulse proteins, properties of egg protein, chemistry of milk protein, changes in milk, egg and meat proteins during heating, addition of acid, alkalis on animal proteins	1	4
	Instructional Hours		15
Suggested Learning Methods: Experimental learning			

IV	**Chemistry of Fats and oils:** Physical and chemical properties of fats and oils rancidity, hydrogenation, winterization, decomposition of triglycerides, shortening power of fats, changes in fats and oils during heating, factors affecting fat absorption in Foods affecting absorption of oil.	2	6
		Instructional Hours	
Suggested Learning Methods: Peer learning			
V	**Aroma compounds** Properties and active principles of spices and condiments other food items, thresh holdvalues, formsof flavour, flovour compounds from fatty acid metabolism, carbohydrate metabolism, amino acid metabolism, factors affecting flavour compounds	1	5,7
		Instructional Hours	**15**
Suggested Learning Methods: Activity based learning			
		Total Hours	**75 Hrs**

Text Books	1.Shakuntala Manay, Shadaksharaswamy. M (2017) Foods, Facts and Principles, New Age International Pvt Ltd Publishers, 2nd Edition 2.Chandrasekhar, U. Food Science and applications in Indian Cookery (2002) Phoenix Publishing House, New Delhi 3.Swaminathan, M. Food Science, (2015) Chemistry and Experimental Foods, Bappco Publishers, Bangalore.
Reference Books	1.Meyer, L.H, Food Chemistry, (2004), 1/e edition, CBS Publishers and Distributors, New Delhi 2.Paul, P.C. and Palmer, H.H. Food Theory and Applications(2000) JohnWiley and Sons, NewYork, (Revised Edition) 3.Chopra H.K, Panesar, P.S, Food Chemistry (2010) Narosa Publishing House, New Delhi
Journals	1. Journal of Food Chemistry and Nutrition

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group activity	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	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	H		M	L	H	L	M	H		H	M	L
CO2	H	M	L	H	L	M		L	M	L	M	L	H
CO3	M	H	L	M			L		H	M	M	H	M
CO4	H	M	L	M		H	M	M	M	L	H	M	M
CO5	M	H		M		L		L	H	L	M	H	L

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	
22U3FSA101 / 21U3FSA101		Allied Paper I - Chemistry – I	
Semester: I	Credits: 3	CIA: 30 Marks	ESE: 45 Marks
Course Objective	To 1. Realize the importance of basics in assemblage of small molecules 2. Utilize in retrieving meaningful conclusion through problem based learning		
Course Category	Entrepreneurship		
Development Needs	Regional		
Course Description	This course provides the insight into the structure and bonds of organic molecules		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the basics in structure and reactions of organic molecules	E-module	Quiz
CO 2	Comprehend chemical bonding and structure of chemicals	Interactive session	Model preparation
CO 3	Identify covalent bonding in molecules and isomers	ICT	Group activity
CO 4	Summarize solution types and kinetics	Interactive session	Seminar
CO 5	Explain about conductance and pH calculations	E- Modules	Assignment

Offered by	Department of Food Science and Nutrition
Course Content	Instructional Hours / Week : 3 (T) +1 (P)

Unit	Description	Text Book	Chapters
I	**Structures:** Methane, Ethylene, Acetylene and Benzene. **Effects:** Inductive effects, mesomeric effect, Hyper conjugative effect, electromeric effect, stric effects in simple and macromolecules.	1,3,5	3,1
		Instructional Hours	**9**
Suggested Learning Methods : Group learning			**02 Hrs**
II	**Chemical Bonding** - Molecular orbital theory, bonding, antibonding and non-bonding orbitals. Molecular orbitals. MO configuration of H2, N2, O2, F2. Bond order. Diamagnetism and paramagnetism. Preparation and properties, structure, preparation and uses of Borane- NaBH4, Borazole Chemistry	4,2,1	20,30,3
		Instructional Hours	**9**
Suggested Learning Methods : Model based learning			**02 Hrs**
III	**Covalent bond:** Orbital overlap, hybridization, geometry of organic molecules- CH4,C2H4, and C2H2. Inductive effect. Electrometric, mesomeric, hyper conjucative and steric effects. Effect in properties of compounds. **Stereoisomerism** Conditions of optical activity-Optical isomerism of tartaric acid, Racemisation, Resolution of racemates-Geometrical isomerism of maleic and fumaric acids	4	26,27
		Instructional Hours	9
Suggested Learning Methods : Model based learning			**02 Hrs**
IV	**Solutions types** – Liquid in Liquid. Raoult's law- - Deviation from ideal behaviour – positive deviation-Negative deviation- Fractional distillation. **Kinetics-** Rate, order, molecularity, pseudo first order, determination of order. Effect of temperature on the rate. Energy of activation	4,2	28, 9
		Instructional Hours	9
Suggested Learning Methods : Group Learning			**02 Hrs**

