AMRITA VISHWA VIDYAPEETHAM
DEEMED TO BE UNIVERSITY
School of Engineering

AMRITAPURI, BENGALURU, COIMBATORE, CHENNAI

DEPARTMENT OF SCIENCES

B.Sc. Food Science and Nutrition

CURRICULUM AND SYLLABI (2021)

GENERAL INFORMATION

ABBREVIATIONS USED IN THE CURRICULUM

L – Lecture
T - Tutorial
P - Practical
Cr – Credits
LO – Learning Objective
CO - Course Outcome
PO – Programme Outcome
PEO - Programme Education Objective
PSO – Programme Specific Outcome
HUM - Humanities (including Languages and others)
SCI - Basic Sciences (including Mathematics)
CSE – Computer Science Engineering
CUL - Cultural Education
CES – Centre for Environmental Studies
CIR-Corporate and Industrial Relationship

Course Outcome (CO) – Statements that describe what students are expected to know, and are able to do at the end of each course. These relate to the skills, knowledge and behavior that students acquire in their progress through the course.

Program Outcomes (POs) – Program Outcomes are statements that describe what students are expected to know and be able to do upon graduating from the Program. These relate to the skills, knowledge, attitude and behaviour that students acquire through the program. NBA has defined the Program Outcomes for each discipline.

PROGRAMME EDUCATION OBJECTIVE (PEO):

Food Science graduates will be able to:

PEO1: Confidently pursue higher studies and research

PEO2: Serve in core food industry, which leverages diverse food science domains including food chemistry, product development, safety & quality control.

PEO3: Become an entrepreneur confidently

PEO4: Perform well in applied nutrition fields including public health and clinical nutrition

PEO5: Contribute to the manpower requirement in this field so as to address societal & national needs

PROGRAM OUTCOME (PO):

1.**Scientific Knowledge**: Apply the knowledge of biological sciences as a basis for understanding the role of food and nutrients in health and diseases.
2.**Design/development of solutions**: Design solutions for health and nutritional problems and design products that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal and environmental considerations.
3.**Environment and sustainability:** Understand the impact of food processing and preservation solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

4. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the nutrition and health care practice.
5. **Individual and team:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
6. **Communication:** Communicate effectively on nutritional and health burdens with the scientific community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
7. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of health care management.

PSO FOR B.SC. FOOD SCIENCE AND NUTRITION

PSO1: Understand the significance of diverse food groups in relation to health.

PSO2: Comprehend the association between nutrients with physiology, diseases and dietary solutions.

PSO3: Associate the theoretical knowledge and skills acquired to the food industry.

PSO4: Apply knowledge and technical skills in assessing, evaluating and providing health care solutions for individuals and communities.

SEMESTER I

Category	Code	Course Title	LTP	Credits
SCI	21FSN101	Food Science	310	4
SCI	21FSN102	Principles of Nutrition	310	4
SCI	21FSN103	Introduction to Physical Chemistry of Foods	300	3
SCI	21FSN181	Food Science (P)	002	1
CSE	21FSN104	Basics of Computer Applications	200	2
HUM	21ENG103	Communicative English	201	3
HUM		Language I	200	2
CUL	21CUL101	Cultural Education I	200	2
		Total credits		**21**

SEMESTER II

Category	Code	Course Title	LTP	Credits
SCI	21FSN111	Nutrition Through life Span	310	4
SCI	21FSN112	Human Physiology	301	4
SCI	21FSN113	Food Microbiology	300	3
SCI	21FSN114	Food Chemistry	300	3
SCI	21FSN182	Nutrition Through life Span (P)	002	1
SCI	21FSN183	Food Chemistry (P)	002	1
HUM	21ENG111	Professional Communication	102	2
HUM		Language II	200	2
CUL	21CUL111	Cultural Education II	200	2
		Total credits		**22**

SEMESTER III

Category	Code	Course Title	LTP	Credits
SCI	21FSN201	Nutritional Biochemistry	310	4
SCI	21FSN202	Clinical Nutrition and Dietetics - I	220	4
SCI	21FSN203	Food Processing and Preservation Technology -I	220	4
SCI	21FSN204	Food Safety and Quality control	210	3
SCI	21FSN281	Clinical Nutrition and Dietetics (P I)	002	1
SCI	21FSN282	Nutritional Biochemistry (P)	002	1
		Free Elective 1**	200	2
CIR	21SSK202	Soft skill -1	103	2
		Total credits		**21**

SEMESTER IV

Category	Code	CourseTitle	LTP	Credits
SCI	21FSN211	Food Processing and Preservation Technology -II	310	4
SCI	21FSN212	Clinical Nutrition and Dietetics - II	220	4
SCI	21FSN213	Bakery and Confectionery	201	3
SCI	21FSN214	Food Biotechnology	300	3
CES	21ENV211	Environment and Sustainability	300	3
SCI	21FSN283	Clinical Nutrition and Dietetics (P II)	002	1
SCI	21FSN284	Food Processing and Preservation - (P)	002	1
		Free Elective 2**	200	2
CIR	21SSK212	Soft skill -2	103	2
	21FSN290	Live in Labs ***		[3]
		Total credits		**23**

SEMESTER V

Category	Code	Course Title	LTP	Credits
SCI	21FSN301	Food Product Development and Marketing	310	4
SCI	21FSN302	Food Service Management	310	4
SCI	21FSN303	Post-Harvest Technology	310	4
SCI	21FSN304	Packaging and Labelling	210	3
SCI	21FSN381	Food Product Development (P)	002	1
SCI	21FSN382	Food Service Management (P)	002	1
SCI		Professional Elective A*	300	3
CIR	21SSK302	Soft skill - 3	103	2
	21FSN390	Live in Labs ***		[3]
		Total credits		**22**

SEMESTER VI

Category	Code	Course Title	LTP	Credits
SCI	21FSN311	Community Nutrition and Public Health	310	4
SCI	21FSN312	Analytical Instrumentation	200	2
SCI	21FSN313	Nutrition Education and Communication	200	2
SCI	21FSN314	Food Product Evaluation	110	2
SCI		Professional Elective B*	300	3
SCI	21FSN383	Food Analysis (P)	002	1

SCI	21FSN399	Project		6
		Total credits		**21**
		Total credits(I+II+III+IV=V+VI)		**129**

* Two Elective courses (A &B) are to be taken by each student, one each at the 5th and the 6th semesters, from the list of electives offered by the department.

** Free Electives - This will include courses offered by Faculty of Humanities and Social Sciences/ Faculty Arts, Commerce and Media / Faculty of Management/Amrita Darshanam - (International Centre for Spiritual Studies).

*** Students undertaking and registering for a Live-in-Lab project, can be exempted from registering for an Elective course in the higher semester.

PROFESSIONAL ELECTIVES

Category	Code	Course Title	LTP	Credits
		ELECTIVES A-VSEMESTER		
SCI	21FSN231	Food Hygiene and Sanitation	300	3
SCI	21FSN232	Adolescence Health and Lifestyle	300	3
SCI	21FSN233	Sports Nutrition	300	3
		ELECTIVES B- VI SEMESTER		
SCI	21FSN331	Home scale preservation of foods	300	3
SCI	21FSN332	Nutraceuticals and Nutrigenomics	300	3
SCI	21FSN333	Career Opportunities in Food Science and Nutrition	300	3

LANGUAGES

Category	Code	Course Title	LTP	Credits
HUM	21TAM102	TAMIL I	2 0 0	2
HUM	21MAL102	MALAYALAM I	2 0 0	2
HUM	21HIN102	HINDI I	2 0 0	2
HUM	21TAM112	TAMIL II	2 0 0	2
HUM	21MAL112	MALAYALAM II	2 0 0	2
HUM	21HIN112	HINDI II	2 0 0	2

FREE ELECTIVES OFFERED UNDER HUMANITIES / SOCIALSCIENCE STREAMS

Cat.	Code	Title	LTP	Credit
HUM	21CUL230	Achieving Excellence in Life - An Indian Perspective	200	2
HUM	21CUL231	Excellence in Daily Life	200	2
HUM	21CUL232	Exploring Science and Technology in Ancient India	200	2
HUM	21CUL233	Yoga Psychology	200	2
HUM	21ENG230	Business Communication	103	2
HUM	21ENG231	Indian Thought through English	200	2
HUM	21ENG232	Insights into Life through English Literature	200	2
HUM	21ENG233	Technical Communication	200	2
HUM	21ENG234	Indian Short Stories in English	200	2
HUM	21FRE230	Proficiency in French Language (Lower)	200	2
HUM	21FRE231	Proficiency in French Language (Higher)	200	2
HUM	21GER230	German for Beginners I	200	2
HUM	21GER231	German for Beginners II	200	2
HUM	21GER232	Proficiency in German Language (Lower)	200	2
HUM	21GER233	Proficiency in German Language (Higher)	200	2
HUM	21HUM230	Emotional Intelligence	200	2
HUM	21HUM231	Glimpses into the Indian Mind - the Growth of Modern India	200	2
HUM	21HUM232	Glimpses of Eternal India	200	2
HUM	21HUM233	Glimpses of Indian Economy and Polity	200	2
HUM	21HUM235	Indian Classics for the Twenty-first Century	200	2
HUM	21HUM236	Introduction to India Studies	200	2
HUM	21HUM237	Introduction to Sanskrit Language and Literature	200	2
HUM	21HUM238	National Service Scheme	200	2
HUM	21HUM239	Psychology for Effective Living	200	2
HUM	21HUM240	Psychology for Engineers	200	2
HUM	21HUM241	Science and Society - An Indian Perspective	200	2
HUM	21HUM242	The Message of Bhagwad Gita	200	2
HUM	21HUM243	The Message of the Upanishads	200	2
HUM	21JAP230	Proficiency in Japanese Language (Lower)	200	2
HUM	21JAP2313	Proficiency in Japanese Language (Higher)	200	2
HUM	21SAN101	Sanskrit I	200	2

HUM	21SAN111	Sanskrit II	200	2
HUM	21SWK230	Corporate Social Responsibility	200	2
HUM	21SWK231	Workplace Mental Health	200	2

SEMESTER I

FOOD SCIENCE

Semester I	**Hours of Instruction/ week – 4**
Course Code: 21FSN101	**No. of Credits – 4**
L-T-P–C 3-1-0-4	**Total 60 hrs.**

Pre requisite: Basic Food Groups, cooking methods, effects of cooking

Course Objectives:

1. To obtain knowledge on food groups and its nutritional composition
2. To understand the impact of cooking on the stability of nutrients.
3. To analyze the changes during processing and storage on the nutritional composition of foods.
4. To study the factors influencing the cooking quality of different foods.

Course Outcomes:

CO1: Acquire knowledge in the composition of food groups.
CO2: Gain knowledge on nutritive value of different foods, cooking methods, factors influencing and changes in cooking quality.
CO3: Gain home scale processing and storage skills to retain nutrients
CO4: Develop culinary skills to satisfy sensory and nutrient needs.

Skills:

- Develop skills on various cooking methods and medium of cooking.
- Acquire skills in processing and storage of foods.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	3	2	1	-	-
CO2	2	1	-	-	-	-	3	2	-	2	-
CO3	2	2	-	-	-	-	3	2	-	2	-
CO4	2	1	-	-	-	-	3	2	-	2	-

Syllabus:

Unit I - Introduction of Food Groups and Cooking Methods **12 hrs.**

Foods, Classification, Functions, Food groups, Balanced Food, Food pyramid, My plate

Cooking- Objectives of Cooking, Preliminary preparation, cooking methods, Dry heat, Moist heat, Merits and Demerits.

Unit II - Cereals, Pulses, Nuts and Oil Seeds, Fats and Oils **12 hrs.**

Structure, Composition and Nutritive Value, Changes in Nutritive Value during Cooking, Processing and storage, cooking quality

Cereals- Cereal cookery concepts, fermented products, non-fermented products, breakfast cereals

Pulses- Factors affecting cooking quality of pulses, storage and infestation, toxic constituents, pulse cookery.
Nuts and oil seeds- Nuts and oil seeds cookery, toxins in nuts and oil seeds
Fats & Oils - Processing and refining of fats, Specific fats, Role of fats/oil in cookery, Emulsion, smoking point, rancidity.

Unit III -Vegetables and Fruits **12hrs**

Vegetables - Classification, Composition and Nutritive Value, Selection, Vegetable cookery- pigments, Changes in Nutritive Value, Ripening of Fruits, Storage of vegetables and Fruits, fungi and algae as foods
Fruits - Classification, Composition and Nutritive Value, post-harvest change, enzymatic and non-enzymatic browning, vegetables and fruits as functional foods, Ripening of Fruits, Pectic substances and gel formation, Storage of Fruits.

Unit IV- Meat, Poultry, Dairy and Fish **12hrs.**

Milk – Composition and Properties of milk, Nutritive Value, effect of heat, acid, enzymes, phenolic compounds and salts. Microorganisms, Processing, Milk Products, Milk Substitutes, Role of milk and milk products in cookery
Egg- Structure, Composition and Nutritive Value, Quality of eggs, Egg cookery, Buying and Handling, preservation,
Role of eggs in cookery.
Fleshy Foods- Structure, Composition and Nutritive value of meat, Selection and Storage – Effect of cooking on colour, Texture and flavour. Ageing of meat, Curing of Meat, Tendering Meat, Cuts and grades of meat, Meat cookery.
Poultry - Classification, Processing, Composition and Nutritive value, Preservation and storage
Fish - Classification, Composition, Selection, Fish cookery, Spoilage, Preservation and storage.

Unit V - Sugars, Beverages, Spices and Condiments **12hrs**

Sugars - Nutritive value, Properties, Stages of sugar cookery, Sugar Related Products, Sugar Cookery and Artificial Sweetener.
Beverages - Classification, Nutritive value – Coffee, Tea, Cocoa, Chocolate, Fruit Beverages, Soups Vegetable Juices, Milk Based Beverages, Malted Beverages, Aerated and Non-Alcoholic Beverages, Miscellaneous Beverages, Alcoholic Beverages.

Spices and Condiments: Types, Functional properties, Role of spices in cookery.

Text Books:

1. Srilakshmi. B. Food Science, New Age International Pvt Ltd Publishers, 3rd Edition, 2005.
2. Shakuntala Manay, Shadaksharaswamy. M Foods, Facts and Principles, New Age International Pvt Ltd Publishers, Sixth Edition, 2015.
3. *Usha Chandrasekhar, Food Science and Application in Indian Cookery*, Phoenix Publishing House P. Ltd., New Delhi, 2002.
4. Food science, Chemistry and Experimental foods by M. Swaminathan.
5. Swaminathan, M. : Hand Book of Food Science and Experimental Food

Reference Books:

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

Evaluation Pattern

Assessment	nternal	External emester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Principles of Nutrition

Semester I	**Hours of Instruction/ week – 4**
Course Code: 21FSN102	**No. of Credits – 4**
L-T-P –C 3-1-0-4	**Total 60 hrs.**

Pre requisite: Nutrients, Sources, Functions and metabolism.

Course Objectives:

1. Acquire an understanding of nutrition science for health promotion and disease prevention
2. Gain knowledge on functions, metabolism, requirements and effects of deficiency of nutrients.
3. Gain scientific knowledge about the vital link between nutrition and health of individuals.

Course Outcomes:

CO1: Understand basic physiology and biochemistry of nutrients.
CO2: Gain knowledge on the role of nutrient in growth and maintenance of physical structure and metabolism of the body.
CO3: Comprehend the various nutritional disorders and curing the effect of malnutrition
CO4: Evaluate nutrition information based on scientific reasoning for clinical and community application

Skills: Learn skills in developing a balanced diet based on individual requirements**.**

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	-	1	3	2	-	-
CO2	3	-	-	-	-	-	1	2	1	-	-
CO3	3	1	-	-	-	-	1	3	3	-	1
CO4	3	1	-	-	-	-	1	3	2	-	1

Syllabus:

Unit I: Energy **12 hrs.**

Energy, Units of Energy, Measurement of Calorific Value, Physiological fuel values, Determination of energy requirements-Direct and Indirect calorimetry, Relation between Respiratory quotient and Energy output, Specific dynamic action of foods (Diet Induced Thermo genesis) definition, determination of basal metabolism -Benedicts Roth Apparatus, Factors Affecting BMR, determination of energy metabolism during work- Energy requirements for various age groups.

Unit II: Carbohydrates and proteins **12hrs.**

Carbohydrates **-** Classification, composition, sources, functions, digestion, absorption, glycemic index and metabolism, Requirements (RDA) and deficiency. Dietary fiber – definition, sources, functions and types - Soluble and Insoluble Fiber.

Proteins **-** Classification, composition, sources, functions, digestion, absorption and metabolism, Requirements (RDA) and deficiency. Amino acid- classification and functions. Evaluation of protein quality- PER, NPU, NDPER, BV and Chemical score.

Unit III: Lipids and Water **12 hrs.**

Lipids and fats- Classification, composition, Sources, Essential fatty acids, functions, digestion, absorption, metabolism and Requirements

Water and electrolyte Balance - Distribution of water and electrolytes, Functions, Requirements, Sources, water balance.

Unit IV: Minerals **12 hrs**

Macro minerals - Classification, Distribution in the body, Functions, Source's, absorption, storage, metabolism, storage, requirements, deficiency and toxicity- Calcium, Phosphorus, Magnesium.

Micro minerals - Classification, Distribution in the body, Functions, Sources absorption, metabolism, storage, requirements, deficiency and toxicity- Sodium, Potassium, Copper, Iron, Zinc, Iodine and Fluorine, selenium

Unit V: Vitamins **12 hrs.**

Fat soluble vitamins - Chemistry, Functions, Sources, absorption, transport, metabolism, Requirements, Deficiency and toxicity.

Water Soluble Vitamins - Chemistry, Functions, Sources, absorption, transport and metabolism, Requirements, Deficiency and toxicity.

Antioxidants - Free radicals damage, Oxidant defense system, Antioxidants in diseases, Sources.

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, 2015.

Reference Books:

1. *Dietary Guidelines for Indians, ICMR, National Institute of Nutrition*, Hyderabad, 2011.
2. *Gordon M. Wardlaw, Paul M.Insel, Perspectives in nutrition* 11th edition, Mosby- year Book,Inc.St.Louis,Missouri, 2019
3. *Krause, M.V. and Hunesher, M.A., Food, Nutrition and Diet Therapy*, 14th Edition, W.B. Saunders Company, Philadelphia, London, 2016.

Evaluation Pattern:

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Introduction to Physical Chemistry of Foods

Semester I	**Hours of Instruction/ week – 3**
Course Code: 21FSN103	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total - 45 hrs.**

Pre requisite: Basics of Bonding, thermodynamics, kinetics and surface chemistry.

Course Objective: To impart knowledge on the basic physical chemistry aspects with respect to food

Course Outcomes:

CO1: To relate the application of thermodynamics in understanding the chemistry of food
CO2: To understand the concept of solutions of solid in liquid and liquid in liquid and the properties related to the concentration of solute.
CO3: To gain knowledge on the colloids and the special properties of colloids
CO4: To understand the basics on surface activity and surface reactions
CO5: To provide knowledge on the rheological properties, its measurement and its application to food

Skills: Develop skills in the application of physical properties of foods in product development

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	1	-	-	-
CO3	1	1	-	-	-	-	-	-	-	-	-
CO4	1	-	-	-	-	-	-	-	-	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-

Syllabus:

Unit I: Thermodynamics **12 hrs**

System and surrounding, homogenous and heterogeneous system, Intensive and extensive properties, Entropy, Enthalpy, Gibb's free energy, stable- unstable systems. Heat capacity, specific heat capacity- measurement of specific heat capacity using Bomb calorimeter

Unit II: Solutions **12 hrs**

Solubility-relative solubility, Concentration of solutions, Solutions of solid in liquid, Factors influencing solubility, Energy of hydration, Solvation, solutions of liquid in liquid. Colligative properties-Lowering of vapour pressure, elevation of boiling point, depression of freezing point and osmotic pressure.

Unit III: Colloidal chemistry **12 hrs**

Types of colloids-Lyophilic and Lyophobic colloids, classification of colloids, stability of lyophobic and lyophilic sol, emulsification, foaming, light scattering, destabilization of emulsions and foams. Isoelectric point, protection of colloids - protective colloids, Gold Number, Hofmeister series, coagulation or flocculation,

coacervation, sensitization, micelle and critical micellation concentration, application of colloids. Sedimentation, Coalescence, gelatinization.

Unit IV: Surface chemistry **12 hrs**

Surface tension, interface tension, capillary effects, surface activity, surfactants, wetting, contact angle, adsorption- types and mechanism, catalysis- bio catalyst- enzymes, self-assembly of macromolecules, thermodynamics of self-assembly.

Unit V: Rheology **12 hrs**

Rheological classification of foods. Rheology of solid foods, rheology of liquid foods, Hooke's law, Newtonian flow, non-Newtonian flow, gel flow- viscoelasticity, methods of viscoelasticity. Factors influencing rheological properties, measurement of rheology, application of study of rheology in food industry.

Text Books:

1. Physical chemistry of foods- Pieter Walstra, Marcel Dekker Incorporation, The Netherlands, 2003. https://www. dekker.com
2. Principles of food chemistry, John M Deman, 3rd edition, An Aspen publication, Maryland, 1999

Reference book

1. Introduction to the physical chemistry of food, Christos Ritzoulis, 1st edition, CRC press, 2013

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

FOOD SCIENCE (Practical- I)

Semester I	**Hours of Instruction/ week – 2**
Course Code: 21FSN181	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30 hrs.**

Pre requisite: Food groups, nutrients, cooking skills, cooking methods.

Course Objectives:

1. Understand different food groups, their nutritive value and role in day's diet.
2. Training in different recipes applying various cooking methods.
3. Calculate nutritive value for selected foods

Course Outcome:

1. Gain hands on skills through different recipes and various cooking methods
2. Understand the concept of food selection based on nutrient sources
3. Developing skills to calculate nutritive value for selected foods

Skills: Develop skills in various cooking methods in involved

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	1	-	3	3	-	-	-
CO2	3	-	-	-	1	-	3	3	-	-	-
CO3	3	-	-	-	2	-	3	3	-	-	-

Practical's: **30hrs.**

1. Cereals and cereal cookery

a. Preparation of cereal products using Rice, Wheat, Ragi, Thinai, Samai, Varagu etc.
b. Experimental cookery on cereals.

2. Pulses

a. Preparation of pulse based recipes.
b. Experimental cookery.

3. Vegetables and Fruits

a. Effect of cooking on vegetables pigments.
b. Preparation of vegetable curries, and fruits salad.

4. Milk Cookery

Preparation of ice creams and milk products

5. Egg

Preparation of

a. Scrambled egg.
b. Poached egg
c. Omelette and Experimental cookery.

6. Fats and Oils

Preparation of deep fat food products.

7. Beverage

Preparation of Coffees, Tea, Cocoa drinks and various milk based fruit juice beverages.

References:

1. Swaminathan, M. : Hand Book of Food Science and Experimental Food Text.
2. Gopalan.C& Ramasastri: Nutritive value of Indian Foods
3. Hughes. O. 1971 : Introductory Foods.
4. Peckham, C.G. 1969 : Foundation of Food Preparation
5. Love, P. 1967 : Experimental Cookery
6. Swaminathan, M. 1976 : Essentials of Food and Nutritive Vol.I
7. Potler, N. : Food Science.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Basics of Computer Applications

Semester I	**Hours of Instruction/ week – 2**
Course Code: 21FSN104	**No. of Credits – 2**
L-T-P – 2-0-0-2	**Total - 30 hrs.**

Pre requisite: Basics of computer usage, Windows, Microsoft office

Course Objectives:

1. To learn the computer peripherals in the operation of computers
2. To understand the computer network in sharing of information through computers
3. To acquire the skills in the applications of windows in documentation, data analysis and presentation

Course Outcomes:

CO1: Gain knowledge on historical developments and computer peripherals in the operation of computers.
CO2: Understand the computer networks in efficient utilization of internet and intranet connection in digital communication.
CO3: Elicit multimedia presentation focusing on utilization of authorizing tools.
CO4: Able to apply computer applications in meal management practices and explore the nutritional softwares and ejournals in professional and academic endeavors.

