MANONMANIAM SUNDARANAR UNIVERSITY

B.Sc. FOOD SCIENCE AND NUTRITION

SYLLABUS

FROM THE ACADEMIC YEAR 2024-25

TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION,

CHENNAI – 600 005

B.Sc. FOOD SCIENCE AND NUTRITION

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TANSCHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	**B.Sc., Nutrition and Dietetics**
Programme Code:	
Duration:	**UG - 3 years**
Programme Outcomes:	**PO1: Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study **PO2: Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and

	present complex information in a clear and concise manner to different groups. **PO3: Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. **PO4: Problem solving: Capacity** to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. **PO5: Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints. **PO6: Research-related skills**: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation **PO7: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team **PO8: Scientific reasoning**: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.

	PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. **PO10Information/digital literacy:** Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. **PO 11 Self-directed learning**: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. **PO 12 Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. **PO 13: Moral and ethical awareness/reasoning**: Ability toembrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstratingthe ability to identify ethical issues related to one‟s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. **PO 14: Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. **PO 15: Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn‟, that are necessary for participating in

	learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

Programme Specific Outcomes:	**PSO1 – Placement:** To prepare the students who will demonstrate respectful engagement with others' ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions. **PSO 2 - Entrepreneur:** To create effective entrepreneurs by enhancing their critical thinking, problem-solving, decision making and leadership skills that will facilitate startups and high potential organizations **PSO3 – Research and Development:** Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development. **PSO4 – Contribution to Business World:** To develop skilled, ethical and creative professionals who can thrive in the ever-changing business environment. **PSO 5 – Contribution to the Society:** To contribute to the development of the society by collaborating with stakeholders for mutual benefit

Credit Distribution for UG Programmes

Sem I	Cr	H	Sem II	Cr	H	Sem III	Cr	H	Sem IV	Cr	H	Sem V	Cr	H	Sem VI	Cre	H
Part 1.	3	6	Part.. 1.	3	6	Part.. 1.	3	6	Part.. 1.	3	6	5.1 Core Course –	4	5	6.1 Core	4	6

Language – Tamil			Language – Tamil			Language – Tamil			Language – Tamil			\CC IX			Course – CC XIII		
Part.2 English	3	6	Part..2 English	3	6	Part..2 English	3	6	Part..2 English	3	6	5.2 Core Course – CC X	4	5	6.2 Core Course – CC XIV	4	6
1.3 Core Course – CC I	5	5	2..3 Core Course – CC III	5	5	3.3 Core Course – CC V	5	5	4.3 Core Course – CC VII Core Industry Module	5	5	5. 3.Core Course CC -XI	4	5	6.3 Core Course – CC XV	4	6
1.4 Core Course – CC II	5	5	2.4 Core Course – CC IV	5	5	3.4 Core Course – CC VI	5	5	4.4 Core Course – CC VIII	5	5	5. 4.Core Course – / Project with viva-voce CC -XII	4	5	6.4 Elective -VII Generic/ Discipline	3	5

															Specific		
1.5 Elective I Generic/ Discipline Specific	3	4	2.5 Elective II Generic/ Discipline Specific	3	4	3.5 Elective III Generic/ Discipline Specific	3	4	4.5 Elective IV Generic/ Discipline Specific	3	3	5.5 Elective V Generic/ Discipline Specific	3	4	6.5 Elective VIII Generic/ Discipline Specific	3	5
1.6 Skill Enhancement Course SEC-1	2	2	2.6 Skill Enhancement Course SEC-2	2	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	1	4.6 Skill Enhancement Course SEC-6	2	2	5.6 Elective VI Generic/ Discipline Specific	3	4	6.6 Extension Activity	1	-
1.7 Skill Enhancem	2	2	2.7 Skill Enhancem	2	2	3.7 Skill Enhancem	2	2	4.7 Skill Enhancem	2	2	5.7 Value Educatio	2	2	6.7 Professional	2	2

ent - (Foundation Course)			ent Course – SEC-3			ent Course SEC-5			ent Course SEC-7			n			Competency Skill		
						3.8 E.V.S.	-	1	4.8 E.V.S	2	1	5.8 Summer Internship /Industrial Training	2				
	23	**30**		**23**	**30**		**22**	**30**		**25**	**30**		**26**	**30**		**21**	**30**
Total – 140 Credits																	

Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework (LOCF) Guideline Based Credit and Hours Distribution System for all UG courses including Lab Hours

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses& Elective Courses [in Total]	13	14
Part-4	Skill Enhancement Course SEC-1	2	2
	Foundation Course	2	2
		23	**30**