V	**Conductance-** Types (definition only)- Ostwald dilution law - Kohlraush's law- Applications Conductometric titrations. **pH and its calculations-** Buffers in livingsystems-Action of buffer solutions -. Henderson Hassel balch equation	6,7	7,263
		Instructional Hours	9
Suggested Learning Methods : Peer group learning			**02 Hrs**
ALLIED CHEMISTRY PRACTICALS -VOLUMETRIC ANALYSIS: 1. Estimation of sodium hydroxide using standard sodium carbonate. 2. Estimation of hydrochloric acid- standard oxalic acid. 3. Estimation of oxalic acid- standard sulphuric acid. 4. Estimation of ferrous sulphate- standard Mohr salt solution. 5. Estimation of oxalic acid- standard ferrous sulphate. 6.Estimation of potassium permanganate- standard sodium hydroxide			
		Instructional Hours	15
Suggested learning method : Demonstration , Virtual lab			**02 Hrs**
		Total Instructional Hours	**60 Hrs**

Text Books	1. Veeriyan V, Allied Chemistry I & II, 1st Edition, 2004 2. Atkin's Physical Chemistry, 7th Edition, Oxford University Press, 2007. 3. Robert Thornton Morrisson and Robert Nelison Boyd, Organic chemistry, 6th Edition,Prentice Hall of India Pvt. Ltd., 2008. 4. B.R. Puri, L.R. Sharma & Madan S. Pathania, Principles of Physical Chemistry, VishalPublishing Company, 6th Edition, 2005. 5. Solomons &Fryhle, Organic Chemistry, 8th Edition, John Wiley & Sons, 2017.
Reference Books	1. Jerry March, Advanced Organic Chemistry, 4th Edition, 2004. 2. Paula YurkanisBruice, Organic Chemistry, 3rd Edition, Pearson Education, 2018. 3. Clayden, Greeves, Warren and Wothers, Organic chemistry, 6th Edition, Oxford UniversityPress, 2007

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Model preparation	Group activity	Total
4	4	7	5	5	5	30

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L	M	L	L			L	M			L	M	
CO2	M	H			L		M		M		H	L	
CO3		M	L	L	M		L	L			L		L
CO4	L	L	M	M		M			L	L	M	H	
CO5	M	H	L	H	M		M	L	M		H	M	L

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		
22U3FSP103 /21U3FSP103 Core Paper III –Basic Food Science (Practical)			
Semester: I	CIA : 25 MARKS	Credits 2	ESE: 25 MARKS

Course Objective	To 1. Understand the changes in foods during cooking 2. Develop skills in preparation of food products
Course Category	Skill Development
Development Needs	National
Course Description	This course inbuilt skills in experimental food science which is essential to formulate new food products

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Identify the composition of foods	Hands on learning	Practical
CO 2	Examine the cooking changes in different foods	Hands on learning	Practical
CO 3	Analyze the properties of food products	Hands on learning	Practical
CO 4	Assess the interaction of food components	Hands on learning	Practical
CO 5	Formulate new food products	Hands on learning	Practical

Offered by	**Department of Food Science and Nutrition**

Course Content	Instructional Hours / Week : 3

Unit	Description
1	Food group: Grouping of foods, measuring of different groups of foods and its nutritive value. Edible portion: Determination of edible portion percentage.
2	Cereals - Methods of cooking fine and coarse cereals. Examination of starch.
3	Fat as a medium for cooking-shallow and deep fat frying.
4	Pulses - Cooking of soaked and un soaked pulses. Common preparation with pulse
5	Vegetables -Experimental cookery using vegetables of different colours and textures.
6	Common preparation with vegetables
7	Fruits -Prevention of darkening in fruits and vegetables. Common preparation with fruits
8	Milk and milk products- Experimental cookery – cream of tomato soup, cheese curry and cooking vegetables in milk. Common preparation with milk, cheese and curd.
9	Fleshy foods fish, meat and poultry- preparations.
10	Egg experimental cookery- boiled egg, poached egg. Common preparations with egg
	Total Instructional hours 45 Hrs