Skills: Acquire the skills in exploring windows applications in development of documents, data analysis in spread sheet and power point presentation

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	-	-	2	1	-	-	2	2
CO2	1	-	1	-	-	2	1	-	-	2	2
CO3	1	-	1	-	-	2	1	-	-	2	2
CO4	1	-	1	-	-	2	1	-	-	2	2

Syllabus:

Unit I - Introduction to Computers 6hrs.

History of Development of Computers, Types of Computes- Main Frame, Minis, Micros and Super Computer Systems, Binary numbers, Bits, Bytes, CPU, Input and Output Devices, Main and Auxiliary Stage Devices, Software and Hardware

Unit II - Operating Systems and MS Office 6hrs.

Introduction to Operating Systems and applications

Practical

Word Processing, Spreadsheet, Data Management and Presentation packages

Unit III - Computer Networks **6hrs.**

LAN, WAN, Intranet, Extranet, Servers, Modem, Fibre Optics Basics of HTML, WWW, URL, TCP/IP

Practicals

Introduction to Computer Networks

Unit IV - Multimedia **6hrs.**

Introduction of multimedia, Basic Elements, Hardware, Applications of Multimedia, Authorizing Tools

Practicals

Introduction to Video, and Audio editing soft wares.

Unit V - Application of Computers in Food Science and Nutrition **6hrs.**

Applications - Nutrition Education and Counseling, Presentation, Spread sheets in Nutrient and Diet calculations, Use of statistical software, Accessing Digital Library, e-Journals in Food Science and Nutrition, Relevant Nutrition software's, Applications and Webpages.

Practicals

Developing Mini Projects in Food Science and Nutrition

Text books:

1. Balagurusamy. E (2008) Computing Fundamentals and C Programming, Tata McGraw Hill Education Private Limited, New Delhi.
2. Bansal.S.K (2014) Text Book of Information Technology, APH, Publishing Corporation.

Reference Books:

1. Andrew S. Tanenbaum (2009) IV Edition, Computer Networks, Pearson Education and Dorling Kindersley Publishers, Delhi.
2. James F. Kurose and Keith W Ross (2008) III Edition, Computer Networking. A Top-Down Approach Featuring the Internet, Pearson Education and Dorling Kindersley Publishers, Delhi.
3. Ralf Steinmetz and Klara Nahrstedt (2011) Multimedia- Computing, Communications and Applications, Pearson Education and Dorling Kindersley Publishers, Delhi.

Evaluation pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

Communicative English

Semester I	**Hours of Instruction/ week – 4**
Course Code: 21 ENG 103	**No. of Credits – 3**
L-T-P – 2-0-1-3	**Total - 60 hrs.**

Course Objectives:

To help students obtain an ability to communicate fluently in English; to enable and enhance the students' skills in reading, writing, listening and speaking; to impart an aesthetic sense and enhance activity.

Course Outcomes:

CO1: Demonstrate competency in all four linguistic skills viz. listening, speaking, reading and writing
CO2: Apply different styles of communication in professional context
CO3: Participate in different planned and extempore communicative activities
CO4: Interpret and discuss facts and information in a given context
CO5: Develop an appreciation for human values

CO - PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	3	3	-	-	-	-	-
CO2	-	-	-	-	-	3	3	-	-	-	-	-
CO3	-	-	-	1	2	3	3	-	-	-	-	-
CO4	-	-	-	-	-	3	3	3	-	-	-	-
CO5	-	-	-	-	-	3	3	3	-	-	-	-

Syllabus:

Unit I

Kinds of sentences, usage of preposition, use of adjectives, adverbs for description, determiners, subject-verb/ pronoun, collocation, phrasal verbs, Modifiers, Linkers/ Discourse markers, Question Tags

Unit II

Paragraph writing
Essay Writing- Descriptive and Narrative

Unit II

Letter Writing- Personal (Congratulation, invitation, felicitation, gratitude, condolence etc.)
Official (Principal/HOD/College authorities, Bank Manager, Editors of Newspapers and Magazines)

Unit IV

Reading Comprehension- Skimming and scanning- inference and deduction-Reading different kinds of materials-Speaking: Narration of incidents/ stories/anecdotes- Current news awareness

Unit V

John Holt's Three Kinds of Discipline (Detailed)
Max Beerbohm's The Golden Drugget (Detailed)
Ogden Nash- This is Going to Hurt Just a Little Bit (Detailed)
Robert Kroetsch- I am getting Old Now(Detailed) Langston Hughes(I Too)
Wole Soyinka Telephone Conversation (Non- detailed)
Kamala Das The Dance of the Eunuchs (Non-detailed)
Edgar Allan Poe The Black Cat (Non-detailed)
Ruskin Bond Time Stops at Shamili (Non-detailed)

References

1. Bond, Ruskin. Time Stops at Shamili and other Stories, Penguin Book India Pvt. Ltd, 1989
2. Martinet, Thomson. A Practical English Grammar, IV Ed. OUP, 1986
3. Murphy, Raymond,. Murphy's English Grammar, OUP, 2004
4. Online Sources

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

TAMIL I

Semester I	**Hours of Instruction/ week – 2**
Course Code: 21 TAM 102	**No. of Credits – 2**
L-T-P-C – 2-0-0-2	**Total - 30 hrs.**

தமிழ் பாடதிட்டம் 101

நோக்கம்:

இலக்கியம் மற்றும் படைப்பிலக்கியத்தை அறிமுகப்படுத்துதல் (சங்க இலக்கியம், காபியங்கள் நீதிஇலக்கியங்கள் மற்றும் இக்கால இலக்கியங்கள்). மாணவர்களின் கருத்துபரிமாற்றுதிறனை மனனத்திறனையும் அதிகரிக்கச் செய்தல், தமிமிழின் அடிப்படை இலக்கணக்கூறுகளையும் அதன்பயன்பாட்டையும் அறிமுகப்படுத்துதல்.

Course Outcomes:

CO1 இலக்கியம்,சங்கஇலக்கியம் அறிமுகப்படுத்துதல்
CO2 படைப்பிலக்கியத்தைஅறிமுகப்படுத்துதல்
CO3 பக்திஇலக்கியத்தைஅறிமுகப்படுத்துதல்
CO4 மாணவர்களின்கருத்துபரிமாற்றுதிறனைமனனத்திறனையும்அதிகரிக்கச் செய்தல்
CO5 தமிமிழின்அடிப்படைஇலக்கணக்கூறுகளையும்அதன்பயன்பாட்டையும்அறிமுகப்படுத்துதல்.
CO6 படைப்புஉருவாக்குதல்

CO-PO MAPPING:

S.No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	1	1	2	-	-	-	-	-
CO2	-	-	-	1	1	3	-	-	-	-	-
CO3	-	-	-	1	1	2	-	-	-	-	-
CO4	-	-	-	1	1	3	-	-	-	-	-
CO5	-	-	-	1	1	2	-	-	-	-	-
CO6	-	-	-	1	1	2	-	-	-	-	-

அலகு 1

சங்கஇலக்கியம்: குறுந்தொகை; (2, 6, 8,40 பாடல்கள்) – புறநானூறு (74,112,184,192 பாடல்கள்) – திருக்குறள் (இறைமாட்சி, அமைச்சு)

அலகு 2

காப்பிய இலக்கியம்: சிலப்பதிகாரம் மதுரைக்காண்டம் (வழக்குறைக்காதை 50-55)
ஆன்மிக இலக்கியம்: திருப்பாவை(3,4) – தேவாரம் (மாசில் வீணையும்)
இடைக்கால இலக்கியம்: பாரதியர் கண்ணன்பாட்டு (என் விளையாட்டு பிள்ளை) – பாரதிதசன் குடும்பவிளக்கு (தாயின்தாலாட்டு).

அலகு3

புதினம்: ஜெயகாந்தன் “குருபீடம்” கட்டுரை: அண்ணா “ஏ தாழ்ந்த தமிழகமே”

அலகு4

சமயமுன்னோடிகள்: திருஞானசம்பந்தர் – திருநாவுக்கரசர் – சுந்தரர் – மாணிக்கவாசகர் – ஆண்டாள் – திருமூலர் – குலசேகர ஆழ்வார் – சீத்தலைச் சாத்தனார் தொடர்பான செய்திகள், மேற்கோள்கள் மற்றும் சிறப்புப் பெயர்கள்

அலகு5

தமிழ் இலக்கணம்: சொல்வகைகள் –வேற்றுமை உருபுகள் –வல்லினம் மிகுமிடம் மிகாயிடம் -சந்தி(புணர்ச்சி) -இலக்கணக்குறிப்பு.

அலகு 6

படைப்பு உருவாக்குதல் (கேட்டல்,பேசுதல், எழுதுதல், வாசித்தல்)

பாட நூல்கள்,

1. ஜெயகாந்தன் “குருபீடம்” மீனாட்சிபுத்தகநிலையம், 1971.
2. அண்ணா “ஏ தாழ்ந்த தமிழகமே” நக்கீரன் பப்ளிகேஷன்ஸ்.
3. பொன் மணிமாறன் “அடோன்தமிழ்இலக்கணம் “அடோன்பப்ளிஷிங்குரூப், வஞ்சியூர், திருவனந்தபுரம், 2007.
4. சக்திதாசன்சுப்ரமணியன் “நல்லகுறுந்தொகைமூலமும்உரையும்”முல்லைபதிப்பகம், 2008.
5. புலியூர்க்கேசிகன் “புறநானூறு” ஸ்ரீசெண்பகாபதிப்பகம், 2010
6. புலியூர்க்கேசிகன் “குறுந்தொகைமூலமும்உரையும்” சாராதபதிப்பகம், 2010.
7. நா.பார்த்தசாரதி “புறநானூற்றுச்சிறுகதைகள்” தமிழ்ப்புத்தகாலயம், 1978, 2001
8. http:/www.tamilvu.org/libirary/libindex.htm.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

MALAYALAM I

Semester I	**Hours of Instruction/ week – 2**
Course Code:21MAL102	**No. of Credits – 2**
L-T-P – 2-0-0-2	**Total 30 hrs.**

Course Objectives:

To teach Malayalam for effective communication in different spheres of life:- Social context , Education, Research & Media.

Course Outcomes:

CO1 Inculcate philosophical thoughts and practice.
CO2 Understand the postmodern trends of literature.
CO3 Understand the literary cultural era of a particular region
CO4 Familiarize with the Malayalam literary maestro.
CO5 Expansion of ideas in writing

CO -PO MAPPING

S.No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	3	1	2	1	-	-	-	-
CO2	-	-	-	1	1	2	1	-	-	-	-
CO3	-	-	-	1	1	2	1	-	-	-	-
CO4	-	-	-	1	1	2	1	-	-	-	-
CO5	-	-	-	1	1	2	1	-	-	-	-
CO6	1	-	-	1	1	2	1	-	-	-	-

Syllabus:

Unit I

Ancient poet trio:*Adhyatmaramayanam*,*LakshmanaSwanthanam (Lines: valsasoumitre… mungikidakayal)*,Ezhuthachan -Medieval period classics – *Jnanappana(Lines:201 to 298*),Poonthanam.

Unit II

Modern Poet trio: *EnteGurunathan*, Vallathol NarayanaMenon- Critical analysis of the poem.

Unit III

Short stories from period 1/2/3: *Poovanpazham*-Vaikaom Muhammed Basheer-Literary & Cultural figures of Kerala and about their literary contributions.

Unit IV

Literary Criticism: *Bharatha Paryadanam-VyasanteChiri*–Ithihasa studies-Kuttikrishna Mararu-Outline of literary Criticism in Malayalam Literature-Introduction to Kuttikrishna Mararu & his outlook towards literature &life.

Unit V

Error-freeMalayalam: **1**. Language; **2**. Clarity of expression; **3**. Punctuation-Thettillatha

Malayalam – Writing-**a**. Expansion of ideas; **b**. Precis Writing; **c**. Essay Writing; **d**. Letter writing; **e**. Radio Speech; **f**. Script/Feature/Script Writing; **g**. News Editing; **h**. Advertising; **i.** Editing; **j.** Editorial Writing; **k**. Critical appreciation of literary works (Any one or two as an assignment).

References:

1. Leelavathy.M, Malaya kaavidha Sahithiya saritraam, Kerala sahitya Akademi, Thrissur; 2015th edition
2. Tarahan. K.M, Novel Sahithiya CHARITRAM, Kerala Sastrasahitya Parishad, 2015
3. Ulloor S. Parameshwara Iyer, Kerala Sahithiya CHARITRAM., World eBook Library, 2010
4. Autobiography of Gandhiji, Ente Sathyanweshana Pareekshana Katha

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

HINDI I

Semester I	**Hours of Instruction/ week – 2**
Course Code: 21HIN 102	**No. of Credits – 2**
L-T-P – 2-0-0-2	**Total 30 hrs.**

Course Objectives:

To teach Hindi for effective communication in different spheres of life: -

Course Outcomes:

CO1: Gain knowledge about the origin and development of Hindi language.
CO2: Understand the grammatical structures of classes of words.
CO3: Apply the mechanics of writing.
CO4: Appreciate different genres of literary texts.
CO5: Demonstrate linguistic competence in written communication.
CO6: Creating different forms of literary writing

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	1	3	-	1	-	-	-
CO2	-	-	-	-	1	3	3	-	1	-	-
CO3	-	-	-	-	1	3	-	-	-	-	1
CO4	-	-	-	-	1	3	3	-	-	1	-
CO5	-	-	-	-	1	3	-	-	-	-	1
CO6	-	-	-	-	1	3	2	-	-	1	-

Syllabus:

Unit-I

a)Introduction to Hindi Language, -other Indian Language's, Official Language, link Language Technical terminology.
b) Hindi alphabet: Paribhasha Aur Bhed.
c) Shabda: Paribhasha Aur Bhed, Roopantharki Drishti se
d) Sangya -Paribhasha Aur Bhed,Sangyake Roopanthar-ling, vachan, karak
e) Sarvanaam- Paribhasha Aur Bhed.

Unit- II

a) Common errors and error corrections in Parts of Speech –with emphasis on use of pronouns, Adjective and verb in different tenses –gender& number
b) Conversations, Interviews, Short speeches.

Unit -III

a) Letter writing –Paribhasha Aur Bhed, Avedanpatra (request letter) &Practice
b) Translation-Paribhasha Aur Bhed, English to Hindi

Unit- IV

Poem:
a) Maithilisharangupth: sakhivemujsekahakarjaate
b) Suryakanthtripatinirala: Priyatam
c) Mahadevivarma- adhikaar
d) Shiyaramsharangupth: ekphoolkichah

Unit- V

Kahani
a) Kafan- Premchand,
b) Rajasthan kiEkGaavkeetheerthyatra - Beeshmasahni
c) Raychandrabhai: ByMahathma Gandhi - Sathyakeprayog
d) Rajani -Mannu Bhandari

Text Books:

1. Prem Chand Ki Srvashrestha Kahaniyam: Prem Chand; Diamond Pub Ltd. New Delhi, Hindi Samay.com.
2. Vyavaharik Hindi Vyakaran, Anuvadthaha Rachana: Dr. H. Parameswaran, Radhakrishna publishing House, New Delhi
3. Kamtha Prasad Guru: Hindi Vyakaran, Best Book pub House, New Delhi
Poetry: Kavya Ganga-Ed: Chandrashekar –Suman Prakashan; Mysore, kavyaSargam-Ed; Dr. Santhosh Kumar Chathurvedi – Lokbharathi Prakashan

Evaluation Pattern:

Assessment		**Total External**
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50
Total	100	

*CA – Can be Assignment, Projects, and Reports

CULTURAL EDUCATION -1

Semester I	**Hours of Instruction/ week – 2**
Course Code: 21 CUL 101	**No. of Credits – 2**
L-T-P -C - 2-0-0-2	**Total 30 hrs.**

Course Objectives:

The course is designed as an introductory guide to the variegated dimensions of Indian cultural and intellectual heritage, to enable students to obtain a synoptic view of the grandiose achievements of India in diverse fields. It will equip students with concrete knowledge of their country and the mind of its people and instil in them some of the great values of Indian culture.

Course Outcomes:

CO1: Be introduced to the cultural ethos of Amrita Vishwa Vidyapeetham, and Amma's life and vision of holistic education.
CO2: Understand the foundational concepts of Indian civilization like puruśārtha-s, law of karma and varṇāśrama.
CO3: Gain a positive appreciation of Indian culture, traditions, customs and practices.
CO4: Imbibe spirit of living in harmony with nature, and principles and practices of Yoga.
CO5: Get guidelines for healthy and happy living from the great spiritual masters

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	2	3	-	3	-	-	-	-
CO2	-	-	-	1	3	-	3	-	-	-	-
CO3	-	-	-	1	3	-	3	-	-	-	-
CO4	-	-	-	3	3	-	3	-	-	-	-
CO5	-	-	-	1	3	-	3	-	-	-	-

Syllabus:

Unit I

Introduction to Indian culture; Understanding the cultural ethos of Amrita Vishwa Vidyapeetham; Amma's life and vision of holistic education.

Unit II

Goals of Life – Purusharthas; Introduction to Varnasrama Dharma; Law of Karma; Practices for Happiness.

Unit III

Symbols of Indian Culture; Festivals of India; Living in Harmony with Nature; Relevance of Epics in Modern Era; Lessons from Ramayana; Life and Work of Great Seers of India.

Text Book: Cultural Education Resource Material Semester-1

Reference Books:

1. The Eternal Truth (A compilation of Amma's teachings on Indian Culture)
2. Eternal Values for a Changing Society. Swami Ranganathananda. BharatiyaVidyaBhavan.
3. Awaken Children (Dialogues with Mata Amritanandamayi) Volumes 1 to 9
4. My India, India Eternal. Swami Vivekananda. Ramakrishna Mission.

Evaluation Pattern

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

SEMESTER II

Nutrition through Lifespan

Semester II	**Hours of Instruction/ week – 4**
Course Code: 21FSN111_____	**No. of Credits – 4**
L-T-P – 3-1-0-4	**Total 60 hrs.**

Pre-requisite: Growth, Development, Demand for nutrition, Different stages of life

Course Objective:

This course will give you an on insight how nutrient needs vary during the lifespan - nutrition during preconception, pregnancy and lactation, infant nutrition, childhood and adolescent nutrition, as well as adult and older adult nutrition.

Course Outcomes:

CO 1: Apply the knowledge of nutrition science to human health across the life span.
CO 2: Measure the nutritional needs for normal healthy human throughout their life cycle on the physiological basis.
CO 3: Comprehend the knowledge on nutritional problems and complications.
CO4: Assess and compare diet and nutritional requirements relative to age, developmental and disease status.
CO 5: Evaluate nutrition products for composition, quality, and appropriateness of use (e.g., infant formulas, supplements and specialty foods) and formulate dietary interventions to address nutritional deficiencies.

Skills: To provide wide knowledge and develop skill in planning the nutritional needs of all age groups by understanding their growth and development, requirements and nutritional problems.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	1	-	-	2	1	-	-	-
CO2	2	-	-	1	-	-	1	2	-	-	-
CO3	1	-	-	-	-	-	1	1	-	-	-
CO4	1	2	-	-	-	-	1	1	1	-	-
CO5	1	2	-	1	-	-	1	1	1	1	-

Syllabus:

Unit I: Introduction to RDA and Balanced Diet **12 hrs.**

Basics for Recommending the Dietary Allowances, Acceptable Dietary Intake, Purposes of RDA, Factors Affecting Recommended Dietary Allowances, Requirements and Recommended Dietary Allowances, Growth chart, Uses of ICMR RDA in planning balanced diet, Consumption Units. Reference Man and Woman, Food and Nutritional Requirements for Adults doing Different Activities.

Unit II: Maternal nutrition **12 hrs.**

Nutrition in pregnancy:

Maternal nutrition and outcome, Importance of pre and periconceptional nutrition during pregnancy; Pre pregnancy weight and fetal outcome. Fetal weight gain. Nutritional assessment and guidance in prenatal care.

- Physiological changes during pregnancy, expansion in blood volume, hormonal profile in pregnancy, organ functions, placental transfer of nutrients and resulting complications in pregnancy. Other nutrition related conditions; pregnancy in obese women, gestational diabetes, preeclampsia, alcohol and caffeine abuse. -Maternal nutrient metabolism and recommended intakes in pregnancy. Maternal weight gain in pregnancy. Intrauterine growth retardation. High risk pregnancies and common concerns during pregnancy. Importance of antenatal care.

Nutrition in lactation:

Nutritional needs for lactation. Breast feeding biology, Psycho - physiological aspects of lactation. Factors affecting lactation capacity. Management of lactation, exclusive breast feeding, Breast support and counseling. Effect of breast feeding on maternal health.

Unit III: Nutrition for infant **12 hrs.**

Infant growth and physiological development. Norms/standards for growth. Growth monitoring and promotion. Failure to thrive. Infant nutritional needs and concerns. Nutrition and brain development. Infant feeding, volume and composition of breast milk, human milk Vs. artificial formula. -Development and nutritional quality of infant food: Modern infant formula, complementary and supplementary feeding. Dietary management issues in infant feeding. Food allergies in infancy. -Preterm and LBW infants: Consequences, implications for feeding and management. Neonatal infant mortality and child mortality, IMR. Government policies, schemes and entitlements.

Unit IV: Nutrition in childhood and adolescence **12 hrs**

Childhood: Growth and development, physiological development. Nutritional needs and feeding for preschool children. Micronutrient malnutrition among preschool children. Child health, morbidity, mortality and under five mortality rate (U5MR). -Nutritional requirements and RDA. Feeding school children, behavioral characteristics and feeding problems. Dietary patterns, planning a school lunch, factors to be considered. Implications of childhood obesity and other nutritional concerns. Healthy food choices during childhood.

Adolescence: Growth during adolescence, nutritional requirements, hormonal influences, age of menarche-factors affecting, physiological problems and nutritional issues in adolescence. Government policies, schemes and entitlements

Unit V: Nutrition for adulthood and old age **12 hrs.**

Nutritional requirements for adult man and woman. Nutritional concerns and diet. Nutrition and work efficiency. -Physiological changes in aging, effects of aging on nutritional health of elderly. RDA, nutritional guidelines. Modification in diet, feeding old people. Nutritional concerns in old age and their management. Government policies, schemes and entitlements

Reference Textbooks:

1. Chernoff R. Geriatric Nutrition, The Health professionals Hand book.4th Edition, Jones and Bartlett Learning, Burlington. 2013.

2. Edelstein S and Sharlin J. Life Cycle Nutrition: An Evidence Based Approach, Jones and Barlett publishers, USA. 2009.

3. Ghai OP. Essential Pediatrics, 2ndedn, Interprint, New Delhi. 1990.

4. John EM and David RT. Geriatric Nutrition. CRC Press. Taylor & Francis group. Boca Raton. 2007.

5. Kathleen ML and Escott S. Krause's Food, Nutrition and Diet Therapy,9thedn, W.B. Saunders Company Pennsylvania. 2000.

6. Mahtab S. Bamji, Kamala Krishna Swamy and G N V Brahmam. Text book of Human Nutrition. Oxford and IBH Publishing, New Delhi. 2009.

Suggested Readings:

1. Park K. Text Book of Preventive and Social Medicine. 21stedn, Banarsidas Bhanot Publishers, Jabalpur, India. 2011.

2. Shills ME, Olson JA, Moshe S and Ross CA. Modern Nutrition in Health and Disease, 9 thedn, Lippincott Williams and Wilkins. 2006.

3. Seth V and Singh K. Diet planning through life cycle: Part 1. Elite publishing house pvt ltd, New Delhi. 2006.

4. Smolin and Grosvenor. Nutrition Science and Applications, 3rdedn, Saunders College Publishing, Philadelphia. 2000.

Evaluation Pattern

Assessment	Internal		External
Periodical 1 (P1)	15		
Periodical 2 (P2)	15		
*Continuous Assessment (CA)	20		
End Semester			50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Human Physiology

Semester II	**Hours of Instruction/ week – 4**
Course Code: 21FSN112____	**No. of Credits – 4**
L-T-P – 3-0-1-4	**Total 60 hrs.**

Pre-requisite: Basic biology, Human body, Organs and systems, functions.