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses& Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-2	2	2
	Skill Enhancement Course -SEC-3 (Discipline / Subject Specific)	2	2
		23	**30**

Second Year – Semester-III

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses& Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course -SEC-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course -SEC-5 (Discipline / Subject Specific)	2	2
	E.V.S	-	1
		22	**30**

Semester-IV

Part	List of Courses	Credit	No. of Hours
Part-1	Language - Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses& Elective Courses including laboratory [in Total]	13	13
Part-4	Skill Enhancement Course -SEC-6 (Discipline / Subject Specific)	2	2
	Skill Enhancement Course -SEC-7 (Discipline / Subject Specific)	2	2
	E.V.S	2	1
		25	**30**

Third Year

Semester-V

Part	List of Courses	Credit	No. of

			Hours
Part-3	Core Courses including Project / Elective Based	22	26
Part-4	Value Education	2	2
	Internship / Industrial Visit / Field Visit	2	2
		26	**30**

Semester-VI

Part	**List of Courses**	**Credit**	**No. of Hours**
Part-3	Core Courses including Project / Elective Based & LAB	18	28
Part-4	Extension Activity	1	-
	Professional Competency Skill	2	2
		21	**30**

Consolidated Semester wise and Component wise Credit distribution

Parts	**Sem I**	**Sem II**	**Sem III**	**Sem IV**	**Sem V**	**Sem VI**	**Total Credits**
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	22	18	92
Part IV	4	4	3	6	4	1	22
Part V	-	-	-	-	-	2	2
Total	23	23	22	25	26	21	**140**

***Part I. II, and Part III components will be separately taken into account for CGPA calculation and classification for the undergraduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

METHODS OF EVALUATION		
Internal Evaluation	Continuous Internal Assessment Test	**25 Marks**
	Assignments / Snap Test / Quiz	
	Seminars	
	Attendance and Class Participation	
External Evaluation	End Semester Examination	**75 Marks**
Total		**100 Marks**

METHODS OF ASSESSMENT	
Remembering (K1)	• The lowest level of questions require students to recall information from the course content. • Knowledge questions usually require students to identify information in the textbook.
Understanding (K2)	• Understanding of facts and ideas by comprehending, organizing, comparing, translating, interpolating, and interpreting in their own words. • The questions go beyond simple recall and require students to combine data.
Application (K3)	• Students have to solve problems by using/applying concepts learned in the classroom. • Students must use their knowledge to determine an exact response.
Analyze (K4)	• Analyzing the question asks the students to break down something into its parts. • Analyzing requires students to identify reasons, causes, or motives and reach conclusions or generalisations.
Evaluate (K5)	• Evaluation requires an individual to make a judgment on something. • Questions to be asked to judge the value of an idea, a character, a work of art, or a solution to a problem. • Students are engaged in decision-making and problem-solving. • Evaluation questions do not have a single right answer.

Create (K6)	• The questions of this category challenge students to get engaged in creative and original thinking. • Developing original ideas and problem-solving skills.

Highlights of the Revamped Curriculum:

1. Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application-oriented content wherever required.
2. The Core subjects include the latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising statistical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced statistical topics in the final semester, catering to the needs of stakeholders with research aptitude.
3. The General Studies and Statistics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.
4. The curriculum is designed to strengthen the Industry-Academia interface and provide more job opportunities for the students.
5. The Statistical Quality Control course is included to expose the students to real-life problems and train the students on designing a mathematical model to provide solutions to industrial problems.
6. The Internship during the second-year vacation will help the students gain valuable work experience, that connects classroom knowledge to real-world experience and narrows down and focus on the career path.
7. A project with a viva-voce component in the fifth semester enables the student to apply conceptual knowledge to practical situations. The state-of-the-art technologies ensure a systematic and precise approach to problem-solving. Such innovative provisions of industrial training, projects and internships will give students an edge over their counterparts in the job market.

8. State-of-the-art techniques from the streams of multi-disciplinary, cross-disciplinary and inter-disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest DBMS and Computer software for Analytics.