Tools for Assessment (25 Marks)

Test I (Mid term)	Test II (Models)	Observation notebook	Performance in lab experiments	Problem solving and critical thinking	Results and presentation	Total
4	4	5	4	4	4	25

Mapping

CO \ PO	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	L	L	M			M	L	H	M	L	M	L
CO2	H	M			M		L	H	M	L	M	L	L
CO3	M	H	L	H	H	L	M	L	M	L	H	L	M
CO4	L	M		L	M	M	L		L	M	L	M	L
CO5	H	H	L	M	H	L	M	H	M	L	H	M	H

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		
22U3FSC204 / 21U3FSC204	Core Paper IV - Human Physiology		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks

Course Objective	To 1. Provide insight into anatomy of human body 2. To Inbuilt knowledge on functions of organs
Course Category	Entrepreneurship
Development Needs	National
Course Description	It gives an insight into the human organ structure and functions

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Comprehend the basic elements of human physiology	E-modules	Assignment
CO 2	Explain the anatomy of digestive system	Model based	Group activity
CO 3	Illustrate the functions of cardio and respiratory system	Tutorials	Model preparation
CO 4	Recall the physiology of reproductive system	Group discussion	Quiz
CO 5	Analyze role of endocrine system and nervous system	Model based teaching	Group presentation

Offered by	Department of Food Science and Nutrition

Course Content	Instructional hours/week: 4 (T) + 1 (P)

Unit	Description	Text Book	Chapters
I	**Cell**: Structure and functions and Tissues - Structure and functions **Blood:** RBC, WBC, Platelets and Lymph. Blood coagulation, blood grouping and Rh factor. **Sense organs** - Structure and function of eye, Nose, tongue, ear and skin..	**1**	**2**
		Instructional Hours	**12**
Suggested Learning Methods: Model based learning, Group activity			**02 Hrs**
II	**Digestive system**: Anatomical Consideration of the digestive tract including liver and pancreas, digestion and absorption of carbohydrate, protein and fat, structure of excretorysystem- kidney, nephrons, urine formation composition of urine, micturition	1	3
		Instructional Hours	12
Suggested Learning Methods: Team based learning, Assignment			**02 Hrs**
III	**Cardio and respiratory system:** **Cardio system:** Structure of heart and blood vessels, Properties of Cardiac Muscle, Functional Tissues, Cardiac Cycle, Heart Rate, Cardiac Output, Blood Pressure, Radial Pulse **Respiratory System**: Anatomy of respiratory tract mechanism of respiration, transport of respiratory gases in blood, gaseous exchange in lungs and tissues	1	5
		Instructional Hours	12
Suggested Learning Methods: Peer group learning, Visual learning			**02 Hrs**
IV	**Reproductive and immune system:** **Reproductive system:** Anatomy of male and female reproductive organs, physiology of menstruation, pregnancy and associated changes, placenta, mammary gland and lactation **Immune system:** Types of immune system	2	7
		Instructional Hours	12
Suggested Learning Methods: Poster making, Model preparation			**02 Hrs**

V	**Endocrinology, Muscle and Central nervous system** Introduction to Endocrinology, hormones, pituitary gland, thyroid gland and parathyroid gland, adrenal gland and endocrine functions of pancreas. **Muscles - physiology of muscular action.** Central nervous system: Physiology of the nerve cell, parts of the central nervous system and function**.**	2	8
		Instructional Hours	12

Related practical experiences

1. Microscope and its use
2. Determination of bleeding time and coagulation time
3. Estimation of Blood profile -Haemoglobin, RBC, WBC, blood group
4. Preparation of blood – smear and DLC
5. Blood pressure and pulse rate recording