Course Objectives:

1. Understand the Composition and Functions of Blood, Haemostasis, Homeostasis, Blood Coagulation, Anemia, Blood Transfusion and Blood Groups
2. Comprehend the structure and functions of Cardiovascular and Respiratory Systems
3. Understand the Anatomy and Physiology of the Digestive and Excretory System
4. Comprehend the Structure and Functions of the Endocrine Glands
5. Understand the Anatomy and Physiology of Male and Female Reproductive Systems
6. Comprehend the Structure and Functions of the Nervous system and sense organs

Course Outcomes:

CO1: Understand the Anatomy and Functions of the various organs and organ systems of the body.
CO2: Comprehend the Mechanism of action of Organs.
CO3: Relate the Physiology of the human body with Food and Nutritional requirements
CO4: Recognize the Clinical Symptoms of Nutritional Deficiencies based on anatomical considerations

Skills: Develop skills to assess physical and clinical symptoms based on the physiological changes

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	-	1	1	1	-	-
CO2	2	-	-	-	-	-	1	1	1	-	-
CO3	3	-	-	-	-	-	1	1	1	-	-
CO4	3	-	-	-	-	-	1	1	1	-	1

Syllabus:

Unit I -Blood, Heart and Circulation **10 hrs.**

Blood - Composition, functions, RBC – Structure, functions, erythropoiesis, Haemoglobin, WBC – Structure, functions, Classification.

Blood Platelets - Structure, functions, Reticulo endothelia system, Blood groups – Rh factor. Blood coagulation, spleen –Structure and functions, Lymph and Lymphatic system.

Heart and Circulation - Heart – Anatomy and physiology, Blood vessels –Structure of artery, vein, capillaries, Cardiac output, Arterial Blood pressure, clinical measurement of blood pressure, properties of cardiac muscle, origin and conduction of heart beat, cardiac cycle, Regulation of the Heart's action.

Unit II - Respiratory and Excretory System **10 hrs.**

Respiratory System - Structure of respiratory organs, Mechanics of respiration, subdivisions of lung air, Chemistry of respiration. Artificial respiration, control of respiration, oxygen saturation, pulsoximeter.
Excretory System - Structure of Excretory System. Kidney, Nephrons, Urine Formation Composition of Urine, Micturition.

Unit III - Digestive System and Musculoskeletal System **10 hrs.**

Digestive System - General anatomy of digestive system – Digestive in the mouth, stomach and intestines. Movements of small intestine. Role of pancreas, Liver – Structure and function.
Musculoskeletal System: General Anatomy of Muscular system- Functions of muscles, Ligaments, Tissues, Skeletal system, Bones and Joints

Unit – IV - Endocrine and Reproductive system **10 hrs.**

Endocrinology - Structure and functions of thyroid, pituitary, parathyroid, adrenals, islets of Langerhans of pancreas, sex glands.
Reproductive System - Anatomy of Male and Female Reproductive Organs, Physiology of Menstruation, Pregnancy and Associated Changes, Placenta, mammary Gland and Lactation- Structure, lactation and process of reproduction, fertilization, development of embryo, pregnancy and parturition.

Unit V - Nervous System and Sense Organs **10 hrs.**

Nervous System:

Spinal cord - Structure and functions. Ascending and descending tracts, reflex action.
Brain - Structure and functions of cerebrum, optic thalamus, midbrain, pons medulla oblongata, Hypo thalamus, cerebellum.
Autonomic nervous system, sympathetic and parasympathetic.

Special Senses.

Eye - Physiology of vision, Structure of eye, dark and light adaptation, accommodation of the eye, visual fields, common problems due to abnormalities – presbyopia, cataract, Astigmatism, Blindness.
Ear – Structure and Physiology.
Nose- Structure and Physiology
Tongue Structure and Physiology.

Unit VI: Practical Experience: **10 hrs**

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1. Bleeding time
2. Clotting time
3. Identification of tissues
4. Blood groups – identification
5. Measurement of Hemoglobin
6. Measuring Pulse Rate
7. Measuring Blood Pressure
8. Measurement of height, weight and calculation of BMI
9. Physical fitness test

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.
3. Sathya Narayana, Essentials of Biochemistry (2000)
4. Saratha Subramanian,Text of Human Physiology(2000).
5. Stuart Ira Fox, Human Physiology (2015)

Reference Books:

1. Best and Taylor, (2011) 13th Edition The Physiological Basis of Medical Practice, Saunders Company.
2. Chaudhri, K. (2016)7th Edition Concise Medical Physiology, New Central Book Agency (Parentral) Ltd., Calcutta.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Food Microbiology

Semester II	**Hours of Instruction/ week – 3**
Course Code: 21FSN113____	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total 45 hrs.**

Pre-requisite: Basic knowledge -microorganisms, food-based microbes.

Course Objective:

1. To obtain knowledge on morphology of microorganisms and types of microscopy
2. To understand the factors influencing the growth of microorganisms
3. To apply the preservation principles and methods to preserve the foods from microbial contamination
4. To explore the beneficial effects of microorganisms in the development of food products.

Course Outcomes:

CO1: Know the different types and morphology of microorganisms and magnification capacity of different types of microscopes.
CO2: Understand the factors affecting the growth in controlling the growth curve of microorganisms.
CO3: Able to preserve the perishable foods from different types of microbial spoilage
CO4: Able to preserve the non-perishable foods from microbial contamination and spoilage.
CO5: Explore the beneficial effects of microorganisms in the processing and development of fermented foods

Skills: Develop skills in identification, testing and control of microorganisms in relation to food safety.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	-	-	-	-	-	-
CO2	2	-	1	-	-	-	-	-	-	1	-
CO3	2	-	-	-	-	-	-	-	-	1	-
CO4	2	-	-	-	-	-	-	-	-	1	-
CO5	2	1	-	-	-	-	-	-	-	1	-

Syllabus:

Unit I: Introduction to Microbiology, Morphology and Growth factors of Microorganisms 12 hrs.

Definition and History, Microscopy, Light and electron Microscopy,General Morphology of Microorganisms Bacteria, Fungi, Algae, Yeast and Virus-Bacteriophage , Microbial Biomass, Growth Curve, Definition of Batch and Continuous culture, Factors Affecting Growth - Intrinsic Factors, Nutrient Content, pH, Redox Potential, Antimicrobial, Barrier and Water Activity. , Extrinsic Factors: Relative Humidity, Temperature and Gaseous Atmosphere, Enumeration strategy of microorganisms, Simple microbial test- sampling, counting

Unit II: Microbiology of Plant based Foods **12 hrs.**

Outline of Contamination, Spoilage and Preservation of Vegetables and Fruits, Cereals and Cereal Products, Pulses, Nuts and oilseeds, Sugar and Sugar Products

Unit III: Microbiology of Animal based Foods **12 hrs.**

Outline of Contamination, Spoilage and Preservation of Milk and Milk Products, Canned Foods, Meat and Meat Products, Egg and Poultry

Unit IV: Beneficial Effects of Microorganisms **12 hrs.**

Fermented Foods – Curd, Cheese, Sauerkraut, Meat, Soy Based Foods, Alcoholic Beverages and Vinegar

Unit V: Food Intoxication and Food Infection **12 hrs.**

Food Borne Diseases – Classification- Intoxication – Botulism and Staphylococcal intoxication- Infection – Salmonellosis, Clostridium Perfringens illness, Bacillus cereus, Ecoli, Shigellosis, Yearsinia and Streptococcus faecalis – Foods involved, Disease's outbreak, Preventive and control measures.

Reference Textbooks:

1. Jay M.J (2015) Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi
2. Ramesh, K.V (2012) Food Microbiology, MJP Publishers, Chennai.
3. Tamine, A (2015) Probiotic Dairy Products, Blackwell Publishing, USA.
4. William C. Frazier (2014) Food Microbiology, Tata McGraw Hills Publishing Company Limited, Chennai.

Suggested Readings:

1. Adams, MR and Moss, MO (2015) Food Microbiology, New Age International (P) Ltd., New Delhi.
2. Cappuccino G.J and Sherman, N (2008) Microbiology – A Laboratory Manual, Pearson Education Publishers, USA,.
3. Jay M.J (2015) Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Food Chemistry

Semester II	**Hours of Instruction/ week – 3**
Course Code: 21FSN114	**No. of Credits – 3**
L-T-P –3-0-0-3	**Total 45 hrs.**

Pre requisite: Basics of chemistry - water, carbohydrates, proteins and fats.

Course objective:
To provide a deeper knowledge on the chemical constituents, their stability, changes - in different medium and their applications

Course outcomes:
CO1: Gain clear understanding of the interaction of water with food and the role of water in food
CO2: Understand the chemistry of sugars and starch and their contribution in the foods
CO3: Gain knowledge on the types of proteins, properties and the action of chemicals on it.
CO4: Recognize the characteristics of fats and oils
CO5: Familiarize with the pigments in food, spices and condiments, enzymes additives and toxic substances.

Skills: Develop skills in the chemistry behind foods during processing

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-
CO3	-	1	-	-	-	-	-	-	-	-	-
CO4	-	1	-	-	-	-	-	-	-	-	-
CO5	1	1	-	-	-	-	-	-	-	-	-

Syllabus:

Unit I: Sols, Gels and Solutions **12 hrs**

Moisture in Foods, Hydrogen Bonding, Bound Water, Water and its interaction with food components and food stability, Water Activity in Foods, Determination of Moisture Content in Foods, True Solutions, Dispersions, Sols, Gels, Foams, Colloids and Emulsions.

Unit II: Carbohydrates- Chemical properties for Food Applications **12 hrs**

Carbohydrates- Starch - granule structure and properties, native and modified Heteropolysaccharides - pectic substances and seed gums, Sweeteners, Effect of Sugar, Acid, Alkali, Fat and Surface Active Agents on Starch, Types of Candies, Chemistry of Milk Sugar, Non Enzymatic Browning, Swelling of Starch Granules, Gel Formation, Retrogradation, Syneresis.

Unit III: Proteins- Chemical properties for Food Applications **12 hrs**

Proteins - Amino acid chemistry, Protein structure, Components of Wheat Proteins, Structure, Gluten Formation 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, Action of Heat, Acid, Alkalis on vegetables Proteins and animal Proteins

Unit IV: Fats and Oils- Chemical properties for Food Applications 12 hrs

Lipids - Fatty acids and triglycerides, Phospholipids, Physical and Chemical Properties of Fats and Oils, Lipid oxidation -Rancidity, hydrolytic and oxidative Hydrogenation - mechanisms and catalysts, Winterization, Decomposition of Triglycerides, Shortening Power of Fats, Changes in Fats and Oils during Heating, Factors affecting fat absorption in foods

Unit V: Chemistry of Pectic Substances, Plant Pigments, Spices and condiments 12 hrs

Pectins, Phenolic Components, Enzymatic Browning in Fruits and Vegetables, Volatile Compounds from Cooked Vegetables, Different Types of Plant Pigments – Water- and Fat-Soluble Pigments, Properties and Active Principles of Spices and Condiments, Colours and colorants, Food additives, Flavours, Acid -base chemistry of foods and common additives, Toxic substances.

Textbooks

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

References

1. Meyer, L.H, Food Chemistry, (2004) CBS Publishers and Distributors, 4th edition
2. Paul, P.C. and Palmer, H.H. Food Theory and Applications (2000) JohnWiley and Sons, New York, (Revised Edition)
3. Chopra H.K, Panesar, P.S, Food Chemistry (2010) Narosa Publishing House, New Delhi
4. "Fennema´s Food Chemistry "4th ed. Damodaran, Parkin & Fennema (2008), CRC Press, Boca Raton, USA

Evaluation pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

Nutrition through Lifespan (Practical-II)

Semester II	**Hours of Instruction/ week – 2**
Course Code: 21FSN182	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30hrs.**

Pre requisite: Stages of Human development, Food & Nutritional Requirements

Course Objectives:

1. Get familiar with weights, measures of both raw ingredients and cooked foods
2. Understand basics of planning menu and prepare food items for different age & income groups
3. Understand the role of a dietitian in diet planning and home maker in family meal planning

Course Outcomes:

1. Understand the basic concept of meal management, meal planning for all age groups
2. Develop skills in planning balanced diet variety food preparation using five food groups a day
3. Apply the knowledge in preparing nutrients dense value-added foods
4. Developing competence in efficient production and cooking methods

Skills: Develop skills in planning and evaluating menu plans throughout different stages of life span

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	1	-	-	-	3	1	2	-	-	-
CO2	2	1	-	-	-	3	1	2	-	-	-
CO3	2	1	1	-	-	3	1	2	-	-	-
CO4	3	1	-	-	-	3	1	2	-	-	-

Practical: **30hrs.**

S.No	Practicals
1	Planning, Preparing and Evaluating Menu During Pregnancy
2	Planning, Preparing and Evaluating Menu During Lactation
3	Planning, Preparing and Evaluating Menu for Infants (Supplementary Foods)
4	Planning, Preparing and Evaluating Menu for Preschoolers
5	Planning, Preparing and Evaluating Menu for School Going Children
6	Planning, Preparing and Evaluating Menu for Adolescents
7	Planning, Preparing and Evaluating Menu for Adults
8	Planning, Preparing and Evaluating Menu for Elderly

Reference books:

1. Dietary Guidelines for Indians, ICMR, National Institute of Nutrition, Hyderabad, 2013.
2. Gopalan, C. Rama Sastri B.V. and Balasubramanian, Nutritive Value of Indian Foods, NIN, ICMR, Hyderabad, 2014.
3. Srilakshmi, B., Dietetics, New Age International (P) Ltd., New Delhi, 2013.
4. Swaminathan, M., Advanced Textbook on Food and Nutrition, Vol. 1, Second Edition, Bangalore Printing and Publishing Co. Ltd., Bangalore, 2012.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Food Chemistry (Practical –III)

Semester II	**Hours of Instruction/ week – 2**
Course Code: 21FSN183	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total -30 hrs.**

Pre requisite: Chemistry behind foods, Effects of cooking, changes during cooking

Course Objectives:

1. To enable the students to Study the physio-chemical changes that occur in foods during cooking.
2. To Gain knowledge about the chemistry underlying the properties and reactions of various food components.
3. To Understand the various properties exhibited by starch and sugars, proteins, fats and oils , pectic substances and spices and condiments

Course Outcomes:

CO1: Demonstrate proficiency in understanding physiochemical changes occurring in foods during cooking.
CO2: Describe the basic principles and properties of starch proteins, fats and oils, pectic substances and spices and condiments.
CO3: Gain sufficient knowledge about chemistry of starch proteins, fats and oils, pectic substances.

Skills: Develop products with minimum nutritional loss based on the knowledge of food chemistry.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO5	PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	3	1	2	-	1	-
CO2	2	2	-	-	-	3	1	2	-	1	-
CO3	2	2	1	-	-	3	1	2	-	1	-

Practical's: **30hrs.**

1. Gelatinization of Starch
2. Microscopic Examination of uncooked and gelatinized Starch
3. Retrogradation and Syneresis
4. Gluten Formation
5. Stages of Sugar Cookery
6. Preparation of Fondant, Fudge, Caramel and Toffee
7. Scum formation
8. Boiling over and scorching of milk
9. Gluten Formation
10. Effect of Soaking, germination and fermentation of Pulses Coagulation of egg white and egg yolk
11. Boiled Egg, Poached Egg, Omlettes, Custards, Cake and Mayonnaise Coagulation and precipitation of milk proteins.
12. Smoking Temperature of Different Fats, Factors Affecting Absorption of Fats
13. Effect of acids, alkali and heat on water & fat-soluble pigments, Enzymatic Browning, prevention

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) CBS Publishers and Distributors, 4th edition
2. Paul, P.C. and Palmer, H.H. Food Theory and Applications (2000) JohnWiley and Sons, New York, (Revised Edition).
3. Chopra H.K, Panesar, P.S, Food Chemistry (2010) Narosa Publishing House, New Delhi.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Professional Communication

Semester II	**Hours of Instruction/ week – 2**
Course Code: 21ENG 111	**No. of Credits –2**
L-T-P – 1-0-2-2	**Total 30 hrs.**

Course Objectives:

1. To convey and document information in a formal environment
2. To acquire the skill of self-projection in professional circles
3. To inculcate critical and analytical thinking

Course Outcomes:

CO1: Demonstrate competency in oral and written communication
CO2: Apply different styles of communication in professional context
CO3: Participate in different planned & extempore communicative activities
CO4: Interpret and discuss facts and information in a given context
CO5: Develop critical and analytical thinking

Skills: Develop skills in critical and analytical thinking

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	3		-	-	-	-
CO3	2	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	2	-	3	-	-	-	-	-
CO5	-	-	-	-	-	3	2	-	-	-	-

Syllabus:

Unit I

Vocabulary Building: Prefixes and Suffixes; One-word substitutes, Modal auxiliaries, Error Analysis: Position of Adverbs, Redundancy, misplaced modifiers**,** Dangling modifiers – Reported Speech

Unit II

Instruction, Suggestion & Recommendation - Sounds of English: Stress, Intonation
- Essay writing: Analytical and Argumentative

Unit III

Circulars, Memos – Business Letters - e - mails

Unit IV

Reports: Trip report, incident report, event report - Situational Dialogue - Group Discussion

Unit V

Listening and Reading Practice - Book Review

Unit- VI

Practical sessions

Text books:

1.Kenneth, Anderson, Tony Lynch, Joan Mac Lean. Study Speaking. New Delhi: CUP, 2008.
2.Marks, Jonathan. English Pronunciation in Use. New Delhi: CUP, 2007.
3.Syamala, V. Effective English Communication for You (Functional Grammar, Oral and Written Communication): Emerald, 2002.

Reference books:

1. Felixa Eskey. *Tech Talk*, University of Michigan. 2005
2. Michael Swan. *Practical English Usage*, Oxford University Press. 2005
3. Anderson, Paul. *Technical Communication: A Reader Centered Approach*, V Edition, Hercourt, 2003.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	20	
Periodical 2 (P2)	20	
Continuous Assessment (CA)	40	
End Semester		20

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

TAMIL II

Semester II	**Hours of Instruction/ week – 2**
Course Code: 21 TAM 112	**No. of Credits – 2**
L-T-P – 2-0-0-2	**Total 30 hrs.**

நோக்கம்:

தமிழ் இலக்கிய வரலாறு அறிதல். நடையியல் ஆய்வு, ஒப்பீட்டறிதல், மொழிப்பயிற்சி, மாணவர்களின் கருத்துபரிமாற்றுதிறனையும் படைப்புத்திறனையும் அதிகரிக்கச் செய்தல், தமிமிழின் அடிப்படை இலக்கணக் கூறுகளையும் அதன் பயன்பாட்டையும் கணினி வழி அறிமுகப்படுத்துதல்.

Course Outcomes:

CO1 தமிழ் இலக்கிய வரலாறு அறிதல்

CO2 நடையியல் ஆய்வு, ஒப்பீட்டறிதல்

CO3 திணை இலக்கியமும் நீதியிலக்கியமும் – பதினெண்கீழ்க்கணக்கு நூல்கள் தொடர்பானப் பிறச் செய்திகளை அறிமுகப்படுத்துதல்

CO4 தமிழக அறிஞர்களின் தமிழ் தொண்டும் சமுதாய தொண்டையும் அறிமுகப்படுத்துதல்.

CO5 தமிமிழின் இலக்கணக்கூறுகளையும் அதன் பயன்பாட்டையும் அறிமுகப்படுத்துதல்.

CO6 படைப்பு உருவாக்குதல்

CO-PO MAPPING

S.No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	2	-	3	2	-	-	-	-
CO2	-	-	-	3	-	3	2	-	-	-	-
CO3	-	-	-	3	-	3	2	-	-	-	-
CO4	-	-	-	2	-	3	3	-	-	-	-
CO5	-	-	-	3	-	3	2	-	-	-	-
CO6	1	-	-	2	-	3	3	-	-	-	-

அலகு 1

தமிழ் இலக்கிய வரலாறு: நாட்டுபுறப்பாடல்கள், கதைக்கள், பழமொழிகள்- சிறுகதைகள் தோற்றமும் வளர்ச்சியும்,

சிற்றிலக்கியங்கள்: கலிங்கத்துப்பரணி (போர்பாடியது) - முக்கூடற்பள்ளு 35.

காப்பியங்கள்: சிலப்பதிகாரம் – மணிமேகலை நடையியல் ஆய்வு மற்றும் ஐம்பெரும் – ஐஞ்சிறுங்காப்பியங்கள் தொடர்பான செய்திகள்.

அலகு 2

திணை இலக்கியமும் நீதியிலக்கியமும்- பதினெண்கீழ்க் கணக்கு நூல்கள் தொடர்பான பிற செய்திகள்- திருக்குறள் (அன்பு, பண்பு, கல்வி, ஒழுக்கம், நட்பு, வாய்மை, பேன்ற அதிகாரத்தில் உள்ள செய்திகள்.

அறநூல்கள்: உலகநீதி(1-5) –ஏலாதி (1,3,6). - சித்தர்கள்: கடுவெளி சித்தர் பாடல்கள் (ஆனந்தக்களிப்பு –1,4,6,7,8), மற்றும் அகப்பேய் சித்தர் பாடல்கள் (1-5).

அலகு 3

தமிழ் இலக்கணம்: வாக்கிய வகைகள் – தன்வினை பிறவினை– நேர்க்கூற்று அயற்கூற்று

அலகு 4

தமிழக அறிஞர்களின் தமிழ் தொண்டும் சமுதாய தொண்டும்: பாரதியார், பாரதிதாசன், பட்டுக்கோட்டை கல்யாணசுந்தரம், சுரதா, சுஜாதா, சிற்பி, மேத்தா, அப்துல் ரகுமான், ந.பிச்சைமூர்த்தி, அகிலன், கல்கி, ஜீ.யூ.போப், வீரமாமுனிவர், அண்ணா, பரிதிமாற்கலைஞர், மறைமலையடிகள்.

அலகு 5

தமிழ் மொழி ஆய்வில்கணினி பயன்பாடு. - கருத்து பரிமாற்றம் - விளம்பர மொழியமைப்பு – பேச்சு - நாடகம் படைப்பு - சிறுகதை, கதை, புதினம் படைப்பு.

பாடநூல்கள்:

மு.வரதராசன்“ தமிழ் இலக்கிய வரலாறு” சாஹித்ய அகடெமி பப்ளிகேஷன்ஸ், 2012
பொன் மணிமாறன் “*அடோன் தமிழ் இலக்கணம்* “அடோன் பப்ளிஷிங்குரூப், வஞ்சியூர், திருவனந்தபுரம், 2007.

http:/www.tamilvu.org/libirary/libindex.htm.
http:/www.gunathamizh.com/2013/07/blog0post_24.html
நா.வானமாமலை, “தமிழர் நாட்டுப் பாடல்கள்” நியூசெஞ்சுரி புத்தக வெளியீட்டகம் 1964,2006
நா.வானமாமலை “பழங்கதைகளும், பழமொழிகளும் ”நியூசெஞ்சுரி புத்தக வெளியீட்டகம், 1980,2008

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	20	
Periodical 2 (P2)	20	
Continuous Assessment (CA)	40	
End Semester		20

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

MALAYALAM II

Semester II	**Hours of Instruction/ week – 2**
Course Code: 21 MAL 112	**No. of Credits – 2**
L-T-P – 2-0-0--2	**Total 30 hrs.**

Course Objectives: To understand the ancient cultural language specialities

Course Outcomes:

CO1 To understand the different cultural influence of linguistic translation.
CO2 To identify the romantic elements of modern literature.
CO3 To analyze the autobiographical aspects.
CO4 To create awareness of the historical, political and socio-cultural aspects of literature.
CO5 Expansion of ideas in writing

CO-PO MAPPING

S.No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	-	-	3	1	-	-	-	-
CO2	-	-	-	1	-	3	-	-	-	-	-
CO3	-	-	-	3	-	3	2	-	-	-	-
CO4	-	-	-	2	-	3	3	-	-	-	-
CO5	-	-	-	1	-	3	2	-	-	-	-

Syllabus: -

Unit I

Ancient poet trio: *Kalayanasougandhikam,(Lines: kallummarangalum… namukkennarikavrikodara*),KunjanNambiar - Critical analysis of his poetry-Ancient Drama: *Kerala Sakunthalam* (Act 1), Kalidasan (Transilated by Attor Krishna Pisharody).