9. **Value additions in the Revamped Curriculum:**

Semester	**Newly introduced Components**	**Outcome / Benefits**
I	**Foundation Course** To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning abstract Statistics and simulating mathematical concepts to real world.	• Instil confidence among students • Create interest for the subject
I, II, III, IV	**Skill Enhancement papers** (Discipline centric / Generic / Entrepreneurial)	• Industry ready graduates • Skilled human resource • Students are equipped with essential skills to make them employable
		• Training on Computing / Computational skills enable the students gain knowledge and exposure on latest computational aspects
		• Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc.
		• Entrepreneurial skill training will provide an opportunity for independent livelihood • Generates self – employment • Create small scale entrepreneurs • Training to girls leads to women empowerment

		• Discipline centric skill will improve the Technical knowhow of solving real-life problems using ICT tools
III, IV, V & VI	Elective papers- An open choice of topics categorized under Generic and Discipline Centric	• Strengthening the domain knowledge • Introducing the stakeholders to the State-of-the Art techniques from the streams of multi-disciplinary, cross-disciplinary and inter-disciplinary nature • Students are exposed to the Latest topics on Computer Science / IT, that require a strong statistical background • Emerging topics in higher education / industry / communication network / health sector etc. are introduced with hands-on-training, facilitating the designing of statistical models in the respective sectors
IV	DBMS and Programming skills, Biostatistics, Statistical Quality Control, Official Statistics, Operations Research	• Exposure to industry moulds students into solution providers • Generates Industry graduates • Employment opportunities enhanced
II year Vacation activity	Internship / Industrial Training	• Practical training in the Industry/ Baking Sector / Private/ Public sector organizations / Educational institutions, enable the students to gain professional experience and also become responsible citizens.
V Semester	Project with Viva – voce	• Self-learning is enhanced • Application of the concept to a real situation is conceived resulting in a tangible outcome
VI Semester	Introduction of Professional Competency	• Curriculum design accommodates all category of learners; 'Statistics for Advanced Explain' component will

	component	comprise advanced topics in Statistics and allied fields, for those in the peer group / aspiring researchers • 'Training for Competitive Examinations' – caters to the needs of the aspirants towards most sought-after services of the nation viz, UPSC, ISS, CDS, NDA, Banking Services, CAT, TNPSC group services, etc.
Extra Credits: **For Advanced Learners / Honors degree**		• To cater to the needs of peer learners/research aspirants

Skills acquired from the Courses	Knowledge, Problem-Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

COURSE OF STUDY AND SCHEME OF EXAMINATION

SEMESTER I							
Part	**List of Courses**	**Credits**	**No. of Hours/ week**	**Total hours/ semester**	**CIA**	**Univ.Exam**	**Total marks**
Language	Tamil/Other Languages	3	6	90	25	75	100
Language	English	3	6	90	25	75	100
Core I	Human Physiology	5	5	75	25	75	100
Core Practical II	Human Physiology Practical	3	3	45	50	50	100
Allied I	Chemistry I	3	4	60	25	75	100
Allied Practical II	Chemistry Practical	2	2	30	50	50	100
Skill Enhancement Course	SEC-1- Public Health Nutrition	2	2	30	25	75	100
Foundation Course	Women's Health and Wellness	2	2	30	25	75	100
	Total	**23**	**30**	**450**	**250**	**550**	**800**

SEMESTER II

Part	List of Courses	Credits	No. of Hours/ week	Total hours/ semester	CIA	Univ.Exam	Total marks
Language	Tamil/Other Languages	3	6	90	25	75	100
Language	English	3	6	90	25	75	100
Core III	Food Science	5	5	75	25	75	100
Core Practical IV	Food Science Practical	3	3	45	50	50	100
Allied III	Chemistry II	3	4	60	25	75	100
Allied Practical IV	Chemistry Practical	2	2	30	50	50	100
Skill Enhancement Course	**SEC- II** Introduction to Fashion Designing	1	2	30	25	75	100
	SEC- III Landscape Design and Ornamental Garden	1	2	30	25	75	100
	Naan Mudhalvan-1	2	2	-	-	-	-
	Total	**23**	**30**	**450**	**250**	**550**	**800**

SEMESTER III

Part	List of Courses	Credits	No. of Hours/ week	Total hours/ semester	CIA	Univ.Exam	Total marks
Language	Tamil/Other Languages	3	6	90	25	75	100
Language	English	3	6	90	25	75	100
Core V	Human Nutrition	6	5	75	25	75	100
Core VI	Human Nutrition - Practical	3	3	45	50	50	100
Elective III	Human Development	4	4	60	25	75	100
SEC IV	Foundations of Baking and Confectionery	1	2	30	25	75	100
EVS	Environmental Studies	2	2	30	25	75	100
	Naan Mudhalvan-2	2	2	-	-	-	-
	Total	**24**	**30**	**450**	**250**	**550**	**800**