Instructional hours	15 Hrs
Suggested Learning Methods: Demonstration, Virtual lab	**02 Hrs**
Total Instructional hours	**75 Hrs**
***Questions shall be taken only from theory portions**	

Text Books	1.Chatterjee C.C (2016), Human Physiology 11th Edition, Medical Allied Agency, Kolkata 2.Sembulingam, K. (2012) Essentials of Medical Physiology, 6th Edition, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
Reference Books	1.Best and Taylor, (2011) 13th Edition The Physiological Basis of Medical Practice, SaundersCompany. 2.Chaudhri, K. (2016), 7th Edition Concise Medical Physiology, New Central Book Agency(Parentral) Ltd., Calcutta.
Journals	1.Journal of physiology 2.Journal of physiology and pharmacy

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Seminar	Group activity	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	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			L		L	H	L	M			L
CO2	L	M			M	M		M	M	H	L		L
CO3		M	L		L		M		M	L	L	L	M
CO4	M			M		H	M	M	L	M	L	M	L
CO5	M	L		M		L		L	M	L	H	M	H

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		
22U3FSC205 / 21U3FSC205	Core Paper V - Principles of Nutrition		
Semester: II	Credits: 4	CIA: 50 Marks	ESE: 50 Marks
Course Objective	To 1. Illustrate the utilization of different nutrients inside the body 2. Understand the physiological functions of each nutrient		
Course Category	Entrepreneurship		
Development Needs	National		
Course Description	This course provides the classifications and properties of biomolecules		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the estimation of energy values of foods	Peer group discussion	Assignment
CO 2	Classify the nutrients based on its functions	E-Module	Seminar
CO 3	Summarize the metabolic functions of nutrients	Group discussion	Model preparation
CO 4	Identify the food sources of macro and micronutrients	Tutorials	Quiz
CO 5	Examine the deficiency disease of nutrients	Case study	Group Discussion

Offered by Department of Food Science and Nutrition

Course Content | **Instructional Hours / Week : 5**

Unit	Description	Text Book	Chapters
I	**Introduction to Nutrition**:General introduction, history of Nutrition. Energy - Definition of Kilocalories, Joule, energy value of foods, determination, physiological fuel values, SDA of foods, basal metabolic rate- definition, factors influencing BMR. Recommended Dietary Allowances for energy. **Carbohydrates** - Classification, functions, source, digestion, absorption and utilization, dietary fibre and health.	1	3,6
		Instructional Hours	15
Suggested Learning Methods: Personalized learning			**02 Hrs**
II	**Protein:** Classification, functions, sources and requirements, digestion, absorption and utilization, Protein quality – PER, BV, NPU, digestibility coefficient, -definition and calculation Reference protein, essential amino acids and mutual supplementation of dietary protein .Fats and Lipids - Classification, functions, sources, requirement, importance of essential fatty acids, their requirements and deficiency..	1	5
		Instructional Hours	15
Suggested Learning Methods : Peer learning			**02 Hrs**
III	**Lipids and Water** **Lipids** - Classification, functions, digestion, absorption and metabolism,functions, sources and requirements **Water** – Importance, distribution in the body, functions of water and sources, water intake and loss, maintenance of water and regulation of acid-base balance in the body, electrolyte balance.	1	4
		Instructional Hours	15
Suggested Learning Methods : Model preparation			**02 Hrs**

IV	**Vitamins: Fat soluble vitamins** –A, D, E and K- functions, source, requirements,deficiency disorders. **Water soluble vitamins** –The B-complex vitamins – Thiamine, Riboflavin, Niacin, Folic acid, Biotin, Pantothenic acid and Vitamin C - functions, source,requirements and deficiency disorders.	1,2	9,10,5
		Instructional Hours	15
Suggested Learning Methods : Poster making, Group discussion			**02 Hrs**
V	**Minerals** - General functions in the body, classification- macro and micro minerals. **Macro minerals** – Calcium and phosphorus - functions, absorption and utilization, requirements, deficiency and toxicity. **Microminerals** – Iron, Fluorine, Zinc, copper, Iodine -functions, absorption, utilization, requirements, deficiency and toxicity	1,2	7,8
		Instructional Hours	15
Suggested Learning Methods : Journal reviews, Peer group activity			**02 Hrs**
		Total Hours	**75 Hrs**