Unit II

Modern/romantic/contemporary poetry: *Chandanakkattil* –G.Sankarakurupu-Romanticism – modernism.

Unit III

Memoirs from Modern Poets: *Theeppathi*, BalachandranChullikkadu-literary contributions of his time.

Unit IV

Partof an autobiography/travelogue: *KannerumKinavum*, Chapter: ValarnnuVarunnoratmavu, V.T.Bhattathirippadu-Socio-cultural literature-historical importance.

Unit V

Error-free Malayalam-**1**. Language; **2**. Clarity of expression; **3**. Punctuation-Thettillatha Malayalam-Writing-**a**. Expansion of ideas; **b**. Précis Writing; **c.** Essay Writing; **d**. Letter writing; **e**.RadioSpeech; **f**.Script/Feature/ScriptWriting; **g**.NewsEditing; **h.** Advertising; **i**.Editing; **j**. Editorial Writing; **k**. Critical appreciation of literary works (Any one or two as an assignment)

References:

1. Leelavathy.M, Malaya kaavidha Sahithiya saritraam, Kerala sahitya Akademi, Thrissur; 2015th edition
2. Tarahan. K.M, Novel Sahithiya CHARITRAM, Kerala Sastrasahitya Parishad, 2015
3. Ulloor S. Parameshwara Iyer, Kerala Sahithiya CHARITRAM., World eBook Library, 2010
4. Autobiography of Gandhiji, Ente Sathyanweshana Pareekshana Katha

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	20	
Periodical 2 (P2)	20	
Continuous Assessment (CA)	40	
End Semester		20

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

HINDI II

Semester II	**Hours of Instruction/ week – 2**
Course Code: 21 HIN 112	**No. of Credits – 2**
L-T-P – 2-0-0-2	**Total 30 hrs.**

Course Objectives:

Appreciation and assimilation of Hindi Literature both drisya & shravya using the best specimens provided.

Course Outcomes:

CO1: Understand the fundamentals of grammar
CO2: Apply the mechanics of writing.
CO3: Develop their critical and creative skills.
CO4: Appreciate different genres of literary texts.
CO5: Demonstrate linguistic competence in written communication.
CO6: Creating different forms of literary writing for Media.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	3	3	1	-	-	-
CO2	-	-	-	-	-	3	3	-	1	-	-
CO3	-	-	-	-	-	3	-	-	-	-	1
CO4	-	-	-	-	-	3	2	-	-	1	-
CO5	-	-	-	-	-	3	2	-	-	-	1
CO6	-	-	-	-	-	3	2	-	-	1	-

Syllabus:

Unit I

a) Visheshan- ParibhashaAurBhed.special usage of adverbs, changing voice and conjunctions in sentences.
b) kriya- ParibhashaAurBhed, rupantharkidrushti se-kaal
c)padhparichay.
d) VigyapanLekhan (Advertisement writing), Saar Lekhan (Precise writing).

Unit II

Communicative Hindi –Moukhik Abhivyakthi –understanding proper pronunciation, Haptics …etc in Interviews, short speeches.

Unit III

Film review, Audio –Visual-Media in Hindi – Movies appreciation and evaluation. News reading and presentations in Radio and TV channels in Hindi, samvaadhlekhan,

Unit IV

a) Harishankarparasaiyi- SadacharkaThavis
b) Jayashankarprasadh – Mamata
c) Mannubandari- Akeli
d) Habibtanvir- Karthus

Unit V

Kavya Tarang

a) Himadrithungshrung se (poet- Jayasankarprasad)
b) Dhabba (poet- kedarnath sing),
c) Proxy (poet- Venugopal),
d) Machis (poet –Suneeta Jain),
e) Vakth. (poet – Arunkamal)
f) Fasal (poet- SarveshwarDayalSaxena)

Text Books:

1.Kavay Tarang: Dr. Niranjan, JawaharPusthakalay, Mathura. kavyaSargam-Ed; Dr. Santhosh Kumar Chathurvedi – Lokbharathi Prakashan.
2.KahaniKunj: Editor:Shashidar , GovindPusthakalay , Mathura
3.Vyavaharik Hindi Vyakaran, AnuvadthahaRachana: Dr. H. Parameswaran, Radhakrishna publishing House, New Delhi

Evaluation Pattern

Assessment	Total Internal	Total External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester	50	50
Total	100	

*CA – Can be Assignment, Projects, and Reports.

Cultural Education II

Semester II	**Hours of Instruction/ week – 2**
Course Code: 21 CUL 111	**No. of Credits – 2**
L-T-P – 2-0-0-2	**Total 30 hrs.**

Course Objectives:

The course is designed to enable students to deepen their understanding and further their knowledge about the different aspects of Indian culture and heritage. It will equip students with concrete knowledge of their country and the mind of its people and instill in them some of the great values of Indian culture

Course Outcomes:

CO1 Get an overview of Indian contribution to the world in the field of science and literature
CO2 Understand the foundational concepts of ancient Indian education system
CO3 Learn the important concepts of Vedas and *Yogasutra*-s and their relevance to daily life
CO4 Familiarize themselves with the inspirational characters and anecdotes from the *Mahābhārata* and *Bhagavad-Gītā* and Indian history
CO5 Gain an understanding of Amma's role in the empowerment of women

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	1	-	2	-	-	-	-
CO2	-	-	-	-	1	-	2	-	-	-	-
CO3	-	-	-	-	1	-	2	-	-	-	-
CO4	-	-	-	-	1	-	2	-	-	-	-
CO5	-	-	-	-	1	-	-	-	-	-	-

Syllabus:

Unit I

To the World from India; Education System in India; Insights from Mahabharata; Human Personality. India's Scientific System for Personality Refinement.

Unit II

The Vedas: An Overview; One God, Many Forms; Bhagavad Gita –The Handbook for Human Life; Examples of Karma Yoga in Modern India.

Unit III

Chanakya's Guidelines for Successful Life; Role of Women; Conservations with Amma.

Text Book:

1. Heritage of India. R.C.Majumdar. Ramakrishna Mission Institute of Culture.
2. The Vedas. Swami ChandrashekharaBharati. BharatiyaVidyaBhavan.
3. Indian Culture and India's Future. Michel Danino. DK Publications.
4. The Beautiful Tree. Dharmapal. DK Publications.
5. India's Rebirth. Sri Aurobindo. Auroville Publications

Evaluation Pattern

Assessment	Total Internal	Total External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester	50	50
Total	100	

*CA – Can be Assignment, Projects, and Reports.

SEMESTER III

Nutritional Biochemistry

Semester III	**Hours of Instruction/ week – 4**
Course Code: 21FSN201	**No. of Credits – 4**
L-T-P – 3-1-0-4	**Total 60 hrs.**

Pre-requisite: School level chemistry of biomolecules

Course Objective: To impart knowledge on the biochemistry and metabolism of macronutrients and micronutrients.

Course Outcomes: At the end of the course, the students will be able to

CO1: Understand the fundamental concepts of nutrition and functions of enzymes and hormones.
CO2: Gain knowledge on the chemical/biochemical properties and metabolic pathways of carbohydrates, proteins, lipids and nucleotides.
CO3: Acquire a clear understanding on the significance of nucleic acids in protein synthesis.

Skills: To provide wide knowledge in connection to nutrition and biochemistry involved in the food components.

CO-PO Mappings

	PO 1	PO2	PO3	PO4	PO7	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	2	3	-	-	3	3	2	-	-
CO2	0	-	3	3	-	-	-	3	2	-	-
CO3	0	-	3	3	-	-	-	3	2	-	-

Syllabus:

UNIT I - Biomolecules **12 hrs**

An overview of bio-macromolecules: carbohydrates, lipids, amino acids, proteins and nucleic acids

Unit II - Chemistry of Enzymes and Hormones **12 hrs**

Enzymes - Classification, nomenclature and general properties - Mechanisms of enzyme action, regulation of enzyme activity - Role of coenzymes and cofactors in enzyme activity - Factors affecting enzyme activity - Enzyme inhibition - iso-enzymes and immobilized enzymes - Clinical significance of enzyme assays. Hormones - Classification, second messengers, and mechanism of action - Neuro-endocrine control of metabolism - Hormonal disorders - Counter regulatory hormones.

Unit III - Chemistry of Carbohydrates and Proteins and their Metabolism **12 hrs**

Carbohydrates – Classification and physico-chemical properties - Aerobic and anaerobic degradation - Glycogenesis, Glycogenolysis, Gluconeogenesis - HMP shunt pathway -Alcoholic fermentation - Hormonal regulations of blood glucose. Proteins and amino acids – Classification, structure and physico-chemical

properties - Protein degradation and metabolism - Urea cycle - Glutamine and alanine cycle - Protein biosynthesis.

Unit IV - Chemistry of Lipids and Nucleotides and their Metabolism **12 hrs**

Lipids - Classification, chemical structure, and properties – Identification of fats and oils (saponification number, acid number, iodine number and Reichert – Miesel number) - Metabolic pathways of triaclyglycerol, fatty acids, cholesterol and lipoproteins - Biosynthesis of fatty acids and ketone bodies. Nucleic acids: Classification - metabolism of nucleic acid components - Biosynthesis of nucleotides.

Unit V - Nucleic Acids **12 hrs**

Chemistry and metabolism of nucleic acids: definition, components, nucleosides, nucleotides, structure of DNA and RNA, types of RNA, replication, transcription, role of DNA and RNA in protein synthesis.
Basics of molecular biology and genetics, molecular basis of mutation, restriction enzymes, recombinant DNA technology, cloning of genes.

Textbooks:

1. Advanced Nutrition and Human Metabolism, Gropper SS, Smith, JL, and Groff JL, 7th Edition, 2018.
2. Wardlaw's Perspectives in Nutrition, Carol Byrd-Bredbenner, et al., 9th Edition, 2013.
3. Harper's Illustrated Biochemistry by Murray, Bender, Botham, Kennelly, Rodwell, and Well (McGraw Hill Publishers), 29th Edition,

Reference books:

1. Handbook of Food and Nutrition, Dr. M. S. Swaminathan, The Banglore printing and publishing Co. Ltd. (Bangalore press), 2004.
2. Lehninger, Principles of Biochemistry, W H Freeman & Co, 2021.
3. Lubert Stryer, Jeremy M. Berg, Biochemistry, WH Freeman, 2019.
4. Color Atlas of Biochemistry by Koolman and Roehm. Thieme, 2nd edition, 2005.
5. Introduction to Nutrition and Metabolism, David. A. Bender, 4th edition, CRC Press, 2008.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

Clinical Nutrition and Dietetics – I

Semester III	**Hours of Instruction/ week – 4**
Course Code: 21FSN202	**No. of Credits – 4**
L-T-P – 2-2-0-4	**Total 60 hrs.**

Pre-requisite: Diet management & Role of Dieticians

Course Objective:

1. Understand the theoretical aspects of clinical nutrition.
2. Gain knowledge on different therapeutic diets and their preparation.

Course Outcomes:

CO1: Understand the basics concepts of Dietary management.
CO 2: Acquire knowledge on the roles and responsibilities, skills, ethics and opportunities for a dietician
CO 3: Apply principles of diet therapy, modification of normal diet for therapeutic purposes.

CO4: Comprehend the causes, symptoms and dietary management addressing to risk factors.

Skills:

- Enhance knowledge and skills of nutrition and to develop critical evaluation skills through an integration of nutrition, dietetics and research.
- Applying technical skills, knowledge of health behavior, clinical judgment, and decision-making skills when assessing and evaluating the nutritional status of individuals and communities

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	-	-	1	1	1	-	-
CO2	1	-	-	2	-	-	1	1	1	-	-
CO3	1	3	-	2	-	-	1	1	1	-	-
CO4	1	2	-	2	-	-	1	1	1	-	-

Syllabus:

Unit I: Introduction to Clinical nutrition and dietetics I **12hrs.**

Definition and history of dietetics- Concepts of a desirable diet for optimum health-Interrelationship between food, nutrition and health- Factors affecting food choices, Physiologic factors regulating food intake- role of neurotransmitters and nutrients in hunger and satiety.
Introduction to diet therapy- Glycemic Index, dietary supplements, adjunct to diet therapy, food nutrition and drug interaction

Unit II - Role and responsibilities of dieticians **12 hrs.**

Dietician, classification, responsibilities, code of ethics, assessment and diet planning, diet counselling and nutrition education, dietician in India, Indian Dietetic Association (IDA)

Unit III - Principles and Objectives of Medical nutrition therapy **12 hrs.**

Characteristics of a Regular diet, rationale for modifications in terms of energy and other nutrients, texture, consistency. Translation of diet orders into menu: defining nutrient needs, desirable dietary pattern, menu plan, use of exchange list, types of menu. Monitoring food intake.
Enteral and Parenteral feeding- Indications, types (oral supplements, tube feeding, parenteral feeding, TPN, pre and post-operative diets, immuno nutrition), methods of administration, monitoring and associated complications.

Unit IV- Dietary principles and management of special conditions: **12hrs.**

Protein and energy malnutrition (hospital and domiciliary treatment) - Febrile diseases-classification of fevers, metabolism, general dietary considerations- diet in acute and chronic fevers (typhoid and tuberculosis) - Surgical conditions, Burns and organ transplants, Infectious diseases (typhoid, malaria, tuberculosis, HIV), arthritis, gout, hypothyroidism

Unit V - Nutrition in adverse reactions to food **12 hrs.**

Pathogenesis, food allergens, symptoms, tests for diagnosis, food allergies - pollen food allergy syndrome, latex –fruit syndrome, food dependent, exercise- induced anaphylaxis, food induced anaphylaxis, food –protein induced enterocolitis syndrome, cow's milk protein allergy (CMPA). Management - restricted diets, elimination diets and hypo- sensitization.

Reference Textbooks:

1. Srilakshmi. B. Dietetics, New age International Publishers, 6th Edition, 2012
2. Davidson S, Passmore R, Breck JFT. Human Nutrition and Dietetics, The English Language Book Society and Churchill Livingston, 1975.
3. Kathleen ML and Escott S. Krause's Food, Nutrition and Diet Therapy, 9thedn, W.B. Saunders Company Pennsylvania, 2000.

Suggested Readings:

1. Bemadette. M. Marriott and Sydne J Carlson, Nutritional needs in cold and high altitude environments
2. Cresci, P. D. (Ed.). (2015). Nutrition support for the critically ill patient: A guide to Practice. CRC Press.
3. Escott-Stump, S. (2008). Nutrition and diagnosis-related care. Lippincott Williams & Wilkins.
4. Gable, J., & Herrmann, T. (2015). *Counselling skills for Dietitians*. John Wiley & Sons.
5. Nelms, M., & Sucher, K. (2015). Nutrition therapy and pathophysiology. Nelson Education

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

Food Processing and Preservation Technology –I

Semester III	**Hours of Instruction/ week – 4**
Course Code: 21FSN203	**No. of Credits – 4**
L-T-P – 2-2-0-4	**Total 60 hrs.**

Pre- requisite: Basics of food processing & preservation methods

Course Objectives:

1. Gain knowledge on the principles of food preservation and processing
2. Understand the physicochemical properties of food
3. Understand the processing of various food groups based on its properties

Course Outcomes:

CO1: Comprehend the nature and properties of foods
CO2: Understand the principles of the various processing methods for different foods.
CO3: Adapting conventional practices and modern technology to arrive at efficient processing.

Skills: Develop skills in various food processing techniques

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	-	-	-	1	2	1	3	-
CO2	3	3	-	-	-	-	1	2	1	3	-
CO3	3	3	-	-	-	-	3	2	1	3	-

Syllabus:

Unit I - Introduction to food processing **12 hrs.**

Nature and properties of food, fluid and visco elastic behavior of foods, Principles of different food processing such as membrane filtration (ultra, osmosis and reverse osmosis, dialysis), pulsed electric, irradiation, high pressure processing and hurdle technology. Effect of food processing on the nutritional properties of food.

Unit II - Processing of cereals and millets **12 hrs**

Milling products and by products of wheat, rice, corn, barley, oats, sorghum and other millets, whole wheat atta, blended flour, fortified flour, flaked, puffed and popped cereals, malted cereals, processed foods - bakery products, pasta products and value-added products.

Unit III - Processing of legumes and oil seeds **12hrs.**

Milling, processing for anti-nutritional factors, processing for production of edible oil, meal, flour, protein concentrates and isolates, extrusion cooking technology, snack foods, development of low-cost protein foods.

Unit IV - Processing of Dairy and animal foods **12hrs.**

Dairy – Manufacture of different types of milk, drying of whole and skim milk, cream separation, churning of butter, processing of different types of cheese, Probiotic milk products - yoghurt, dahi and ice-cream,

indigenous milk products - khoa, burfi, kalakhand, gulab jamun, rasagola, srikhand, channa, paneer, ghee, lassi.

Animal Foods: Canning, cooking, drying, pickling, curing and smoking, salami, kebabs, sausages, sliced, minced, corned, whole egg powder, egg yolk powder, fish protein concentrate and fish oil

Unit V Processing of Fruits and Vegetables **12 hrs.**

Introduction to ripening of fruits and vegetables, processing and preservation of various fruits and vegetables, fruit juices concentrates and powders, purees, pastes, sugar and salt preserves, dehydrated fruits and vegetables.

Related practical experiences

1. Visit to TNAU
2. Visit to flour mill
3. Visit to milk processing unit
4. Visit to FSSAI, CODEX, NABL Accreditation labs

Text Books:

1. Shakuntala Manay, N. and Shadaksharaswamy, M., (2008) Foods – Facts and Principles, 3rd Edition, New Age International (P) Limited Publishers, New Delhi, 2013.
2. S. Ranganna, Handbook of Analysis and Quality Control for Fruit and Vegetable Products, McGraw Hill Education, 2017.
3. G.Subbulakshmi and Shoba A Udipi Food Processing and preservation, New Age International Publishers, New Delhi, 2008.
4. Sivasankar B, (2004) Food Preservation and Processing, 1st Edition, Prentice – Hall of India Private Ltd., New Delhi, 2012.
5. Bawa AS, Raju PS, Chauhan OP, (2013) Food Science, New India Publishing Agency, New Delhi, 2013.

Reference Books:

1. Fellow, P., Food Processing Technology (2016)– Principles and Practices, 3rd Edition, CRC Press Woodland Publishers, England.
2. Adams, M.R. and Moss, M.O., Food Microbiology, (2015) New Age International (P) Ltd., New Delhi.
3. Sommers, C.H. and Xveteng Fan, (2016) Food Irradiation Research and Technology, 2nd Edition, Blackwell Publishing, New Delhi.
4. Manual of methods of Analysis of foods, fruit and vegetable Processing, FSSAI, 2016.

Evaluation Pattern:

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

Food Safety and Quality Control

Semester III	**Hours of Instruction/ week – 3**
Course Code: 21FSN204	**No. of Credits – 3**
L-T-P – 2-1-0-3	**Total 45 hrs.**

Pre –requisite: Food safety, Consumer awareness, Nutrition information and labelling

Course Objectives:

1. Know the importance of quality assurance in food industry.
2. Know the principles of quality control of food additives.
3. Know the standards for quality assessment and food safety against adulteration for various foods.
4. Familiarize with critical assessment and control points for quality assurance.

Course Outcome:

CO1: Understand the principles of quality assurance systems in a food industry.
CO2: Apply quality management systems to food processing and evaluation.
CO3: Identify and understand issues pertaining to food safety and quality control.
CO4: Assessing the quality parameters during food product development.

Skills: Develop skills in food safety and food quality management

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	1	-	-	-	-	-	1	-
CO2	2	2	-	1	-	-	-	-	-	1	-
CO3	2	2	-	1	-	-	1	-	-	1	-
CO4	2	2	-	1	-	-	-	-	-	1	-

Syllabus:

Unit I **8hrs.**

Water, Sanitation, Hygiene, Food quality, Food selection, Food Safety, House hold hygiene, Food safety measures duringfood production, Organization of quality control function in the food industry.

Unit II **10hrs.**

Principles of Quality control of food –Raw material control, processed control and finished product inspection.
Leavening agents, classification, uses and optimum levels.
Food additives - Preservatives, colouring, flavouring, sequestering agents, emulsifiers and antioxidants.

Unit III **8hrs.**

Standardization systems for quality control of foods-National and International standardization system, Food grades, Food laws-compulsory and voluntary standards.

Food adulteration - Common adulterants in foods and tests to detect common adulterants.

Unit IV **10hrs.**

Methods for determining quality - Subjective and objective methods.

Sensory assessment of food quality-appearance, color, flavour, texture and taste, different methods of sensory analysis, preparation of score card, panel criteria, sensory evaluation room.

Unit V **9hrs.**

Food safety: The concept of food safety and its definition. Elements of food safety management. Challenges in management of food safety and outlook. Hazards associated with foods – Milk and dairy products; meat, egg and poultry; fruits and vegetables; nuts and oil seeds. Control of hazards and management of safety of foods at raw and processed stage.

Hazard Analysis and Critical Control Point System (HACCP): Introduction, the need for HACCP, Principles of the HACCP System and application of HACCP, microbiological criteria in food packaging.

Reference Books:

1. Food science-Norman potter
2. Jay M.J (2015) Modern Food Microbiology, Fourth Edition, CBS Publishers and Distributors, New Delhi
3. Food Technology-Presscott.S.C.and Procter
4. Food chemistry-Meyer
5. Food science, Chemistry and experimental foods-M.Swaminathan
6. Food chemistry-Lee
7. Food science-Srilakshmi(2001)2nd edition, New age international publishers-(2001)B.Sc. Food Sci &Nut.(2014-15, Annexure No. 32 A Page 16 of 33 SCAA Dt.06.02.2014
8. Rerfus.K.Guthrie-Food sanitation –3rd edition –Van Nostrand Reinhold Newyork 1988.
9. Mahirdra-S.N.-Food safety –A techno-legal analysis-Tata McGrawhill publishers 2000.
10. Manoranjan Kalia-Food processing and preservation.
11. Roday-Food hygiene and sanitation.
12. Indian Food industry,2000. Vol19:2

Evaluation Pattern:

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Clinical Nutrition and Dietetics – I (Practical- IV)

Semester III	**Hours of Instruction/ week – 2**
Course Code: 21FSN281	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30 hrs.**

Pre requisite: Diet Planning, Therapeutic Diet

Course Objectives: To enable the students to

1. Understand the basic principles in diet planning
2. Develop skills and techniques in planning and preparation of therapeutic diets for various disease conditions

Course Outcomes:

CO1: Understand the basic principles involved in planning diets for different disease conditions.
CO2: Plan and prepare diets to meet out the quality and quantity requirements for specific disease conditions
CO3: Acquire practical knowledge of therapeutic diet to meet the requirement

Skills: Develop skills to plan and prepare therapeutic diet

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	1	-	3	1	2	2	1	1
CO2	2	2	-	1	-	3	1	2	2	1	1
CO3	2	2	-	1	-	3	1	2	2	1	1

Practical's: **30hrs.**

Planning, Preparation of diet in

a. Soft, clear and full fluid diet.
b. Low and medium cost diet for protein – calorie, vitamin A, Iron deficiency.
c. Overweight and underweight conditions.
d. Fevers of shot and long duration.
e. Diarrhea, dysentery, constipation.
f. Peptic Ulcer.