SEMESTER IV							
Part	**List of Courses**	**Credits**	**No. of Hours/ week**	**Total hours/ semester**	**CIA**	**Univ.Exam**	**Total marks**
Language	Tamil/Other Languages	3	6	90	25	75	100
Language	English	3	6	90	25	75	100
Core VII	Nutrition through Life Cycle	6	5	75	25	75	100
Core VIII	Nutrition through Life Cycle-Practical	3	3	45	50	50	100
Elective IV	Fibre to Fabric	4	4	60	25	75	100
SEC V	Fundamentals of Research in Nutritional Sciences	1	2	30	50	50	100
	Value-Based Education	2	2	30	25	75	100
	Naan Mudhalvan-3	2	2	-	-	-	-
	Total	**24**	**30**	**450**	**225**	**475**	**700**

SEMESTER V							
Part	**List of Courses**	**Credits**	**No. of Hours/ week**	**Total hours/ semester**	**CIA**	**Univ.Exam**	**Total marks**
Core IX	Nutritional Biochemistry	4	5	75	25	75	100
Core X	Dietetics	4	5	75	25	75	100
Core XI	Dietetics - Practical	4	5	75	50	50	100
Core XII	Project	3	5	75	50	50	100
Elective V	Food Service Management	3	4	60	25	75	100
Elective VI	Food Product Development	3	4	60	25	75	100
	Naan Mudhalvan-4	2	2	-	-	-	-
Internship	Internship/ Industrial Visit/ Field Visit	2	0	-	50	50	100
	Total	**25**	**30**	**420**	**250**	**450**	**700**

SEMESTER VI							
Part	**List of Courses**	**Credits**	**No. of Hours/ week**	**Total hours/ semester**	**CIA**	**Univ.Exam**	**Total marks**
Core XIII	Functional Foods for Chronic Diseases	4	6	90	25	75	100
Core XIV	Basics of Food Microbiology	4	6	90	25	75	100
Core XV	Food Preservation and Processing	4	6	90	25	75	100
Elective VII	Sports Nutrition	3	5	75	25	75	100
Elective VIII	Changing Trends in Extension Education	3	5	75	25	75	100
	Naan Mudhalvan-5	2	2	-	-	-	-
	Extension Activity	1	-	-	-	-	-
	Total	**21**	**30**	**420**	**125**	**375**	**500**

SEMESTER I	
Core/Major Course I	**Human Physiology**
Paper Code:	**Theory:6hrs/week**

Course Learning Outcomes:

Gain the basic knowledge of human anatomy and physiology.
Define the main structures composing the human body.
Explain the structure and functions of cells, tissues, organs, and systems of the human body.
Relate structure and functions of tissues.

Provide excellent preparation for careers in the health professions and/or biomedical research.

COURSE CONTENT

Unit-I

Cell–Structure of organs and functions. Tissues–Structure, Classification and Functions.

Unit-II

Blood – Composition, functions, coagulation, factors affecting coagulation, blood groups. Gastrointestinal and Hepatobiliary system – Structure, physiology and functions for different organs and role of hormones and enzymes.

Unit-III

Immune system – Innate, acquired and active immunity, cell mediated immunity, humoral immunity and the complement system.

Heart and circulation – Structure, cardiac cycle, cardiac output, factors affecting cardiac output, normal ECG, heart failure, blood pressure, control and factors affecting blood pressure.

Unit-IV

Respiratory system – Structure and functions, Lung volumes and lung capacities, Factors affecting efficacy of respiration.

Excretory system -(A) Urinary System: -Structure and functions of organs of urinary system (In brief), Mechanism of urine formation. (B) Skin: -Structure and functions, Regulation of body temperature.

Unit-V

Reproductive system–(A) Female reproductive system--Structure and functions, menstrual cycle, menarche and menopause.

(B) Male Reproductive System—Structure and functions.

Endocrine system - Thyroid, Parathyroid, Adrenal gland, Pituitary and Sex glands – Structure and functions.

References

1. Ross and Wilson (2011), *Anatomy and Physiology in Health and Illness*, 11th Edition, Church Hill Livingstone.
2. West, J.B. (2007), *Best and Taylor's Physiological Basis of Medical Practice*, 11th Edition.
3. Gyton (1996), *Text Book of Medical Physiology*, 9th Edition, Prism Books Pvt. Ltd., W.B. Sanders Company, USA.
4. Chatterjee C.C (2016), *Human Physiology Volume I*, Medical Allied Agency, Kolkata.
5. Chatterjee C.C (2004), *Human Physiology Volume II*, Medical Allied Agency, Kolkata.
6. Sembulingam, K. (2000), *Essentials of Medical Physiology*, Jaypee Brothers Medical Publishers (P) Ltd., New Delhi.
7. Chaudhri, K. (1993), *Concise Medical Physiology*, New Central Book Agency (Parentral) Ltd., Calcutta.