Text Books	1.Srilakshmi, B., Nutrition Science, New Age International (P) Ltd., New Delhi, 2017. 2.Mahtab, S, Bamji, Kamala Krishnasamy, G.N.V. Brahmam, Text Book of Human Nutrition, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi, 2015 3.Swaminathan, M., Advanced Textbook on Food and Nutrition, Vol. 1, Second Edition, Bangalore Printing and Publishing Co. Ltd., Bangalore, 2012
Reference Books	1.Dietary Guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2013. 2.Gordon M. Wardlaw, Paul M.Insel, Perspectives in nutrition third edition, Mosby year Book,Inc.St.Louis,Missouri,2015 3.Krause, M.V. and Hunesher, M.A., Food, Nutrition and Diet Therapy, 14th Edition, W.B. Saunders Company, Philadelphia, London, 2013.

Tools for Assessment (50 Marks)

CIA I	CIA II	CIA III	Assignment	Model preparation	Group activity	Total
8	8	10	8	8	8	50

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L		L	M					L	L	M	H	L
CO2	M						L		L	M	L	M	L
CO3	M		L	L			M		M	M	L	L	M
CO4	M	L	M						H	L	M	M	M
CO5	H	M	L	M			H		H	H	L	M	H

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		
22U3FSA202 / 21U3FSA202	Allied Paper II -Chemistry – II		
Semester: II	Credits: 3	CIA: 30 Marks	ESE: 45 Marks
Course Objective	To 1. Understand the different structures of chemicals 2. Inbuilt skills in thermodynamics		
Course Category	Entrepreneurship		
Development Needs	Regional		
Course Description	It provides knowledge on structure and properties of inorganic chemicals		

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the basics of metals and coordination chemistry	Lecture	Quiz
CO 2	Comprehend preparation and properties of aromatic compounds	E-module	Seminar
CO 3	Describe the properties of proteins and carbohydrates	E-module	Assignment
CO 4	Discuss the basic laws of thermodynamics	Lecture using ICT	Group activity
CO 5	Explain about electrodes and batteries	Video lesson	Model preparation

Offered by	Department of Food Science and Nutrition

Course Content	Instruction Hours / Week: 3 (T) + 1 (P)

Unit	Description	Text Book	Chapters
I	Metals General methods of extraction of metals. Types of ores. Methods of ore dressing.. Reduction methods, electrical methods, types of refining Van Arkel Zone refining. Coordination chemistry Nomenclature. Theories of Werner, Pauling, Chelation examples. Hemoglobin, Chlorophyll. Applications of EDTA in qualitative and quantitative analysis	1,3,5	3,1
	Instructional Hours		**09**
Suggested Learning Methods : Group learning, Model based learning			**02 Hrs**
II	Aromatic compounds: Electrophilic substitution in benzene- Mechanism of nitration, halogenation, alkylation, acylation, sulphonation, Preparation and properties of naphthalene. Heterocyclics: Preparation, uses and electrophilic substitution properties of furan, thiophene, pyrrole and pyridine	4,1,2	20, 30
	Instructional Hours		9
Suggested Learning Methods : Group learning, Model based learning			**02 Hrs**
III	Amino Acids: Classification, preparation and properties, preparation of peptides. Classification of proteins by physical properties and by biological functions. Carbohydrates: classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose..	4	26,27
	Instructional Hours		9
Suggested Learning Methods : Peer learning, Model based learning			**02 Hrs**
IV	Energetics: Definition of first law thermodynamics. Types of systems. Reversible, irreversible. Isothermal and adiabatic processes. Spontaneous processes, Joule-Thomson effect. Enthalpy, bond energy. Need for the second law. Carnot cycle and Carnot theorem. Entropy and its significance. Free energy change.	4,2	28,9
	Instructional Hours		9
Suggested Learning Methods : Group learning, Model based learning			**02 Hrs**