Text Books:

1. Srilakshmi, V. Dietetics New Age International P. Ltd., New Delhi, 2011.
2. Dietary Guidelines of Indians – A Manual, National Institute of Nutrition, Hyderabad, 2011.
3. Garg, M. Diet, Nutrition and Health, ABD Publishers, 2006.

Reference books:

1. Krause, M.V. and Mahan, L.K. Food, Nutrition and Diet Therapy, 9th Ed., W.B. Saunders Company, Philadelphia, 2009.
2. Maimun Nisha, Diet Planning for Diseases, Kalpaz Publishers, 2006.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Nutritional Biochemistry (Practical – V)

Semester III	**Hours of Instruction/ week – 2**
Course Code: 21FSN282	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30 hrs.**

Pre requisite: Basics on biochemical assessments

Course Objective: To impart knowledge quantitative estimation of blood and urine parameters.

Course Outcomes: At the end of the course, the students will be able to

CO1: Understand the fundamental concepts biomolecules.
CO2: Gain hands on experience in quantitative analysis of urine and blood parameters

Skills: Develop skills on blood and urinary analysis.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	-	-	2	-	-	-
CO2	2	-	-	-	-	-	-	2	-	-	-

Practicals: **30hrs.**

1. Quantitative analysis of Urine for sugar, protein, Bile pigments, Bile salts,
2. Acetone and Blood.
3. Estimation of Urine Glucose (Benedict's Method)
4. Estimation of Urine Urea (DAM-TSC Method)
5. Estimation of Blood Glucose (Folin-WU Method)
6. Estimation of Blood Urea (DAM-TSC Method)
7. Estimation of serum cholesterol (Zak's Method)
8. Estimation of serum bilirubin.
9. Electrophoretic pattern of blood proteins (Demonstration).

Text Books:

1. Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, William Itinmaon Medical Books, London, 2010.

2. Oser, B.L., Harke's Physiological Chemistry XIV Edition Tata McGraw Hill Publishing Company Ltd., Bombay, 2011

Reference Books:

1. Sadasivam, S. and Manickam, A. Biochemical Method, Second Edition,New Age International P. Ltd., Publishers, New Delhi, 2013.

2. Raghuramulu, N., Madhavannair, K. and Kalyana Sundaram, National Institute of Nutrition, 2013, A Manual of Laboratory Techniques, Hyderabad, 500007

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Soft Skill I

Semester III	**Hours of Instruction/ week – 3**
Course Code: 21 SSK 202	**No. of Credits – 3**
L-T-P – 1-0-2-2	**Total 45 hrs.**

Pre-requisite: Team Spirit, self-confidence and required knowledge, basic English language skills, knowledge of high school level mathematics.

Course Objective: To help students understand the nuances of leadership, know the importance of working in teams, face challenging situations, crack interviews, improve communication skills and problem-solving skills.

Course Outcome:

CO1: Soft Skills - At the end of the course, the students would have understood the importance and tactics of working in teams. They would have developed the ability to communicate convincingly and negotiate diplomatically while working in a team to arrive at a win-win situation. They would further develop their inter-personal and leadership skills. They would also have acquired the necessary skills, abilities and knowledge to present themselves confidently.

CO2: Soft Skills - At the end of the course, the students would have the ability to prepare a suitable resume. They would have the ability to analyse every question asked by the interviewer, compose correct responses and respond in the right manner to justify and convince the interviewer of one's right candidature through displaying etiquette, positive attitude and courteous communication. They would be sure-footed in introducing themselves and facing interviews.

CO3: Aptitude - At the end of the course, students will be able to identify, recall and arrive at appropriate strategies to solve questions on geometry. They will be able to investigate, interpret and select suitable methods to solve questions on arithmetic, probability, statistics and combinatorics.

CO4: Verbal - At the end of the course, the students will have the ability to understand and use words, idioms and phrases, interpret the meaning of standard expressions and compose sentences using the same.

CO5: Verbal - At the end of the course, the students will have the ability to decide, conclude, identify and choose the right grammatical construction.

CO6: Verbal - At the end of the course, the students will have the ability to examine, interpret and investigate arguments, use inductive and deductive reasoning to support, defend, prove or disprove them. They will also have the ability to create, generate and relate facts / ideas / opinions and share / express the same convincingly to the audience / recipient using their communication skills in English.

Skills: Communication, teamwork, leadership, facing interviews and problem-solving.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	3	3	3	3	-	-	-	-
CO2	-	-	-	3	3	3	3	-	-	-	-
CO3	-	-	-	-	3	3	3	-	-	-	-
CO4	-	-	-	-	3	3	3	-	-	-	-
CO5	-	-	-	-	3	3	3	-	-	-	-
CO6	-	-	-	-	3	3	3	-	-	-	-

Syllabus:

Unit I - Soft Skills

Team Work: Value of teamwork in organizations, Definition of a team. Why team? Effective team-building. Parameters for a good team, roles, empowerment and need for transparent communication, Factors affecting team effectiveness, Personal characteristics of members and its influence on team.

Leadership, Internal problem solving, Growth and productivity, Evaluation and co-ordination.
Facing an interview: Importance of verbal & aptitude competencies, strong foundation in core competencies, industry orientation / knowledge about the organization, resume writing, being professional. Importance of good communication skills, etiquette to be maintained during an interview, appropriate grooming and mannerism.

Unit II - Aptitude

Geometry: 2D, 3D, Coordinate Geometry, and Heights & Distance.

Permutations & Combinations: Basics, Fundamental Counting Principle, Circular Arrangements, and Derangements.

Probability: Basics, Addition & Multiplication Theorems, Conditional Probability, and Bayes' Theorem.

Statistics: Mean, Median, Mode, Range, and Standard Deviation.

Logical Reasoning: Blood Relations, Direction Test, Syllogisms, Series, Odd man out, Coding & Decoding, Cryptarithmetic Problems and Input-Output Reasoning.

Campus recruitment papers: Discussion of previous year question papers of all major recruiters of Amrita Vishwa Vidyapeetham.

Competitive examination papers: **Discussion of previous year question papers of CAT, GRE, GMAT, and other management entrance examinations.**

Miscellaneous: Interview Puzzles, Calculation Techniques and Time Management strategies.

Unit III - Verbal Skills

Vocabulary: Create an awareness of using refined language through idioms and phrasal verbs.
Grammar (Advanced Level): Enable students to improve sentences through a clear understanding of the rules of grammar.
Reasoning Skills: Facilitate the student to tap his reasoning skills through Syllogisms, and critical reasoning arguments.
Reading Comprehension (Advanced): Enlighten students on the different strategies involved in tackling reading comprehension questions.
Public Speaking Skills: Empower students to overcome glossophobia and speak effectively and confidently before an audience.
Writing Skills: Introduce formal written communication and keep the students informed about the etiquettes of email writing.

References:

1. Adair. J., (1.986), "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
2. Gulati. S., (2006) "Corporate Soft Skills", New Delhi, India: Rupa & Co.
3. The Hard Truth about Soft Skills, by Amazone Publication.
4. Verbal Skills Activity Book, CIR, May 2018
5. Nova's GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
6. The BBC and British Council online resources

7. Owl Purdue University online teaching resources
8. www.thegrammarbook.com online teaching resources
9. www.englishpage.com online teaching resources and other useful websites
10. Student Workbook: Quantitative Aptitude & Reasoning, Corporate & Industry Relations, Amrita Vishwa Vidyapeetham.
11. Quantitative Aptitude for All Competitive Examinations, Abhijit Guha.
12. How to Prepare for Quantitative Aptitude for the CAT, Arun Sharma.
13. How to Prepare for Data Interpretation for the CAT, Arun Sharma.
14. How to Prepare for Logical Reasoning for the CAT, Arun Sharma.
15. Quantitative Aptitude for Competitive Examinations, R S Aggarwal.
16. A Modern Approach to Logical Reasoning, R S Aggarwal.
17. A Modern Approach to Verbal & Non-Verbal Reasoning, R S Aggarwal.

Evaluation Pattern

Assessment	Internal	External
Continuous Assessment (CA) – Soft Skills	40	
Continuous Assessment (CA) – Aptitude	10	20
Continuous Assessment (CA) – Verbal	10	20
Total	60	40

***CA - Can be Presentations, Speaking activities and tests.**

SEMESTER IV

Food Processing and Preservation Technology –II

Semester IV	**Hours of Instruction/ week – 4**
Course Code: 21FSN211_____	**No. of Credits – 4**
L-T-P – 3-1-0-4	**Total 60 hrs.**

Pre-Requisite: Techniques involved in food processing and preservation

Objectives:

1. Understand the importance of food preservation.
2. Gain knowledge on the types of food spoilage
3. Comprehend the use of different temperatures in food processing
4. Understand preservation of various foods using sugar, chemicals and salt
5. Understand the principles and concept of food fermentation

Course Outcomes:

CO1: Understand the role of microorganisms in food spoilage
CO2: Gain knowledge on high and low temperature processing
CO3: Comprehend chemical preservation, sugar preservation and fermentation
CO4: Apply the knowledge/concepts to develop new products with minimal processing for better retention of essential nutrients

Skills:

1. Develop skills in food preservation
2. Develop new products with minimal processing for better retention of essential nutrients

CO PO Mappings:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	-	1	3	-	2	-
CO2	2	2	1	1	-	-	1	3	-	2	-
CO3	2	2	1	1	-	-	1	3	-	2	-
CO4	2	3	-	1	-	-	1	3	-	2	-

Syllabus:

Unit I - Introduction to Food Preservation **10hrs.**

Importance of Food Preservation, Types of Spoilage, Basic Principles of Food Preservation.

Unit II - Preservation by the Use of Low and High Temperature **14hrs.**

a) Preservation by the Use of Low temperature- Refrigeration, freezing

Refrigeration, Advantages, Factors to be Considered, Common Spoilages, Freezing, Difference between Refrigeration and Freezing, Methods of Freezing, freeze drying and freeze concentration, Steps Involved in Freezing Common Foods, Spoilages, storage.

b) Preservation by the Use of High Temperature - Drying, Dehydration

Sun Drying, Solar Drying and Dehydration, Mechanical Dehydration, Merits and demerits, Factors Affecting Drying, Preparation of Foods for Drying, Freeze Drying and Dehydro Freezing – Mechanism and Advantages, Spray drying, Canning, Steps Involved, Types of Cans, Spoilage Encountered, Pasteurization and Sterilization

Unit III - Preservation by Using Sugar 12hrs.

Sugar Concentrates – Principles of Gel Formation, Preparation of Jam, Jelly, Marmalades, sauce and squash, Preserves, Candied, Glazed and Crystallized Fruits

Unit IV - Preservation by Using Chemicals and Salts Fermentation 12hrs.

Definition, Types of Fermentation, Advantages, Preparation and Preservation of Fruit Juices, RTS Pickling – Principles Involved and Types of Pickles- Indian Pickles, Vinegar, Salt Preservation Chemical Preservatives – Definition, Role of Preservation, Permitted Preservatives, FPO Specification, Bio preservatives of microbial origin, FSSAI

Unit V - Preservation by Fermentation 12hrs.

Common Fermented Foods, Wine and Cheese Making

Text Books:

1. Sivasankar, B. (2013) Food Processing and preservation 2nd edition, prentice Hall, Pvt, Ltd.
2. Srilakshmi, N., (2016) 6th Edition, Food Science, New Age International Private Ltd., New Delhi, 2002.
3. Bibek Ray, Fundamental Food Microbiology, CRC Press, 2003
4. Swaminathan, M., Food Science, Chemistry and Experimental Foods, Bappco Publishers, Bangalore, 2014.
5. Chandrasekhar, U, Food Science and Applications in Indian Cookery, Phoenix Publishing House Private Ltd., New Delhi, 2012.

Reference Books:

1. Adams, M.R. and Moss, M.O., Food Microbiology, New Age International (P) Ltd., New Delhi, 2015.
2. Fellow, P., (2010) Food Processing Technology – Principles and Practices, 3rd Edition, CRC Press Woodland Publishers, England.
3. Sommers, C.H. and Xveteng Fan, Food Irradiation Research and Technology, Blackwell Publishing, 2016.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Clinical Nutrition and Dietetics – II

Semester IV	**Hours of Instruction/ week – 4**
Course Code: 21FSN212____	**No. of Credits – 4**
L-T-P – 2-2-0-4	**Total 60 hrs.**

Pre-requisite: Nutrition & Diseases

Course Objective:

1. Understand the role of nutrition for good health.
2. Obtain knowledge on different therapeutic diets and their preparation.
3. To acquire relevant skills to develop as a dietitian.

Course Outcomes:

CO1: Understand the principles behind various diets in prevention and treatment of diseases.
CO2: Gain core knowledge and skills to enable individuals to work in public health and health promotion
CO3: Gain experience on planning and preparation of various therapeutic diets.
CO4: Develop capacity and aptitude for taking up dietetics as a profession

Skills:

- Develop skills and techniques in the planning and preparation of diets for various disease conditions
- Applying principles of diet therapy in planning, preparation and nutrient calculation of hospital diets, therapeutic diets for various diseases

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	1	-	-	1	1	1	-	1
CO2	2	-	-	1	-	-	1	1	1	-	1
CO3	2	2	-	-	-	-	1	1	1	-	1
CO4	2	-	-	-	-	-	1	1	1	-	1

Syllabus:

Unit I - Introduction to Clinical nutrition and dietetics **10 hrs.**

Nutritional assessment in clinical care – goals and methods (SGA). Modification of normal diets (normal, soft and fluid diets), types and factors to be considered in planning therapeutic diets, general principles of dietary calculation.

Principle involved in planning menu. Techniques of writing menus, Food service management in hospitals- Types (centralized and decentralized systems of service), management of delivery and service of food in different systems.

Unit II - Dietary management of metabolic syndrome and associated disorders **13 hrs.**

Metabolic syndrome: Concept; Pathophysiology of insulin resistance.

Obesity- introduction, etiology, clinical assessment, treatment approaches, consequences of obesity and its prevention.

Diabetes mellitus – types, etiology, symptoms and diagnosis, aims of dietary treatments, special dietary consideration for type I and II diabetics, complications of diabetes
Diseases of the heart and blood vessels- etiology, symptoms and diagnosis; atherosclerosis, lipids and other dietary factors and coronary heart diseases (CHD). Diet in CHD, hypertension, congestive heart failure and hyperlipidemia.

Unit III - Dietary management of gastrointestinal tract disorders 13hrs.

Structure and function of gastrointestinal tract, dietary treatment for constipation, diarrhea, peptic ulcer, celiac disease, tropical enteropathy, tropical sprue, inflammatory bowel disease, irritable bowel syndrome and diverticular disease.

Unit IV - Nutritional management in liver and kidney diseases 12 hrs.

Diseases of the liver - functions of liver, clinical assessment of liver function. Pathogenesis, signs and symptoms of hepatitis, acute liver failure, cirrhosis and encephalopathy. Nutritional management in liver diseases.
Dietary management in gallbladder diseases.

Diseases of the kidney - functions of kidney, clinical assessment of kidney function. Pathogenesis, signs and symptoms of acute and chronic renal failure, nephrotic syndrome and renal calculi. Nutritional management in kidney diseases and during renal replacement therapy.

Unit V - Nutritional therapy in neoplastic diseases 12hrs.

Cancer- Types, stages and markers. Nutrition in the etiology of cancer. Nutritional effects of cancer and cancer therapy, nutritional care of cancer patient. Complementary and alternative nutrition therapies.

Reference Textbooks:

1. Srilakshmi.B, Dietetics, New age International publishers, New Delhi, 2019. Seventh edition,
2. Kathleen ML and Escott S. Krause's Food, Nutrition and Diet Therapy, 9thedn, W.B. Saunders Company Pennsylvania, 2000.
3. Davidson S, Passmore R, Breck JFT. Human Nutrition and Dietetics, The English Language Book Society and Churchill Livingston, 1975.
4. Thomas B. Manual of Dietetic Practice. Blackwell Scientific Publications, Oxford, London, 1988.
5. Robinson CH. Normal and Therapeutic Nutrition. Oxford Publishing Co, Bombay, 1972.

Suggested Readings:

1. Erdman JW, Macdonald IA and Zeisel SH. Present Knowledge in Nutrition, 10thedn, International Life Sciences Institute Press, Washington DC, 2012.
2. Shills ME, Olson JA, Moshe S and Ross CA. Modern Nutrition in Health and Disease, 9thedn, Lippincott Williams and Wilkins, 2006.
3. Gibney MJ, Macdonald IA and Roche HM. Nutrition and Metabolism, Blackwell Publishing, UK, 2003.
4. Gibney MJ,Elia M, Ljungqvist O and Dowsett J. Clinical Nutrition, Blackwell Publishing, UK, 2005.
5. Park K. Text Book of Preventive and Social Medicine. 21stedn, Banarsidas Bhanot Publishers, Jabalpur, India, 2011.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Bakery and Confectionery

Semester IV	**Hours of Instruction/ week – 3**
Course Code: 21FSN213____	**No. of Credits – 3**
L-T-P – 2-0-1-3	**Total 45 hrs.**

Pre- requisite: Baking principles & bakery products

Course Objectives:

1. Understand the science and technology of baking
2. Understand the role of different ingredients in bakery
3. Develop skills in planning and establishing a bakery unit.

Course Outcomes:

CO1: Understanding the role of ingredients in baking quality.
CO2: Increased knowledge on the complete process of baking and presentation of baked products
CO3: Improved knowledge on appropriate sanitation, hygiene and safety practices during baking
CO4: Gain knowledge to set up a bakery unit.

Skills: Learned various baking skills to bake different products

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	-	-	-	-	1	1	-	1	-
CO2	1	2	-	-	-	-	1	1	-	1	-
CO3	-	-	1	1	-	-	-	1	-	1	-
CO4	-	-	-	-	-	-	1	-	-	2	-

Syllabus:

Unit I **8hrs.**

Introduction to baking:

Baking - Definition, History, Principles of baking, classification of baked foods. Types of equipment's in baking industry, cleaning and sanitizing methods of baking equipment's, baking temperature of different products, operation techniques of different baking equipment's.

Unit II **8hrs.**

Role of Ingredients:

Ingredients and Their Role in Baking - Flour, Yeast, sugar, egg, butter, salt, baking powder, colouring, flavouring agents. List of standard colouring and flavouring agents

Unit III **10hrs.**

Factors for setting up a bakery unit:

Factors to be considered for Setting up a Bakery Unit
Types of Ovens – Construction and Working of Conventional and Modern Ovens, Study and Maintenance of Major and Minor Equipment's.

Bread Making – Steps and Methods, Role of Ingredients, Variety Breads, Qualities of a Good Loaf, Bread Faults, bread diseases.

Unit IV **10hrs.**

Preparation and Decoration of baked foods

Cake Making – Functions of Ingredients

Cake Mixing Methods, Types of Cakes, Cake Judging, Cake Faults and remedies Biscuit, Cookie and Pastry Making, Types and techniques of Icing,

Frosting and fillings. Sensory evaluation of baked products- objective and subjective methods

Unit V **9hrs.**

Confectionery

Processing of Raw Materials -Cocoa and Chocolate. Making of Toffee, Chocolates, Fruit Drops, Hard Boiled Candies (clear, hard, pulled, grained, filled), Soft candies (fondant, modified fondants like toffee, fudge, marshmallows, gums, jellies, chocolates) Bars, Chewing Gums, Special Confectionery Foods- tablets, Lozenges.

Reference Books:

1. Potter, N. Food Science, The AVI Publishing Co., Inc., West Port, Connecticut, 1975.
2. Baker's Handbook on practical Baking. Wheat Associates, USA, New Delhi.
3. Dubey, SC, Basic Baking Science and Craft, Jwalmukhi Job Press, Bangalore, 1979.
4. Modern Pastry Chab, Vol.I and II, A VI Publishing Co., Inc., West Port, Connecticut, 1977.
5. Bakery Journal

Practicals: (To gain knowledge about Bakery - No Examination)

1. Breads
2. Cakes
3. Biscuits and cookies
4. Pastries
5. Icing

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Food Biotechnology

Semester: IV	**Hours of Instruction/ week – 3**
Course Code: 21FSN214	**No. of Credits – 3**
L-T-P –C 2-1-0-3	**Total 45 hrs.**

Pre requisite: Genetic engineering, enzymes and microbes, fermentation

Course Objectives:

1. To understand the role of enzymes as a tool in genetic engineering and biotechnology
2. To make learners aware on the principles of genetic engineering, plant tissue culture and molecular cloning
3. To enable learners to understand the concept of fermentation biotechnology
4. To delineate the role of microbes in the application of biotechnology in Food Science and Nutrition

Course Outcomes:

CO1: Expand the knowledge of food biotechnology in relation to genetic engineering and plant tissue culture.
CO2: Understanding the role of enzymes and microbes in food industry.
CO3: Helps to keep abreast on development and applications of biotechnology in food and nutrition.

Skills: Develop appropriate skills involved in food biotechnology and genetic engineering

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	-	-	-	-	-	1	-
CO3	2	-	-	-	-	-	-	-	-	1	-

Syllabus:

Unit I - Introduction and Tools of Genetic Engineering **10hrs.**

Definition, enzymes as tools - exonucleases, endonucleases, ligases, reverses transcriptase and alkaline phosphatase, cloning vectors-plasmids, bacteriophage, cosmids and phasmids

Unit II Genetic Engineering and Plant Tissue Culture **10hrs.**

Outline of genetic engineering in prokaryotes (microbial cells), concepts of molecular cloning, plant tissue culture, micro propagation, transgenic plants, genetically modified foods-golden rice, flavr savr tomato and Bt brinjal; enlisting applications of genetic engineering, isolation of DNA and Plasmids

Unit III - Fermentation Biotechnology **8hrs.**

General structure of bioreactors and listing types, bacterial growth curve, batch and continuous culture, environmental factors, basic concepts of downstream processing, definition of biochips and biosensors

Unit IV- Use of Microbes in Food Industry **8hrs.**

Primary metabolites, secondary metabolites, synthesis of citric acid, glutamate, xanthan gum, vitamin B12, riboflavin and Single Cell Protein – spirulina and yeast biomass

Unit V - Enzyme Biotechnology **9hrs.**

Soluble enzymes, immobilization of enzymes – methods of immobilization, role of enzymes in food industry, safety assessment of transgenic crops

Text Books:

1. Dubey, R.C., 2014, A Text Book of Biotechnology, 5th revised edition, S. Chand and Company Ltd., New Delhi.
2. Green, P.J., 2010, Introduction to Food Biotechnology, CRC Press, USA.

Reference Books:

1. Dietrich Knorr, 2017, Food Biotechnology, Marcel Dekker Inc., New York.
2. Owen, P. Ward, 2018, Fermentation Biotechnology, Principles, Processes and Products, Prentice Hall, Advanced Reference Series, New Jersey, 07632

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Environment and Sustainability

Semester IV	**Hours of Instruction/ week – 3**
Course Code: 21ENV211	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total – 45 hrs.**

Pre requisite: 12th Standard in Science

Course Objectives:

1. Understand the basic facts related to the environment including components of the environment, nutrient recycling, biodiversity and ecosystem services.
2. Identify various interactions between society and the environment, including overpopulation, urbanization, resource exploitation, habitat destruction, consumerism, environmental protection, activism, regulation.
3. Characterize some important environmental issues from environmental and social perspectives.
4. Assess integrated approaches for solving socio-environmental problems and sustainable living, including indigenous and traditional approaches.
5. Identify attitudinal factors and specifically, the ethical issue that lies at the root of social and environmental problems and the necessity for individual attitudinal change and sustainable action to attain global sustainability.

Course Outcomes:

CO1: Integrate facts and concepts from ecological, physical and social sciences to characterize some common socio-environmental problems.

CO2: Develop simple integrated systems and frameworks for solving common interconnected socio-environmental problems.

CO3: Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

CO4: Identify the ethical underpinnings of socio-environmental issues in general.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	1	-	-	-	1	-	-	-	-
CO2	-	-	-	-	-	-	1	-	-	-	-
CO3	-	-	2	-	-	-	1	-	-	-	-
CO4	-	-	1	1	-	-	1	-	-	-	-

Syllabus:

Unit 1

State of Environment and Unsustainability, Need for Sustainable Development, Traditional conservation systems in India, People in Environment, Need for an attitudinal change and ethics, Need for Environmental Education, Overview of International Treaties and Conventions, Overview of Legal and Regulatory Frameworks.

Environment: Abiotic and biotic factors, Segments of the Environment, Biogeochemical Cycles, Ecosystems (associations, community adaptations, ecological succession, Food webs, Food chain, ecological pyramids), Types of Ecosystems – Terrestrial ecosystems, Ecosystem Services, Economic value of ecosystem services, Threats to ecosystems and conservation strategies.
Biodiversity: Species, Genetic & Ecosystem Diversity, Origin of life and significance of biodiversity, Value of Biodiversity, Biodiversity at Global, National and Local Levels, India as a Mega-Diversity Nation (Hotspots) & Protected Area Network, Community Biodiversity Registers. Threats to Biodiversity, Red Data book, Rare, Endangered and Endemic Species of India. Conservation of Biodiversity. People's action. Impacts, causes, effects, control measures, international, legal and regulatory frameworks of: Climate Change, Ozone depletion, Air pollution, Water pollution, Noise pollution, Soil/land degradation/pollution

Unit 2

Linear vs. cyclical resource management systems, need for systems thinking and design of cyclical systems, circular economy, industrial ecology, green technology. Specifically apply these concepts to: Water Resources, Energy Resources, Food Resources, Land & Forests, Waste management.
Discuss the interrelation of environmental issues with social issues such as: Population, Illiteracy, Poverty, Gender equality, Class discrimination, Social impacts of development on the poor and tribal communities, Conservation movements: people's movements and activism, Indigenous knowledge systems and traditions of conservation.

Unit 3

Common goods and public goods, natural capital / tragedy of commons, Cost benefit analysis of development projects, Environment Impact Assessment (EIA), Environment Management Plan (EMP), Green business, Eco-labeling, Problems and solutions with case studies.
Global and national state of housing and shelter, Urbanization, Effects of unplanned development case studies, Impacts of the building and road construction industry on the environment, Eco-homes /Green buildings, Sustainable communities, Sustainable Cities.
Ethical issues related to resource consumption, Intergenerational ethics, Need for investigation and resolution of the root cause of unsustainability, Traditional value systems of India, Significance of holistic value-based education for true sustainability.

Textbooks and References

1. https://www.sites.google.com/site/amritaevs/home
2. R. Rajagopalan, Environmental Studies: From Crisis to Cure. Oxford University Press, 2011, 358 pages. ISBN: 9780198072089.
3. Daniel D. Chiras, Environmental Science. Jones & Bartlett Publishers, 01-Feb-2012, 669 pages. ISBN: 9781449645311.
4. Andy Jones, Michel Pimbert and Janice Jiggins, 2011. Virtuous Circles: Values, Systems, Sustainability. IIED and IUCN CEESP, London. URL:http://pubs.iied.org/pdfs/G03177.pdf
5. Annenberg Learner, The Habitable Planet, Annenberg Foundation 2015. URL: http://www.learner.org/courses/envsci/unit/pdfs/textbook.pdf

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar.

CLINICAL NUTRITION AND DIETEITCS – II (Practical VI)

Semester IV	**Hours of Instruction/ week – 2**
Course Code: 21FSN283	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30 hrs.**

Pre requisite: Diet Planning, Therapeutic Diet

Course Objectives:

1. Understand the basic principles in diet planning
2. Gain knowledge on different disease conditions which requires dietary recommendations
3. Develop skills and techniques in planning and preparation of therapeutic diets for various disease conditions

Course Outcomes:

CO1: Understand the basic principles involved in planning diets for different disease conditions.
CO2: Plan and prepare diets to meet out the quality and quantity requirements for specific disease conditions
CO3: Understand the calculations of nutritive value for the planned and prepared diet

Skills: Develop skills to plan and prepare diets for specific disease conditions

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	-	1	-	-	1	2	1	-	2
CO2	2	3	-	1	-	-	2	2	2	-	2
CO3	2	1	-	-	-	-	2	1	1	-	-

Practical's **30hrs.**

1. Modifications of Diets in Liver Diseases – Jaundice, Hepatitis and Cirrhosis
2. Diets for Nephritis, renal Failure and renal Calculi, Protein Restricted Diets
3. Diets for Cardiovascular diseases – Sodium Restricted, Hypertension, atherosclerosis, Fat Controlled
4. Modification of Diets in Diabetes Mellitus
5. Modification of Diet for Cancer Patients and HIV Infected Person

Text Books:

1. Srilakshmi, V. Dietetics New Age International P. Ltd., New Delhi, 2011.
2. Dietary Guidelines of Indians – A Manual, National Institute of Nutrition, Hyderabad, 2011.
3. Garg, M. Diet, Nutrition and Health, ABD Publishers, 2006.

Reference books:

1. Krause, M.V. and Mahan, L.K. Food, Nutrition and Diet Therapy, 9th Ed., W.B. Saunders Company, Philadelphia, 2009.
2. Maimun Nisha, Diet Planning for Diseases, Kalpaz Publishers, 2006.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Food Processing and Preservation (Practical- VII)

Semester IV	**Hours of Instruction/ week – 2**
Course Code: 21FSN284	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30 hrs.**

Pre requisite: Food preservation, cooking methods.

Course objectives:

1. To learn the principles behind the methods of preservation
2. To understand the stages of cookery and chemical characteristics in food preservation
3. To able to formulate preserved products with nutritional value addition
4. To acquire skills to preserve different food groups based on perishability

Course Outcomes:

CO1: Know the principles of food preservation methods.
CO2: Acquire skills to formulate preserved products with value addition for nutritional benefits.
CO3: Develop new products with maximum retention of essential nutrients

CO - PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	2	-	1	2	-	2	2	2	3	-
CO2	2	2	-	1	2	-	2	2	2	3	-
CO3	2	2	-	1	2	-	2	2	2	3	-

Skills: Develop food processing and preservation skills for product development

Practicals: **30hrs.**

1. Stages in sugar cookery, Evaluation of pectin quality, sugar concentration (Brix), pH and acid content
2.Preparation of jam, jelly, marmalades, preserves, candied, Tutti fruity, Glazed, Crystallized fruits, Toffees
3. Preparation of squashes, fruit juice and RTS
4. Preparation of Tomato sauce, Tomato ketchup.
5. Preparation of pickles (oil, vinegar and salt based)
6. Preparation of salted, dehydrated, vegetables preserves (vathals)
7. Preparation of dehydrated cereal and pulse products (vadams), -Rice, Sago, Wheat, Maida, Rice flakes, black gram dhal, green gram dhal, horse gram dhal.
8. Visit to Fruits and Vegetable processing industry.

Text Books:

1. ***Srivastava R.P. Fruit and vegetable preservation – Principles and Practices***, International Book Distributing Co., (IBDC), New Delhi.2013

Reference Books:

1. ***Maria Parloa (2012), Canned fruit, preserves and jellies: Household methods of preparation,*** **Published by US department of Agriculture, Washington**
2. ***M. Shafiur, Rahman (2017), Handbook of food preservation*** 2nd edition, CRC press.

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

SOFT SKILLS II

Semester IV	**Hours of Instruction/ week – 3**
Course Code: 21 SSK 212	**No. of Credits – 3**
L-T-P – 1-0-2-2	**Total 45 hrs.**

Pre requisite: Willingness to learn, communication skills, basic English language skills, knowledge of high school level mathematics.

Course Objective:

To help students understand the corporate culture and assist them in improving their group discussion skills, communication skills, listening skills and problem-solving skills.

Course Outcomes:

CO1: Soft Skills - At the end of the course, the students will have a clear understanding of the corporate culture, professional etiquette, professional grooming and would have understood the nuances of smooth transition from academic to the corporate. They would further develop their inter-personal and leadership skills.

CO2: Soft Skills - At the end of the course, the students shall learn to examine the context of a Group Discussion topic and develop new perspectives and ideas through brainstorming and arrive at a consensus.

CO3: Aptitude - At the end of the course, the student will be able to interpret, critically analyze and solve questions under arithmetic, algebra and logical reasoning and solve them employing the most suitable methods.

CO4: Verbal - At the end of the course, the students will have the ability to relate, choose, conclude and determine the usage of right vocabulary according to the context.

CO5: Verbal - At the end of the course, the students will have the ability to utilise prior knowledge of grammar to recognise structural instabilities and modify them.

CO6: Verbal - At the end of the course, the students will have the ability to comprehend, interpret, deduce and logically categorise words, phrases and sentences. They will also have the ability to theorise, discuss, elaborate, criticise and defend their ideas.

Skills: Communication, etiquette and grooming, inter-personal skills, listening skills, convincing skills, problem-solving skill.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS03	PS04
CO1	-		-	3			3				
CO2	-		-	3			3				
CO3	-		-	-			3				
CO4	-		-	-			3				
CO5	-		-	-			3				
CO6	-		-	-			3				

Syllabus:

Unit I – Soft Skills

Professional Grooming and Practices: Basics of corporate culture, key pillars of business etiquette: socially acceptable ways of behavior, body language, personal hygiene, professional attire and cultural adaptability. Handling pressure, multi-tasking. Being enterprising. Adapting to corporate life:

Emotional Management (EQ), Adversity Management, Health Consciousness. People skills, Critical Thinking and Problem solving.

Group Discussions: Advantages of group discussions, Types of group discussion and Roles played in a group discussion. Personality traits evaluated in a group discussion. Initiation techniques and maintaining the flow of the discussion, how to perform well in a group discussion. Summarization/conclusion.

Unit I – Aptitude

Equations: Basics, Linear, Quadratic, Equations of Higher Degree, and Problems on Ages.

Logarithms, Inequalities and Modulus: Basics

Sequence and Series: Basics, AP, GP, HP, and Special Series.

Time and Work: Basics, Pipes & Cistern, and Work Equivalence.

Time, Speed and Distance: Basics, Average Speed, Relative Speed, Boats & Streams, Races, and Circular Tracks.

Logical Reasoning: Arrangements, Sequencing, Scheduling, Venn Diagram, Network Diagrams, Binary Logic, and Logical Connectives, Clocks, Calendars, Cubes, Non-verbal reasoning and Symbol based reasoning.

Unit I – Verbal Skills

Vocabulary: Help students understand the usage of words in different contexts.
Grammar (Medium Level): Train Students to comprehend the nuances of Grammar and empower them to spot errors in sentences and correct them.
Reading Comprehension (Basics): Introduce students to smart reading techniques and help them understand different tones in comprehension passages.
Reasoning: Enable students to connect words, phrases and sentences logically.
Oral Communication Skills: Aid students in using the gift of the gab to interpret images, do a video synthesis, try a song interpretation or elaborate on a literary quote.

References:

1. Adair. J., (1986), "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
2. Gulati. S., (2006) "Corporate Soft Skills", New Delhi, India: Rupa & Co.
3. The Hard Truth about Soft Skills, by Amazon Publication.
4. Verbal Skills Activity Book, CIR, May 2018
5. Nova's GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
6. The BBC and British Council online resources
7. Owl Purdue University online teaching resources
8. www.thegrammarbook.com online teaching resources
9. www.englishpage.com online teaching resources and other useful websites
10. Student Workbook: Quantitative Aptitude & Reasoning, Corporate & Industry Relations, Amrita Vishwa Vidyapeetham.
11. Quantitative Aptitude for All Competitive Examinations, Abhijit Guha.
12. How to Prepare for Quantitative Aptitude for the CAT, Arun Sharma.
13. How to Prepare for Data Interpretation for the CAT, Arun Sharma.
14. How to Prepare for Logical Reasoning for the CAT, Arun Sharma.

15. Quantitative Aptitude for Competitive Examinations, R S Aggarwal.
16. A Modern Approach to Logical Reasoning, R S Aggarwal.
17. A Modern Approach to Verbal & Non-Verbal Reasoning, R S Aggarwal.

Evaluation Pattern

Assessment	Internal	External
Continuous Assessment (CA) – Soft Skills	40	
Continuous Assessment (CA) – Aptitude	10	20
Continuous Assessment (CA) – Verbal	10	20
Total	60	40

*CA - Can be Presentations, Speaking activities and tests

Live-in Lab I

Semester V	Course Code: 21FSN290	L-T-P – 0-0-0-3

Course Objectives

- Identify and analyse the various challenge indicators present in the village by applying concepts of Human Centered Design and Participatory Rural Appraisal.
- User Need Assessment through Quantitative and Qualitative Measurements
- Designing a solution by integrating Human Centered Design concepts
- Devising proposed intervention strategies for Sustainable Social Change Management

Course Outcome

CO1: Learn ethnographic research and utilise the methodologies to enhance participatory engagement.
CO2: Prioritize challenges and derive constraints using Participatory Rural Appraisal.
CO3: Identify and formulate the research challenges in rural communities.
CO4: Design solutions using human centered approach.

CO-PO Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1		3	2	1	3	2	2
CO2		3	2	1	3	2	2
CO3		3	2	1	3	2	2
CO4		3		1	3	2	2

Syllabus

This initiative is to provide opportunities for students to get involved in coming up with technology solutions for societal problems. The students shall visit villages or rural sites during the vacations (after 4th semester) and if they identify a worthwhile project, they shall register for a 3-credit Live-in-Lab project, in the fifth semester.

Thematic Areas

- Agriculture & Risk Management
- Education & Gender Equality
- Energy & Environment
- Livelihood & Skill Development
- Water & Sanitation
- Health & Hygiene
- Waste Management & Infrastructure

The objectives and the projected outcome of the project will be reviewed and approved by the department chairperson and a faculty assigned as the project guide.

Evaluation Pattern

Assessment	**Marks**
Internal (Continuous Evaluation) [75 marks]	
Workshop (Group Participation)	15
Village Visit Assignments & Reports	15
Problem Identification and Assessment	15
Ideation: Defining the Needs, Proposed Designs & Review	20
Poster Presentation	10
External [25 marks]	
Research Paper Submission	25
Total	**100**
Attendance (To be added separately)	5
Grand Total	**105**

SEMESTER V

FOOD PRODUCT DEVELOPMENT AND MARKETING

Semester V	**Hours of Instruction/ week – 4**
Course Code: 21FSN301	**No. of Credits – 4**
L-T-P – 3-1-0-4	**Total 60 hrs.**

Pre requisite: Product development, consumer view on food products, product testing, sensory evaluation

Course Objectives:

1. Develop new food products to support nutri enterprise.
2. Develop entrepreneurship skills for setting up small scale food industries
3. Understand sustainable packaging and labelling for different food products

Course Outcomes:

1. Learn the trends and dimensions in food consumption pattern
2. Understand and apply the principles in food product development and design.
3. Gain knowledge on different steps involved in food testing, evaluation and packaging
4. Develop entrepreneurship skills and to plan financial and marketing strategies

Skills:

- Develop skills and process in new food product development.
- Develop skills in Marketing of Food Products.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	3	1	-	-	3	1	-	-	-	-
CO2	-	3	1	1	-	3	-	-	1	1	-
CO3	-	3	2	-	-	3	-	1	1	1	-
CO4	-	-	-	1	-	3	1	-	-	1	1

Syllabus:

Unit I - Food consumption pattern **10hrs.**

Trends in Food Consumption pattern. Economical, Psychological and Sociological Dimensions of Food Consumption patterns. Trends in Social Change as a Base for New Product Development

Unit II - Introduction to Food Processing and Product Development **13hrs.**

Food Components, Types of Food Processing, Status of Food Processing Industry in India and Scope of Growth in Future, Principles and Purpose of New Product Development, Product Design and Specifications.

Unit III – Development of Convenience Foods **13hrs.**

Traditional Foods, Weaning Foods, Convenience Foods, RTE, RTS, Extruded foods, IMF Foods, Speciality Products, Health foods, Nutritional Supplements, Functional Foods, Nutraceuticals and Designer Foods, Sports Foods,

Foods for Defence Services, Space foods, flight foods.

Unit IV - Testing, Evaluation and Packaging of Products **12hrs.**

Standardization, Portion size, Portion Control, Quantity Cooking, Shelf Life Evaluation- Sensory and Microbial Testing of Processed Foods, Nutrient Analysis. Suitable Packaging Materials for Different Foods, SWOT Analysis, labelling information and designing, misbranded foods and loss.

Unit V Financial Management and Marketing of Food Products **12hrs.**

Institutional Support (Training and Finance) for Entrepreneurship Development. Financial Institutions (Central and State Government) banks/Funding

Agencies, Financial Accounting Procedures, Book Keeping, Market Research, Marketing Strategies, digital marketing, Cost Calculation , Advertising Methods, Product sales, Product License, Legal specifications, Consumer Behaviour and Food Acceptance, data sciences.

Text Books:

1. Sudhir Gupta (2017) Handbook of Packaging Technology, Engineers India Research Institute, New Delhi
2. Khanaka, S.S., Entrepreneurial Development, S. Chand and Company Ltd, New Delhi, 2016.

Reference Books:

1. Suja, R. Nair (2014) Consumer Behaviour and Marketing Research, 1st Edition, Himalaya Publishers.
2. Hmacfie,(2017) Consumer led Food Product Development, Weedhead Publishing Ltd., UK
3. Fuller, Gordon, W(2015)New Food Product Development, 2nd Edition, CRC Press, Boca Raton, Florida,
4. Schaffner .D,J, Schroder , W.R.(2010)Food Marketing and International Perspectives, Web/McGraw Hill Publication

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

FOOD SERVICE MANAGEMENT

Semester V	**Hours of Instruction/ week – 4**
Course Code: 21FSN302	**No. of Credits – 4**
L-T-P – 3-1-0-4	**Total 60 hrs.**

Pre requisite: Food service, food production, menu planning, purchase and storage, institutional food service.

Course Objectives:

1. To understand the approaches, tools, management and resources of institutional food service.
2. To learn planning and organizing space.
3. To study the principles of food, personal and hygiene management.
4. To gain knowledge in financial management and marketing skills.

Course Outcome:

CO1: Gain experience in principles and functioning of food service institutions
CO2: Understand about financial management and marketing skills.
CO3: Apply knowledge on personnel management, sanitation and hygiene in food service institutions.
CO4: Acquire technical skills to develop quantitative and qualitative cookery.

Skills: Develop skills in bulk food production and institutional food service.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	1	-	-	-	-	1	1	-	1	-
CO2	-	-	-	-	-	-	1	1	-	-	-
CO3	-	2	1	-	-	-	-	1	-	-	-
CO4	-	2	-	-	-	-	-	-	-	1	-

Syllabus:

UNIT I - Introduction to Food Service system 12hrs.

Food Service

Types of food service systems, Approaches to management, Principles of management, Tools of management, Management of resources.

Kitchen space, storage space, service areas.

Equipment: Types, selection, purchase, design, installation, operation and maintenance

UNIT II - Food Management 12hrs.

Food management- Characteristics of foods, nutritional knowledge, food purchase, inventory management, menu planning, food production, food service, waste management.
Need based specific units- Dietary, catering, institutional food service.

UNIT III - Personal Management and Hygiene **12hrs.**

Personnel Management: concepts, staff employment, employee benefits, staff training and development, legal aspects of personal management.

Sanitation and safety- Hygiene, Sanitation and Safety in Food Service Institutions: Definition, importance, environmental hygiene and sanitation; hygiene in food handling; personnel hygiene of personnel; importance of pest and rodent control in food services.

Safety: Accidents in food service establishments, safety procedure, training, Educating, legal responsibilities of food service manager.

Unit IV - Financial management and marketing **12hrs**

Definition, application of management Accounts of catering operators, cost concepts, book keeping and accounting – systems of book keeping, book of account maintenance of account books, balance sheets, inventor budgetary control.Marketing the products, challenges ahead

UNIT V - Concepts behind food service **12hrs.**

Styles of food service – Color, Table service, furnishing, packing services, service stations – hospitals, restaurants, hotels, Motels, food courts and catering services. Services - banquet and party setting and services, therapeutic diets, home remedies, traditional cookery, international cushiness, current trends.

Reference Books:

1. Mohini Shetty, Institutional food management, New age International Publishers, 2016.
2. West ,BB, Wood "Food service in Institutions" ,Johnwiley & Sons,New York
3. Khan MA "Food service operations", AVI publishing Company Inc.1987.
4. Sethi and Mahan S.-Catering Management and integrated approach, Johnwiley & Sons,New York .
5. Kotas R and Davis B "food cost control" Billing & Sons Ltd, Great Britian ,1976
6. Dr. B.K. Chakravati, " A Technical guide to Hotel operation" , Metropolitan, New Delhi India.
7. Earl R. Palan and Judity A. Stadler (1986) Preparing for the food service Industry, AVI - Publishing& co
8. Mickey Warner (1989) Recreational food service Management Van Nostrand Reinhold, Newyork.
9. J.M. Diwan (1997) Catering and food service Management, Common Wealth publishers.
10. Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Post-Harvest Technology

Semester V	**Hours of Instruction/ week – 4**
Course Code: 21FSN303	**No. of Credits – 4**
L-T-P – 3-1-0-4	**Total 60 hrs.**

Pre-requisite: Post-harvest loss, processing methods, storage, handling, transportation of commodities.

Course Objectives:

1. To understand the importance and methods of post-harvest techniques for foods
2. To gain knowledge in food processing and food conservation

Course Outcome:

CO1: Gain understanding on significance of post-harvest technology.
CO2: Understand the factors involved in post-harvest loss
CO3: Gain knowledge on different storage structures
CO4: Understand the methodologies to in post-production techniques

Skills: To develop skills in food processing and Food conservation

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	1	-	-	-	1	-	1	-
CO2	2	1	1	-	-	-	-	1	-	1	-
CO3	2	-	1	-	-	-	-	1	-	1	-
CO4	2	2	1	1	-	-	-	1	-	1	-

Syllabus:

UNIT I **10hrs.**

Introduction to Post Harvest Technology - Definition, importance and problem encountered.
Buffer stock – definition, quantity of stores available. Governmental measures to augment food production-need for food conservation. Food loss in the post-harvest period, extent of losses, loss in the field, threshing yard, storage, marketing loss.
Role of Post-Harvest Technology in combating malnutrition in India.

UNIT II **13hrs.**

Importance of processing- methods of processing cereals (wheat, rice, maize), breakfast cereals, pulses, fruits and vegetables, meat, fish, poultry, egg and sugars

UNIT III **13hrs.**

Importance of processing- methods of processing of oil seeds, milk and milk products, condiments and spices, Beverages, tea, coffee and cocoa (SS).

UNIT IV **12hrs.**

Agents Causing Food Losses - Physical agents, (moisture, temperature), Chemical losses, biological losses- insects- insects-microorganisms.

Control of Spoilage Agents - Importance and methods of sanitary handling, physical, chemical, biological and other means of control of insects, rats and rodents and birds. Insect control methods- Physical methods and chemical methods including fumigation techniques.

Handling and Transport of Food Commodities - Traditional and improved methods. Nutrient losses in spoiled foods and national program to save various food produce.

UNIT V **12hrs.**

Storage - Importance of storage structures- requirements, traditional & modern and underground & above ground storage and their improvements, Cold storages, FCI godowns. PDS. Agencies Controlling Food Losses - Role of SGC, FCI, CWC, SWC, IGSI in controlling food losses.