V	EMF (Definition)-Theory of oxidation and reduction-Nomenclature of cell- Daniel cell Reference electrode-Standard Hydrogen Electrode (SHE)-Saturated Calomel Electrode (SCE). Determination of pH-Hydrogen, Quinhydrone and glass electrodes Hydrogen- Oxygen fuel cell-Batteries-Lead-storage battery-Batteries of future-Lithium ion batteries	1,2	7,2
		Instructional Hours	9
Suggested Learning Methods : Model based learning, Group learning			**02 Hrs**
ORGANIC ANALYSIS: systematic analysis 1. Detection of Elements (N, S, Halogens). 2. To distinguish between aliphatic and Aromatic. 3. To distinguish between saturated and unsaturated. 4. Functional group tests for phenols, acids (mono and di), aromatic primary amine, amide, diamide, carbohydrate 5.Functional groups characterized by confirmatory test			
		Instructional Hours	**15**
Suggested Learning Methods: Demonstration, Virtual lab			**02 Hrs**
		Total Hours	60 Hrs

Text Books	1. Veeriyan V, Allied Chemistry I & II, 1st Edition, 2004 2. Atkin's Physical Chemistry, 7th Edition, Oxford University Press, 2007. 3. Robert Thornton Morrisson and Robert Nelison Boyd, Organic chemistry, 6th Edition,Prentice Hall of India Pvt. Ltd., 2008. 4. B.R. Puri, L.R. Sharma & Madan S. Pathania, Principles of Physical Chemistry, VishalPublishing Company, 6th Edition, 2005. 5. Solomons &Fryhle, Organic Chemistry, 8th Edition, John Wiley & Sons, 2017.
Reference Books	1. Jerry March, Advanced Organic Chemistry, 4th Edition, 2004. 2. Paula YurkanisBruice, Organic Chemistry, 3rd Edition, Pearson Education, 2018. 3. Clayden, Greeves, Warren and Wothers, Organic chemistry, 6th Edition, Oxford UniversityPress, 2007. 4. http://ebookacid.weebly.com/engineering/organic-chemistry-english-6th-edition

Tools for Assessment (30 Marks)

CIA I	CIA II	CIA III	Assignment	Model preparation	Group activity	Total
4	4	7	5	5	5	30

Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	L								L	L	L	M	
CO2	L					M			M	M	L	M	L
CO3	M		L		M				H	M	M	H	L
CO4	L	M	L			H	L		M	M	H	M	M
CO5	M	M				L			M	M	H	H	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	
22U3FSP206 / 21U3FSP206		Core Paper VI – Principles of Nutrition (Practical)	
Semester: II	Credits: 2	CIA: 25 Marks	ESE: 25 Marks

Course Objective	To 1. Develop skills in qualitative and quantitative analysis of food 2. Understand the interactions between food components
Course Category	Skill devolopment
Development Needs	National
Course Description	This course relates the concepts in theory with the practical and enhance the nutrient analysis skills

Course Outcomes		Teaching Methods	Assessment Methods
CO 1	Recall the chemical properties of micro and macro molecules	Hands on learning	Practical
CO 2	Categorize the structures of micro and macro molecules	Hands on learning	Practical
CO 3	Identify the standard procedure for nutrient analysis	Hands on learning	Practical
CO 4	Demonstrate the analysis of nutrients in given sample	Hands on learning	Practical
CO 5	Interpret the results of nutrient content in a sample	Hands on learning	Practical

Offered by	**Department of Food Science and Nutrition**

Course Content	Instruction hours/week:3

Description

1. Qualitative tests for sugars – Monosaccharides and Disaccharides
2. Quantitative estimation of glucose
3. Estimation of energy –Bomb calorie meter
4. Qualitative tests for protein
5. Qualitative Tests for Minerals
6. Estimation of Iron
7. Estimation of Calcium
8. Estimation of Ascorbic Acid
9. Estimation of total fat
10. Estimation of phosphorus

Total Instructional Hours	45

Tools for Assessment (25 Marks)

Test I (Mid term)	Test II (Models)	Observation notebook	Performance in lab experiments	Problem solving and critical thinking	Results and presentations	Total
4	4	5	4	4	4	25

Mapping

CO \ PO/PSO	PO1	PO 2	PO 3	PO 4	PO5	PO6	PO 7	PO 8	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M		L	H		L	M	L	M	M	L	L	L
CO2	L		L	M		M	L		L	M	M	L	L
CO3	H			M			M		H	H	L	H	M
CO4	L	M	L	L	M	L	L	M	M	M	H	M	M
CO5	H	H	M		M		M	H	H	H	H	H	H

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