Related Experiences:

1. Visit to FCI
2. Visit to Processing Mill (Cereal & Pulse)
3. Food park with cold storage

Reference Books:

1. Handling and storage of food grains- S V Pingale ICAR, New Delhi, 1976.
2. Handling and storage of food grains in tropical and subtropical areas- D W Hall, FAD, Rome, 1970.
3. Food Science, N.W.Potter- The A VI Publishing Co., The Westport, 1973.
4. Food Technology, Prescott and Proctor.B.B.Mc Graw Hill Book Co., New York, 1937.
5. Gordon G Birth, Food science, Pub in New York.
6. Robins M Philip Convenience food- Recent Technology 1976.
7. Technology of cereals by NL Kent and JAD Evers.
8. Food protection technology by Charles W., Felix Havis Pub.1987.
9. John A Troller, 1983, Sanitation in food processing, Academic press

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Packaging and Labelling of Food Products

Semester V	**Hours of Instruction/ week – 3**
Course Code: 21FSN304	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total 45 hrs.**

Pre requisite: Packaging methods, packaging materials, Food product labelling

Course Objectives:

1. To understand the relationship between packaging design and the chemistry of the food packaged.
2. To understand the influence of oxygen in storage materials.
3. To understand the different types of materials used in food packaging.
4. To understand the principles of labeling

Course Outcomes:

CO1: Demonstrate knowledge of the material involved in packaging with the chemistry of the food packaged.
CO2: Describe the influence of oxygen in different types of packaging materials.
CO3: Demonstrate the advantages and disadvantages involved with different packaging material.
CO4: Acquire knowledge on the factors to be considered while labeling packed foods

Skills: Develop skills in food packaging based on the chemistry of food and packaging material's used**.**

CO PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO5	PSO1	PSO2	PSO3	PSO4
CO1	2	-	1	-	-	-	-	-	-	2	-
CO2	-	1	-	-	-	-	-	-	-	2	-
CO3	2	1	2	-	-	-	-	-	-	2	-
CO4	2	-	2	-	-	-	-	-	-	2	-

Syllabus:

Unit I - Packaging design and chemistry of food products **9 Hrs**

Food Packaging- Definition, Principles of packaging, Importance, relationship between Packaging and food, functional requirements for food packaging- preservation and protection, transport and storage, operational, communication, appellative function, persuasive function, informative function, environmental requirements. Integrated food packaging systems- Types, Food packaging and environmental ethics, sustainability in food packaging, packaging design.

Unit II - Oxygen scavenging Packaging **9 Hrs**

Active Packaging, oxygen scavengers, moisture control, gas permeability control, ethylene scavengers, odour removers, antimicrobial packaging, carbon dioxide absorbers.

Unit III - Food packaging Materials **9 Hrs**

Chemical features of food packaging materials, characteristics, Ceramic packaging materials, metal packaging materials, cellulosic packaging materials, plastic packaging materials, multilayer packaging, testing and analysis.

Unit IV Labeling of Food Products **9 Hrs**

Components- Nutritional information, factors to be considered, design and graphics, nutrition facts
Labelling- Purpose, type, regulations, market survey on food labelling

Unit V Regulations **9 Hrs**

Laws and regulatory compliances, Understanding Bar codes- Where to Get Barcodes, Creating your own Barcodes, Incorporating Barcodes.

References:

1. Giovanni brunazzi, Salvatore Parisi and Amina Pereno, The importance of packaging design for the chemistry of food products, Springer, 2014.
2. Aaron L. brody, Eugene R. Strupinsky and Lauri R. Kline, Active packaging for food applications, CRC Press LLC, 2001.
3. Luciano piergiovanni and Sara limbo, food packaging materials, springer briefs in molecular science-chemistry of foods, Springer 2016.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Food Product Development (Practical- VIII)

Semester V	**Hours of Instruction/ week – 2**
Course Code: 21FSN381	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30hrs**

Pre requisite: Product Development Standardization, Organoleptic Evaluation.

Course Objectives

1. To develop skills in product development
2. To understand the steps involved in costing
3. To learn sales techniques

Course Outcomes:

CO1: Identify and categorize suitable foods for developing products

CO2: Understand the steps involved in the preparation of a new food product

CO3: Standardization of food products for large scale cooking

CO4: Gain knowledge on marketing techniques and launching the developed products

Skills: Develop Skills for new food product development and standardization

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	-	-	3	-	2	2	2	2	2
CO2	3	3	-	-	3	-	2	1	2	2	2
CO3	3	3	-	-	3	-	2	1	-	2	2
CO4	2	-	-	-	3	-	2	1	2	2	2

Practical's **30hrs.**

Product Development and Standardization
Cereal and Pulse Based Foods
Fruit Juices, Squash , Jams and Preserves
Pickles, Ketchup, Sauce
Weaning Foods
Health Foods and Nutritional Supplements
Convenience foods, RTS and RTE foods
Marketing of a Food Product
Selection of a Product, Preparation, Standardization and Quantity Cooking
Selection of Packaging Material, Labelling , Cost Calculation and Marketing
Presentation of Report

Text Books:

1. Sudhir Gupta (2007) Handbook of Packaging Technology, Engineers India Research Institute, New Delhi
2. Khanaka, S.S., Entrepreneurial Development, S. Chand and Company Ltd, New Delhi, 2006.

Reference Books:

1. Suja, R. Nair(2014) Consumer Behaviour and Marketing Research, 1st Edition, Himalaya Publishers.
2. Hmacfie,(2007) Consumer led Food Product Development, Weedhead Publishing Ltd., UK
3. Fuller, Gordon, W(2005) New Food Product Development, 2nd Edition, CRC Press, Boca Raton, Florida,
4. Schaffner .D,J, Schroder , W.R.(2010)Food Marketing and International Perspectives, Web/McGraw Hill Publication

Evaluation Pattern:

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Food Service Management (Practical IX)

Semester V	**Hours of Instruction/ week – 2**
Course Code: 21FSN382	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30hrs**

Prerequisite: Food service, food production, menu planning, purchase, storage, Institutional food service.

Course Objectives:

1. Understanding the approaches, tools, management and resources of institutional food service.
2. To learn planning and organizing space.
3. To learn the principles of food, personal and hygiene management.

Course Outcome:

CO1: Gain experience in principles, designing and functioning of food service institutions
CO2: Apply knowledge on personnel management, sanitation and hygiene in food service institutions.
CO3: Acquire technical skills to develop quantitative and qualitative cookery.

Skills: Develop skills in bulk food production and institutional food service.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	1	-	3	-	2	1	-	2	-
CO2	2	-	2	1	3	-	1	1	-	2	-
CO3	3	2	-	1	3	-	1	1	-	2	-

Practical's **30 hrs.**

1. Lay out planning for different food service system.
2. Learn to setup different styles of food service
3. Family meal & functions menu & service planning
4. Lay out plan for hospital dietary service
5. Quality standards and control
6. Process of standardization of recipes
7. Portion control: Management of left-over foods.
8. Creating good ambiance in food service (Interior decoration)
9. Informal and formal service styles (Table Service)
10. Traditional food service systems
11. Roles and Responsibilities of front office and house keeping

Reference Books:

1. Mohini Shetty, Institutional food management, New age International Publishers, 2016.
2. West ,BB, Wood "Food service in Institutions" ,Johnwiley & Sons,New York
3. Khan MA "Food service operations", AVI publishing Company Inc.1987.
4. Sethi and Mahan S.-Catering Management and integrated approach, Johnwiley & Sons,New York .
5. Kotas R and Davis B "food cost control" Billing & Sons Ltd, Great Britian ,1976
6. Dr. B.K. Chakravati, " A Technical guide to Hotel operation" , Metropolitan, New Delhi India.
7. Earl R. Palan and Judity A. Stadler (1986) Preparing for the food service Industry, AVI -Publishing& co
8. Mickey Warner (1989) Recreational food service Management Van Nostrand Reinhold, Newyork.
9. J.M. Diwan (1997) Catering and food service Management, Common Wealth publishers.
10. Tersel MC and Harger – Profession food preparation , Johnwiley & Sons,New York

Evaluation Pattern

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

Soft Skill III

Semester V	**Hours of Instruction/ week – 3**
Course Code: 21 SSK 302	**No. of Credits – 3**
L-T-P – 1-0-3-2	**Total 45 hrs.**

Pre requisite: Team Spirit, self-confidence and required knowledge, basic English language skills, knowledge of high school level mathematics.

Course Objective:

To help students understand the nuances of leadership, know the importance of working in teams, face challenging situations, crack interviews, improve communication skills and problem-solving skills.

Course Outcomes:

CO1: Soft Skills - At the end of the course, the students would have understood the importance and tactics of working in teams. They would have developed the ability to communicate convincingly and negotiate diplomatically while working in a team to arrive at a win-win situation. They would further develop their inter-personal and leadership skills. They would also have acquired the necessary skills, abilities and knowledge to present themselves confidently.

CO2: Soft Skills - At the end of the course, the students would have the ability to prepare a suitable resume. They would have the ability to analyse every question asked by the interviewer, compose correct responses and respond in the right manner to justify and convince the interviewer of one's right candidature through displaying etiquette, positive attitude and courteous communication. They would be sure-footed in introducing themselves and facing interviews.

CO3: Aptitude - At the end of the course, students will be able to identify, recall and arrive at appropriate strategies to solve questions on geometry. They will be able to investigate, interpret and select suitable methods to solve questions on arithmetic, probability, statistics and combinatorics.

CO4: Verbal - At the end of the course, the students will have the ability to understand and use words, idioms and phrases, interpret the meaning of standard expressions and compose sentences using the same.

CO5: Verbal - At the end of the course, the students will have the ability to decide, conclude, identify and choose the right grammatical construction.

CO6: Verbal - At the end of the course, the students will have the ability to examine, interpret and investigate arguments, use inductive and deductive reasoning to support, defend, prove or disprove them. They will also have the ability to create, generate and relate facts / ideas / opinions and share / express the same convincingly to the audience / recipient using their communication skills in English.

Skills: Communication, teamwork, leadership, facing interviews and problem-solving.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	3	3	3	-	-	-	-
CO2	-	-	-	-	3	3	3	-	-	-	-
CO3	-	-	-	-	3	-	3	-	-	-	-
CO4	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	-	-	-	-

Syllabus:

Unit I – Soft Skills

Team Work: Value of teamwork in organizations, Definition of a team. Why team? Effective team-building. Parameters for a good team, roles, empowerment and need for transparent communication, Factors affecting team effectiveness, Personal characteristics of members and its influence on team.

Leadership, Internal problem solving, Growth and productivity, Evaluation and co-ordination.

Facing an interview: Importance of verbal & aptitude competencies, strong foundation in core competencies, industry orientation / knowledge about the organization, resume writing, being professional. Importance of good communication skills, etiquette to be maintained during an interview, appropriate grooming and mannerism.

Unit II – Aptitude

Geometry: 2D, 3D, Coordinate Geometry, and Heights & Distance.

Permutations & Combinations: Basics, Fundamental Counting Principle, Circular Arrangements, and Derangements.

Probability: Basics, Addition & Multiplication Theorems, Conditional Probability, and Bayes' Theorem.

Statistics: Mean, Median, Mode, Range, and Standard Deviation.

Logical Reasoning: Blood Relations, Direction Test, Syllogisms, Series, Odd man out, Coding & Decoding, Cryptarithmetic Problems and Input-Output Reasoning.

Campus recruitment papers: Discussion of previous year question papers of all major recruiters of Amrita Vishwa Vidyapeetham.

Competitive examination papers: **Discussion of previous year question papers of CAT, GRE, GMAT, and other management entrance examinations.**

Miscellaneous: Interview Puzzles, Calculation Techniques and Time Management strategies.

Unit II – Verbal Skills

Vocabulary: Create an awareness of using refined language through idioms and phrasal verbs.

Grammar (Advanced Level): Enable students to improve sentences through a clear understanding of the rules of grammar.

Reasoning Skills: Facilitate the student to tap his reasoning skills through Syllogisms, and critical reasoning arguments.

Reading Comprehension (Advanced): Enlighten students on the different strategies involved in tackling reading comprehension questions.

Public Speaking Skills: Empower students to overcome glossophobia and speak effectively and confidently before an audience.

Writing Skills: Introduce formal written communication and keep the students informed about the etiquettes of email writing.

References:

1. Adair. J., (1.986), "Effective Team Building: How to make a winning team", London, U.K: Pan Books.
2. Gulati. S., (2006) "Corporate Soft Skills", New Delhi, India: Rupa & Co.
3. The Hard Truth about Soft Skills, by Amazone Publication.
4. Verbal Skills Activity Book, CIR, May 2018
5. Nova's GRE Prep Course, Jeff Kolby, Scott Thornburg & Kathleen Pierce
6. The BBC and British Council online resources

7. Owl Purdue University online teaching resources
8. www.thegrammarbook.com online teaching resources
9. www.englishpage.com online teaching resources and other useful websites
10. Student Workbook: Quantitative Aptitude & Reasoning, Corporate & Industry Relations, Amrita Vishwa Vidyapeetham.
11. Quantitative Aptitude for All Competitive Examinations, Abhijit Guha.
12. How to Prepare for Quantitative Aptitude for the CAT, Arun Sharma.
13. How to Prepare for Data Interpretation for the CAT, Arun Sharma.
14. How to Prepare for Logical Reasoning for the CAT, Arun Sharma.
15. Quantitative Aptitude for Competitive Examinations, R S Aggarwal.
16. A Modern Approach to Logical Reasoning, R S Aggarwal.
17. A Modern Approach to Verbal & Non-Verbal Reasoning, R S Aggarwal.

Evaluation Pattern

Assessment	Internal	External
Continuous Assessment (CA) – Soft Skills	40	
Continuous Assessment (CA) – Aptitude	10	20
Continuous Assessment (CA) – Verbal	10	20
Total	60	40

***CA - Can be Presentations, Speaking activities and tests.**

21 FSN 390	LIVE-IN-LAB II	L-T-P-C: 0-0-0-3

Course Objective:

- Proposal writing in order to bring in a detailed project planning, enlist the materials required and propose budget requirement.
- Use the concept of CoDesign to ensure User Participation in the Design Process in order to rightly capture user needs/requirements.
- Building and testing a prototype to ensure that the final design implementation is satisfies the user needs, feasible, affordable, sustainable and efficient.
- Real time project implementation in the village followed by awareness generation and skill training of the users (villagers)

Course Outcome

CO1: Learn co-design methodologies and engage participatorily to finalise a solution
CO2: Understand sustainable social change models and identify change agents in a community.
CO3: Learn Project Management to effectively manage the resources
CO4: Lab scale implementation and validation
CO5. Prototype implementation of the solution

CO-PO Mapping

PO/PSO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	3	3		3		3
CO2	2	3	3		3		3
CO3	2	3	3		3		3
CO4	2	3	3		3		3
CO5	2	3	3		3		3

Syllabus

The students shall visit villages or rural sites during the vacations (after 6th semester) and if they identify a worthwhile project, they shall register for a 3-credit Live-in-Lab project, in the fifth semester.

Thematic Areas

- Agriculture & Risk Management
- Education & Gender Equality
- Energy & Environment
- Livelihood & Skill Development
- Water & Sanitation
- Health & Hygiene
- Waste Management & Infrastructure

Evaluation Pattern

Assessment	Marks
Internal (Continuous Evaluation) [63 marks]	
1. Proposed Implementation	**2**
Presentation Round 1	
2. Proposal Submission + Review	**6**
3. Co-design	**6**
i. Village Visit I (Co-Design Field Work Assignments)	4
ii. Presentation of Co-design Assessment	2
4. Prototype Design	**14**
i. Prototype Design	4
ii. Prototype Submission	8
iii. Sustenance Plan	2
5. Implementation	**35**
i. Implementation Plan Review	3
ii. Implementation	24
iii. Testing & Evaluation	4
iv. Sustenance Model Implementation	4
External [37 Marks]	
6. Research Paper	**18**
7. Final Report	**15**
8. Poster Presentation	**4**
Total	**100**
Attendance	5
Grand Total	**10**

SEMESTER VI

Community Nutrition and Public Health

Semester VI	**Hours of Instruction/ week – 4**
Course Code: 21FSN311	**No. of Credits – 4**
L-T-P – 3-1-0-4	**Total 60 hrs.**

Pre requisite: Public health problems, food security, nutrition intervention programmes, nutrition indicators

Course Objectives:

1. Understand the significance of public health nutrition
2. Gain knowledge on prevailing epidemiology, food and nutrition security status in public health
3. Develop skills to assess the nutritional status of the community

Course Outcomes:

CO1: Develop comprehensive skills in public health nutrition
CO2: Acquire knowledge in epidemiological aspects
CO3: Excel in assessment of nutritional status on the community
CO4: Creating field experts to the Government and Non-Government Organizations

Skills: Develop skills in assessing health and nutritional status of the community

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	1	-	3	1	1	-	-	1
CO2	1	-	1	1	-	-	1	1	-	-	1
CO3	-	-	1	-	3	3	1	1	-	-	1
CO4	-	-	1	1	3	3	1	1	-	-	1

Syllabus:

Unit I - Introduction to Public Health nutrition **10hrs.**

Understanding the community, public health nutrition, public health nutrition cycle, nutritional status of community. Public health nutrition and national development, sustainable development goals, assessment of public health and nutritional status of the community at the global, national, regional and community level.

Unit II - Health and Nutritional Assessment of Community **13hrs.**

Direct parameters - Anthropometry, biochemical, clinical and dietary methods – definition, instruments and tools, standard of reference and measurement techniques

Indirect parameters – vital statistics, nutritional and health indicators, HDI index, socio- economic indices, KAP, psychosocial factors, ecological factors

Unit III - Food and Nutritional Security **13hrs.**

Introduction and definition of food and nutritional security, factors affecting food and nutritional security, National and International approaches to improve food security Environmental impact-biodiversity, Eco nutrition. Dietary diversity-per capita availability and consumption

Unit IV - Epidemiology in Public Health **12hrs.**

Introduction and definition of epidemiology, role of epidemiology in public health Epidemiology of communicable diseases and non- communicable diseases-causes, signs, symptoms, treatment and prevention. Immunization-types of immunity, immunization agents, schedules. National and International programmes on immunization

Unit V - Strategies for Promoting Public Health Nutrition **12hrs.**

National and state level health and Nutrition intervention programmes and policies, FNHW interventions. International and National Organizations and agencies involved in public health interventions-World Public Health Nutrition Association (WPHNA), WHO, UNICEF, ICMR, Ministry of Health and Family Welfare-National Institute of Health and Family Welfare Public Health Foundation of India (PHFI), Indian Institute of Public Health

Text Books:

1. Park.A.(2007), Park's Text book of Preventive and Social Medicine XIX Edition M/S Banarasidas, Bharath Publishers, 1167, Prem Nagar, Jabalpur, 428001(India)
2. Balmji.M.S, Prahlad Rao N, Reddy.V (2004). Text Book of Human Nutrition, II Edition, oxford and PBH Publishing Co. Pvt.Ltd, New Delhi
3. Gibney MJ, Margetts BM, Kearney JM, Arab L (2004) Public Health Nutrition Blackwell Publishing Co. UK
4. Brahman, G.N.V., Lakshmaiah, A., Rao, M. and Reddy, G.(2005) Methodology on Assessment of Diet and nutritional Status of Community, National Institute of nutrition, Hyderabad.

Reference Books:

1. Rayner.G,Lang T. Public Health and Nutriton. Our Vision: Where do we go?[Commentary] World Nutriton April 2012,3,4,92 – 118
2. Reports of the State of World's Children, WHO and UNICEF, Oxford University.
3. Reports of National Family Health Survey, International Institute for Population Science, Mumbai.
4. Indian Journal of Medical Research, ICMR, New Delhi,
5. Indian Journal of Pediatrics, Valley Nicro, Missouri, U.P.
6. Indian Journal of Nutrition and Dietetics, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Analytical Instrumentation in food Analysis

Semester VI	**Hours of Instruction/ week – 2**
Course Code: 21FSN312	**No. of Credits – 2**
L-T-P – 2-0-0-2	**Total 30 hrs.**

Pre requisite: Basic knowledge on instruments used in food analysis

Course Objectives:

1. Gain knowledge on different analytical techniques used in food analysis
2. Understand the principles and applications of various analytical instruments used in food analysis.

Course Outcomes:

CO1: Familiarized to various conventional and modern food analysis techniques
CO2: Familiarize with various principle under which each techniques work.
CO3: Understand the applications of instruments for appropriate nutrients and active compounds.

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	1	-	-	3	1
CO2	2	-	-	-	-	-	1	-	-	3	1
CO3	2	1	-	-	-	-	1	-	-	3	1

Syllabus:

Unit I - Introduction to Food Analysis **5hrs.**

Need for food analysis, need for Instrumentation in Food Analysis, Criteria for Selecting a Technique, Instrumental Techniques in Food Analysis, Transition of food analysis.

Unit II Chromatographic Techniques **7hrs.**

Gas chromatography, Liquid chromatography, Thin Layer Chromatography, High Performance Thin Layer Chromatography – Principles and applications

Unit III Hyphenated Techniques **6hrs.**

Gas Chromatography-Mass Spectrometry (GC-MS), Liquid Chromatography-Mass Spectrometry (LC-MS) - – Principles and applications- Principles and applications

Unit IV - Spectroscopic Techniques **6hrs.**

Visible Spectroscopy, Atomic-Absorption Spectroscopy (AAS), Inductively Coupled Plasma – Optical Emmission Spectrophotometry (ICP- OES/MS), Nuclear Magnetic Resonance Spectroscopy (NMR), Fourier Transform Infrared Spectroscopy (FT-IR) –Principles and applications.

Unit V Thermal Methods of Analysis **6hrs.**

Thermogravimetry, Differential Thermal Analysis (DTA), Differential Scanning Calorimetry (DSC) – principles and applications

Text books:

1. Manual in Instrumentation in Food Analysis**,** IGNOU University

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Nutrition Education and Communication

Semester VI	**Hours of Instruction/ week – 2**
Course Code: 21FSN313	**No. of Credits – 2**
L-T-P – 2-0-0-2	**Total 30 hrs.**

Pre requisite: Nutrition & counseling.

Course Objectives:

1. Expose on the methods of nutrition education
2. Understand the significance of Information Education and Communication (IEC) tools for nutrition education
3. Develop skills on how to plan, execute and evaluate a nutrition education programme.

Course Outcomes:

CO1: Appropriate skills for developing nutrition education materials
CO2: Gain knowledge on mass communication, media and aid tools for nutrition education
CO3: Utilize different communication tools for nutrition education
CO4: Gained knowledge on approaches, strategies and to organize nutrition education programmes

Skills: Develop skills in organizing nutrition education programmes

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	3	3	-	1	-	-	1
CO2	1	-	-	1	3	3	-	1	-	-	1
CO3	1	-	-	1	3	3	-	1	-	-	1
CO4	1	-	-	1	-	-	-	1	-	-	1

Syllabus:

Unit I - Nutrition Education **6hrs.**

Nutrition Education Meaning, nature and importance of nutrition education to the community and the lessons to be taught. Training workers in nutrition education programs, integration of nutrition education with education and extension work. Principles of planning, executing and evaluating nutrition education programs, problems of nutrition education, Nutrition education approaches

Methods of Nutrition Education - Direct and Indirect Methods, Individual and Group Contacts, Types, Methods, Merits and Demerits

Unit II - Mass Communication in Nutrition Education **6hrs.**

Definition, Merits and Demerits, Types – Print Media, Newspapers, Magazine, Leaflets, Pamphlets, Radio, Television, Films, Film Strips

Unit III - Tools in Nutrition Education **6hrs.**

IEC Materials - Significance of IEC materials, types, Advantages and Limitations, Design and development of IEC materials

Related Experiences

Preparation of chart or poster or leaflets

Digital Health Interventions: Mobile Health, Mobile App, online communication, Dietary survey, Web sources

Uses of Folk Media in Nutrition Education - Types of Folk Media, Merits and Demerits

Related Experiences

Preparation of Skits or Puppet Shows or Villupattu

Unit IV - Organizing Programmes in Nutrition Education **6hrs.**

Introduction – Selection of Theme, Planning the Programme, Executing the Programme, Evaluation of the Programme

Unit V Approaches and Strategies for improving nutritional status and health **6hrs.**

Approaches and Strategies for improving nutritional status and health, Health–based interventions, Food–based interventions including fortification and genetic improvement of foods, supplementary feeding, Nutrition education for behaviour change, environmental sanitation, Food Nutrition and health WASH interventions, National and state governmental nutrition education intervention programmes.

Text books:

1. ***Adivi Reddy, A. Extension Education***, Srilakshmi Press, Bapatla, 2001.
2. ***Srilakshmi, B., Nutrition Science***, 6th Edition, New Age International (P) Ltd., New Delhi, 2017.

Reference books:

3. ***John Antony, D. Skills of Counseling, Micro Skill Model***, Includes Kinetics and Focusing, Anugraha Publications, 2003.
4. ***Venkataiah, S.E.D, New Dimensions of Extension Education***, Anmol Publications, New Delhi, 2001.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Food Product Evaluation

Semester VI	**Hours of Instruction/ week – 2**
Course Code: 21FSN314	**No. of Credits – 2**
L-T-P – 1-1-0-2	**Total 30 hrs.**

Pre requisite: Basic knowledge on food product evaluation

Course Objectives:

3. Gain knowledge about different techniques for food product development and evaluation
4. Learn various methods of evaluating the quality and safety of foods.

Course Outcomes:

CO1: Gain knowledge on the importance of food grading and quality
CO2: Identify the sensory characteristics of different foods
CO3: Interpret the evaluation techniques and tests used in analyzing food quality
CO4: Ascertain the role of microorganisms in food quality

Skills: Develop skills in food product development and evaluation

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	3	-	1	-	-	-	1	-	1	1
CO2	1	3	-	1	-	-	-	1	-	1	1
CO4	1	3	-	1	-	-	-	1	-	1	1
CO5	1	3	1	1	-	-	1	1	-	1	1

Syllabus:

Unit I - Introduction to Food Evaluation Quality **5hrs.**

Definition, Objectives and Need for Evaluation of Food Quality
Factors Affecting the Evaluation of Food Quality – Psychological and Physiological

Unit II Methods of Evaluation of Food Quality – Subjective Methods **8hrs.**

Sensory Characteristics of Food - Appearance, Colour, Flavour, Taste, Texture and Consistency, Conducting Sensory Tests – Training Panel Members, Testing Laboratory – Preparation of Samples, Techniques of Smelling and Tasting, Testing time, Design of Experiment, Reasons for Testing Food Quality
Tasting procedures- Chewing, nibbling, slurping, mouth rinsing

Organoleptic Evaluation- Flavour, Colour, Clarity, Viscosity, texture, smelling procedures

Unit III Sensory Tests used for Food Evaluation 6hrs.

Types of Tests, Difference Tests, Rating Tests, Sensitivity Tests, Descriptive Tests, Interpretation of scores, Application of softwares in interpreting scores

Threshold tests- Absolute, Recognition, Differential, Terminal

Discrimination tests- paired comparison, duo trio difference, triangular difference, single sample test, two alternative forced choice test

Descriptive tests- Simple descriptive, Descriptive with rating, Flavour profile, Dilution profile technique

Unit IV - Methods of Evaluation of Food Quality – Objective Methods 6hrs.

Basic Guidelines, Advantages and Disadvantages, Tests Used, Chemical, Physico-chemical, Microscopic, Physical Method- grading, Instruments used for Evaluation.

Unit V Evaluation of Microbial Quality of Foods 5hrs.

Methods, Assays used to assess the Microbial Loads of different foods, Permitted levels of Microbial Load in different foods, Microbes responsible for Food Quality, Microbiological evaluation standards.

Text books:

1. Srilakshmi, B. Second Edition, Food Science, New Age International (P) Limited Publishers, New Delhi. 2016
2. Harry T. Lawless, Hildegarde, Sensory Evaluation of Food Principles and Practices, Second Edition, Springer Science, 2010.
3. Joshi, V.K Sensory Science: Principles and Applications in Food Evaluation, 2016.

Reference books:

1. Hutenwigs, B.J. Food Color and Appearance, Published by Blackie Academic and Professional, London, 2010.
2. Howard R. Beckley, Jacquiline, H. Sensory and Consumer Research in Food Product Design and Development, 2016
3. Bi, Jian, Sensory Discrimination Tests and Measurements: Statistical Principles, Procedures and Tables, 2016.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Food Analysis (Practical – X)

Semester IV	**Hours of Instruction/ week – 2**
Course Code: 21FSN383	**No. of Credits – 1**
L-T-P – 0-0-2-1	**Total 30 hrs.**

Pre requisite: Quantitative Analysis, Proximate analysis

Course Objectives:

1. To learn the qualitative and quantitative analytical tests in foods.
2. To understand the principles of reaction in the identification of nutritional constituents of foods.
3. To acquire the skills to analyze nutritional components of foods.
4. To demonstrate the analysis of nutritional constituents in foods.

Course Outcomes:

CO1: Know the difference between qualitative and quantitative analytical tests in foods.
CO2: Understand the identification of different types of sugars, proteins and minerals.
CO3: Able to identify and analyse constituents in foods in a logical sequence of steps of analysis.

Skills: Acquire Skills to quantify proximate nutrients in foods

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	3	-	-	3	-	1	2	-	-	-
CO2	2	-	-	-	3	-	1	2	-	-	-
CO3	2	3	-	-	3	-	-	2	-	-	-

Practical's: **30hrs.**

1. Quantitative tests for sugars, proteins and minerals.
2. Quantitative estimation of glucose in sugar solution.
3. Quantitative estimation of reducing sugar in grape juice.
4. Quantitative estimation of reducing sugar in honey solution.
5. Quantitative estimation of ascorbic acid in drumstick leaves.
6. Quantitative estimation of ascorbic acid in lime juice.
7. Quantitative estimation of ascorbic acid in raw and cooked cabbage.
8. Quantitative estimation of calcium.
9. Quantitative estimation of phosphorous.

Text Books:

1. Varley, H., Gowenlak, A.H. and Hill, M. Practical Clinical Biochemistry, William Itinmaon Medical Books, London, 2010.

2. Oser, B.L., Harke's Physiological Chemistry XIV Edition Tata McGraw Hill Publishing Company Ltd., Bombay, 2011

Reference Books:

1. Sadasivam, S. and Manickam, A. Biochemical Method, Second Edition,New Age International P. Ltd., Publishers, New Delhi, 2013.
2. Raghuramulu, N., Madhavannair, K. and Kalyana Sundaram, National Institute of Nutrition, 2013, A Manual of Laboratory Techniques, Hyderabad, 500007

Evaluation Pattern

Internal	External	Total
80	20	100

*CA – Regular Lab work assessment

ELECTIVES A
Food Hygiene and Sanitation

Semester V	**Hours of Instruction/ week – 3**
Course Code: 21FSN231	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total 45 hrs.**

Pre requisite: Food safety, Hygiene, WASH, FNHW

Course Objectives:

1. Understand the basics of food hygiene
2. Understand the concepts of safe and effective sanitation practices
3. Understand the sanitary aspects of water.

Course Outcome:

CO1: Design food hygiene and sanitation measures to control the spread of microorganisms.
CO2: Understand the links between water, sanitation and health

Skills: Develop skills in maintaining sanitary practices in food industry

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	1	-	-	2	-	-	1	1
CO2	1	2	2	1	-	-	2	-	-	1	1

Syllabus:

Unit I - Food hygiene **9hrs.**

General principle of food hygiene. Hygiene in rural and urban areas in relation to food preparation, personal hygiene and food handling habits. Place of sanitation in food plants. Sanitary aspects of building and equipment: Plant layout and design, Comparative studies on sanitary fabrication of different types of processing equipment's.

Unit II - Safe and effective insect and pest control **9hrs.**

Extraneous materials in foods, Principles of Insects and pest's control. Physical and chemical methods of control. Effective control of micro-organisms: microorganisms important in food sanitation, micro-organisms as indicator of sanitary quality.

Unit III - Sanitary aspects of water supply **9hrs.**

Source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water, preventing contamination of potable water supply.

Unit IV - Cleaning practices **9hrs.**

Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices.

Unit V - Sanitation practices **9hrs.**

Sanitary aspects of waste disposal. Establishing and maintaining sanitary practices in food industry, sanitation principle and the requirements for a food sanitation program, role of sanitation, general sanitary consideration and sanitary evaluation of food plants.

References:

1. Guide to Improve Food Hygiene - Gaston and Tiffney
2. Practical Food Microbiology & Technology - Harry H. Weiser, Mountney, J. and Gord, W.W.
3. Food Poisoning and Food Hygiene - Betty C. Hobbs
4. Principles of Food Sanitation - Marriott and Norman, G.
5. Hygiene and Sanitation in Food Industry - S. Roday

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Adolescence Health and Lifestyle

Semester V	**Hours of Instruction/ week – 3**
Course Code: 21FSN232	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total 45 hrs**

Pre-requisite: Health, Lifestyle changes, adolescence needs.

Course Objectives:

1. Understand the value of health and nutrition during adolescence.
2. Understand the relationship between lifestyle practices and health outcomes
3. Understand various strategies undertaken to promote adolescent health, lifestyle and nutritional status

Course Outcome:

CO1: Increased mindfulness on significance in adolescent's health

CO2: Gained information on the impact of long term good lifestyle practices on health

CO3: Attained knowledge on methods to overcome unhealthy lifestyle practices

Skills: Develop skills to overcome lifestyle changes during adolescence

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	-	-	1	-	-	2	-	1	-	1
CO2	2	-	-	1	-	-	2	-	1	-	1
CO3	2	-	-	1	-	-	2	-	1	-	1

Syllabus:

Unit 1 – Introduction to Adolescent Health and Lifestyle

9hrs.

Significance of Adolescent Health- stages of adolescence, physical, social, emotional, spiritual and intellectual well-being, sedentary lifestyle, reproductive health and factors influencing, integration of knowledge and skills to develop a healthy lifestyle plans, parent's adolescence communication

Unit II – Promotion of Good Eating Habits

9hrs.

Food choices- Skipping Breakfast- Factors, impact on health, Measures to overcome
Junk Food Consumption - Factors, impact on health, Measures to overcome
Eating White Products- Factors, impact on health, Measures to overcome
Water and Fluid intake- Significance on health

Unit III – Resting pattern and physical activity **9hrs.**

Postures – Ergonomics, Good and Bad postures, Advantage and Disadvantages

Degenerative Disc Disease – Causes, types, Consequences to human health

Sleeping Pattern – Types, advantages and disadvantages, circardium rhythm, nocturnal habits, consequences to human health,

Physical activity, obesity and weight management- Types and significance, weight management,

Unit IV – Supporting Mental Health **9hrs.**

Stress- Causes, types, signs and symptoms, coping with emotions and stress, impact of Stress on adolescent health

Depression and Suicidal tendency- Causes and impact of Depression on adolescent health

Peer pressure- Causes, types and impact of peer pressure and ways to overcome on adolescent health

Procrastination- Causes, types and impact of peer pressure and ways to overcome on adolescent health

Violence – Types, causes and effects, rehabilitation measures

Unit V – Personal habits and hygiene **9hrs.**

Personal Habits:

Alcohol addiction, Smoking, Substance Abuse, Electronic addiction - Factors, symptoms, types health impact, measures to overcome

Personal hygiene:

General hygiene, menstrual hygiene, dental hygiene

Text Books:

1. An Introduction to Lifestyle Management: Facilitator's Handbook, Dr.Anja Morris-Paxton, 2019
2. Food Science- Srilakshmi, Prosper Montague Publishing Group Ltd., Hamlyn, London. 2015.
3. Internet Addiction: The Ultimate Guide for How to Overcome An Internet Addiction For Life (Gaming Addiction, Video Game, TV, RPG, Role-Playing, Treatment, Computer) Paperback Caesar Lincoln, 2014.
4. Food & Nutrition- Swaminathan (1995), The Bangalore Printing & publishing co ltd., Vol I, Second Edition, Bangalore
5. The New Rules of Posture: How to Sit, Stand, and Move in the Modern World, Mary Bond, 2006
6. Stress Management: A Wellness Approach First Edition by Nanette E. Tummers, ISBN-13: 978-1450431668

Evaluation Pattern:

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

SPORTS NUTRITION

Semester V	**Hours of Instruction/ week – 3**
Course Code: 21FSN233	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total 45 hrs.**

Pre-requisite: Health and fitness knowledge, practice.

Course Objectives:

1. Understand the importance of fitness and health
2. Gain knowledge on relationship between nutrition for physical activity
3. Gain understanding on the techniques of training
4. Understand the risks of hypokinetic diseases
5. Comprehend the principles of exercise and stress management

Course Outcome:

CO1: Understand the significance of fitness and training
CO2: Foster fitness skills
CO3: Learn to manage lifestyle related disorders
CO4: Participate on stress and health management practices

Skills: Gain the Technical Ability to establish and manage Fitness Centers

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	-	-	1	1	1	-	1
CO2	1	-	-	1	-	-	1	1	1	-	1
CO3	1	-	-	1	-	-	1	1	1	-	1
CO4	1	-	-	1	-	-	1	1	1	-	1

Syllabus:

Unit 1 - Health and Fitness **9hrs.**

Definition, Components and Relationship among Physical Fitness, Wellness and Health – challenges and personalized approach, Benefits of fitness training

Unit II - Exercise Physiology and Nutrition for Physical Activity **9hrs.**

Pulmonary Structure and Function, Cardiovascular Regulation and integration, Skeletal and neural control,

endocrines and exercise, role of macro and Micro nutrients, optimum nutrition and Introduction -Food Groups, My Pyramid (FAO/WHO, 2005), Adequate Diet. Role of Macro and Micro nutrients – Carbohydrates, Proteins, Fats, Vitamin D, Calcium, Iron, Optimum Nutrition and Hydration for Health

Unit III - Physical Activity Training **9hrs.**

Aerobic and anaerobic training -To enhance Cardio Vascular Endurance, Flexibility and Body Composition, Measurement of PAL, Benefits of Fitness training and Gadgets for measuring PA – Motorized Treadmill, (aerobic Fitness), Functional Trainer, Fluid Rower (Upper body), Elliptical Bicycle and Bicyle Ergometer (Lower body), Stretch Trainer (Whole body), Multi Gym (9, 12, 16 station) for different muscle groups

Unit IV - Diseases due to Faulty Food Habits and Physical Inactivity **9hrs.**

Life Style related diseases/disorders -Non communicable Disease conditions- Underweight, Obesity, Diabetes mellitus, Hypertension, Cancer, Cardiovascular Disease, Anaemia

Unit V - Exercise, Stress and Health Management **9hrs.**

Stress Assessment and Management Techniques-Exercise at medium and high altitudes, Underweight, Overweight and Obesity, Relaxation Techniques, Yoga and Meditation for Health, Clinical Exercise Physiology for Cancer, CV and Pulmonary rehabilitation

Text Books:

1. Werner W. K Hoejer (1989), Life time Physical Fitness and Wellness, Morton Publishing Company, Colorado.
2. Mishra, S. C (2005) Physiology in Sports. Sports Publication, New Delhi
3. Greenberg, S. J and Pargman, D (1989) Physical Fitness – A Wellness Approach Prentice Hall International (UK) Limited, London
4. Swaminathan T, (2008) Essentials of Food and Nutrition Bangalore Printing Publishing Co.

Reference Books:

1. McArdle, W. D, Frank I. Katch, F. I and Victor L. Katch (1996) Exercise Nutrition: Energy Nutrition and Human Performance. William & Wilkin Publishing USA.
2. Mahan, K and Stump, E. S (1996) Krause Food and Nutrition and Diet Therapy W.B Saunders Company, USA.
3. McArdle, W. D, Frank I. Katch, F. I and Victor L. Katch (2010) Essentials of Exercise Physiology, 7th edition. William & Wilkin Publishing USA.

Evaluation Pattern:

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

ELECTIVES B

Home Scale Preservation of Foods

Semester VI	**Hours of Instruction/ week – 3**
Course Code: 21FSN331	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total 45 hrs.**

Pre-requisite: Food processing, preservation, additives, preservatives

Course Objectives:

1. Understand the methods of home scale food preservation
2. Gain knowledge related to preservation on sugar, salt, drying and chemicals preservative
3. Learnt the importance of moisture removal and fermentation in home scale preservation

Course Outcomes:

CO1: Gain expertise to manage surplus fruits and vegetables at home scale level
CO2: Enhance the knowledge related to preservation on sugar, salt, drying and chemicals preservative
CO3: Empowered to become an entrepreneur in small scale food industries

Skills: Develop skills in food processing and preservation at home scale level

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	1	3	-	1	1	1	1	1
CO2	1	-	1	1	3	-	1	1	1	1	1
CO3	1	-	-	1	3	-	1	1	1	1	1

Syllabus:

Unit 1- Introduction to Food Preservation **9hrs.**

Basic Principles of Food Preservation, Types of Spoilage, Importance of Food Preservation Different Methods of Food Preservation. Management of surplus foods.

Unit I1- Preservation by using Sugar **9hrs.**

Sugar concentrates, Preparation of Jam, Jelly, Marmalades, Preserves, Candied, Glazed, Crystallized Fruits, FPO Specification, Problems Encountered, Spoilages

Unit III - Preservation by Removal of Moisture **9hrs.**

Sun drying Drying, Dehydration, Method of Drying, Preparation of Vegetable Vathals - Ladies Finger, Brinjal, Beans, Cluster Beans, Preparation of Vadams – Rice vadam, Sago Vadam, Rice Flakes Vadam, Tomoto Vadam

Unit IV-Preservation by using Chemicals and Salts **9hrs.**

Chemical Preservatives – Definition, Types of Preservatives, Preparation and Preservation of Fruit Juices, picking – Principles Involved, Process, Types

Preparation of Various Types of Pickles – Lime, Mango, Ginger, Capsicum, Mixed Vegetables, Brinjal, Onion, Garlic

Unit V- Fermentation **9hrs.**

Definition, Types of Fermentation, Common Fermented Foods – Cheese Making, Dokhla,Wine

Text books:

1. Adams, M.R. and Moss, M.O. (2005) Food Microbiology, New Age International (P) Ltd., New Delhi,.
2. Usha Chandrasekhar, (2002) Food Science and Applications in Indian Cookery, Phoenix Publishing House Pvt. Ltd., New Delhi,.
3. Srilakshmi, B.(2013) Food Science, New Age International (P) Ltd., New Delhi,

Reference Books:

1. Fellows, P. (2000) Food Processing Technology, Principles and Practice, 2nd Edition, CRC Press, Woodland Publishing Ltd., Cambridge, England.
2. Sommers, C.H. and Xveteng Fan, (2006) Food Irradiation Research and Technology, Blackwell Publishing, 2006.
3. Swaminathan, M. Food Science, Chemistry and Experimental Foods, Bappco Publishers, 2013.

Evaluation Pattern:

Assessment	Internal	External
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Nutraceuticals and Nutrigenomics

Semester VI	**Hours of Instruction/ week – 3**
Course Code: 21FSN332	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total 45 hrs.**

Pre- requisite: Nutraceuticals, bioactive components, dietary supplements, genetically modified foods

Course Objectives:

1. Gain knowledge about functional foods, nutraceutical and nutrigenomics.
2. Understanding the molecular level interaction between nutrients and other dietary bioactive with human genome.
3. Know the applications of nutrigenomics in wellness and disease management.

Course Outcomes:

CO1: Understand the developments in the field of nutraceuticals and nutrigenomics.

CO2: Understanding the functions of dietary supplements and nutraceuticals in disease conditions.

CO3: Know the importance of probiotics and prebiotics in human health

CO4: Comprehend the components of nutrigenomics, gene expression, functional foods

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	-	-	-	2	2	2	-	-
CO2	2	2	-	-	-	-	2	2	2	-	-
CO3	2	2	-	-	-	-	2	2	2	-	-
CO4	2	2	-	-	-	-	2	2	2	-	-

Syllabus:

Unit I - Nutraceuticals and Functional Foods **9hrs.**

Definition of functional and traditional foods, nutraceuticals, designer foods and pharma foods, history of functional foods, components of functional foods, foods containing nutraceuticals and classification of nutraceuticals – based on plant sources, mechanism of action and chemical nature

Unit II - Role of Dietary Supplements and Nutraceuticals in Health and Disease **9hrs.**

Concept of dietary supplements, sources and functions of phytochemicals with suitable examples, FOSHU foods – concepts, regulatory aspects

Unit III - Probiotics and Prebiotics **9hrs.**

Gut microbiota, functions, concept of probiotic, prebiotics & symbiotics; applications of probiotics in human

nutrition

Unit IV - Nutrigenomics **9hrs.**

Definition of nutrigenomics, gene expression – transcription, translation, post translational modification, nutrition in the omics era- elementary concepts on epigenetics, transcriptomics, proteomics, metabolomics; genetic variation and nutritional implications

Unit V - Nutrition and Gene Expression and Nutrigenomics and Complex Diseases **9hrs.**

Nutrient control of gene expression – amino acids, nucleotides, basic concepts of nutrigenomics and complex diseases – diabetes, cancer and obesity

Text Books:

1. 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.
2. Srilakshmi, B. Second Edition, Food Science, New Age International (P) Limited Publishers, New Delhi, 2017
3. Simopoulus, A.P. and Ordovas, K.J.M., 2004, Nutrigenetics and Nutrigenomics, Vol. 93, Karger, Switzerland.

Reference Books:

1. Watson, David, H., 2013, Performance Functional Foods, CRC Press, Wood Head Publishing Ltd., England
2. Tamine, A., 2015, Probiotic Dairy Products, Blackwell Publishing Ltd., UK
3. Narasinga Rao, B.S., 2015, Nutrition Research in India – A Country Report, Published by INSA, New Delhi.
4. Webb, G.P., 2016, Dietary Supplementations and Functional Foods, Blackwell Publishing Ltd., New York.
5. Tai, E.S. and Gillies, P.J., 2007, Nutrigenomics – Opportunities in Asia, Karger, Singapore. 2013.

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

Career Opportunities in Food Science and Nutrition

Semester VI	**Hours of Instruction/ week – 3**
Course Code: 21FSN333	**No. of Credits – 3**
L-T-P – 3-0-0-3	**Total 45 hrs.**

Pre requisite: Biological sciences, food science, dietetics, community nutrition, food industry

Course Objectives:

1. Understand the extended higher learning opportunities for UG Food Science and Nutrition graduates.
2. Understand various career opportunities pertaining to graduates in UG Food Science and Nutrition.
3. Building capacity and Learning skill for competitive examination opening into government and non-government sectors

Course Outcome:

CO1: Awareness built on higher learning opportunities

CO2: Building appropriate skills and capacity to open careers in various food sector.

CO3: Building knowledge and skills for the competitive exam preparations.

Skills: Strengthen technical and develop exam preparedness skills

CO-PO Mappings

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	1	-	2	3	-	-	-	-
CO2	-	-	-	1	-	2	3	-	-	-	-
CO3	-	-	-	1	-	2	3	-	-	-	-

Unit I - Preparation for higher learning & research **9hrs.**

Understanding the domains of higher learning, Opportunities for higher learning, thrust areas of exchange studies, possible interdisciplinary courses and learning opportunities.

Unit II - Career opportunities in hospitals **9hrs.**

Registered Dietitian Examination, preparation, how to apply, syllabus, technical knowledge and skills required.

Unit III - Career opportunities in government sector & community **9hrs.**

Various Ministry, National and state government departments open for recruiting officers and staff with food science and nutrition background.

Unit IV - Career opportunities in food industry & as entrepreneur **9 hrs.**

Required Education & Training for a career in the Food Industry, Opportunities as a Food technologist Product/process development scientist, Quality manager, Regulatory affairs officer, Know about the Recruiters and roles and responsibilities. Small- and large-scale food-based business, how to initiate startups, applying for FSSAI, setting quality standards roles and responsibilities.

Unit V – Preparation for competitive exams **9hrs.**

Various resources web links and websites for various relevant job applications. State employment Exchange registration.

Registered Dietitian Exam- Eligibility, registration, application, Syllabus.

NET /SLET Exams– Interior design, resource management, textiles and clothing, human development, extension education

Text books/ References:

1. Premalata, M, (2007), 'Text Book of Home science', Kalyani Publishers, Chennai.
2. Online resources

Evaluation Pattern

Assessment	Internal	External Semester
Periodical 1 (P1)	15	
Periodical 2 (P2)	15	
*Continuous Assessment (CA)	20	
End Semester		50

*CA - Can be Quizzes, Assignment, Projects, and Reports, and Seminar

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