SEMESTER I	
Core/Major Practical I	**Human Physiology**
Paper Code:	**Practical:3hrs/week**

Course Learning Outcomes:

1. Gain the basic knowledge of the different vital organs, glands and tissues under a microscope.
2. To estimate the blood parameters like hemoglobin, blood group, bleeding time, clotting time and platelet count

Course content

1. Microscopic study of tissues - epithelial, connective, and muscular.
2. Collection of blood samples - Capillary blood from fingertips and venous blood.
3. Separation of blood components (centrifugation).
4. Estimation of hemoglobin - Sahli's Acid hematin method.
5. Determination of hematocrit (Wintrobe method).
6. Preparation and examination of stained blood smear (wedge or glass slide method).
7. Determination of erythrocyte sedimentation rate (Wintrobe method).
8. Determination of blood group.
9. Determination of bleeding time (Duke method) and coagulation time (capillary tube method).
10. Platelet count (Rees Ecker method by hemocytometry).
11. Clinical examination of a radial pulse (pulse rate).
12. Measurement of blood pressure (sphygmomanometry).
13. Effect of exercise on blood pressure and heart rate.
14. Microscopic structure of heart, digestive system, and kidney.
15. Microscopic structure of reproductive organs - ovary, uterus, mammary glands, and testis.
16. Microscopic structure of endocrine glands - thyroid, pituitary, and adrenal.

Reference: G.K. Pal and Pravati Pal, *Textbook of Practical Physiology*, Orient Longman Ltd., 2001.

Title of the Course		PUBLIC HEALTH NUTRITION								
Category	Year I Sem I	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
SEC I		Y		Y		2	2	25	75	100

Learning Objectives
To enable the students to:
Gain knowledge about nutritional policies, programs and agencies involved in combating malnutrition.
Acquire knowledge and skills in assessment of nutritional status.
Create awareness on improving health and nutrition of the community

UNIT	CONTENT	HOURS
UNIT I	**Concept and scope of public nutrition** Definition, concept, scope and multidisciplinary nature of public nutrition **Nutritional problems affecting the community.** Etiology, prevalence, clinical features and preventive strategies for malnutrition-related problems and deficiency disorders- Undernutrition (Protein-energy malnutrition, Wasting, Stunting), Over nutrition (obesity and related risks), Nutritional anemia, Vitamin A deficiency, Iodine deficiency disorders, Fluorosis.	**15**
UNIT II	**Assessment of nutritional status** Objectives and importance, Methods of assessment: Direct (Clinical signs, Anthropometry, Biochemical tests); Indirect(Diet surveys, vital statistics)	**10**
UNIT III	**Nutrition policy and programs** National nutritional policy**;** Integrated Child Development Scheme (ICDS), Midday Meal Program- State and National (Poshan Abhiyan), National programs for the prevention of anemia, Vitamin A deficiency, Iodine deficiency disorders, Fortification of Foods and Public Distribution System as a preventive approach.	**15**

UNIT IV	**Nutrition education** Objectives, principles and scope of nutrition and health education, creating awareness on current public health issues and devising strategies for prevention and management.	**10**

UNIT V	**Role of National and International agencies in combating malnutrition** WHO,FAO, UNICEF; National: FSSAI, ICAR, ICMR, NIN, FNB, CFTRI, NNMB- Role, Target groups (if specified), Policies and Programs.	**10**
Practical	**Practical/experiential learning** Planning low-cost nutritious recipes for infants, preschoolers, pregnant/ lactating mothers for nutrition education. Assessment of nutritional status - Anthropometry: Weight and height measurements - Plotting and interpretation of growth charts for children below 5 years - Identification of clinical signs of common nutritional disorders - Dietary assessment: 24-hour recall, Food Frequency Questionnaire, Diet Diversity Score Planning a Nutrition Education Program, and imparting nutrition education to the community	**15**
	TOTAL	**75**

COURSE OUTCOME

After successful completion of the course, the student will be able to:

CO1. Define terms related to public health nutrition.

CO2. Describe the nutritional problems prevalent in the community.

CO3. Explain the significance of assessment of nutritional status.

CO4. Assess the role of various organizations in combating nutritional problems.

CO5. Conduct nutrition education programs to create awareness of improving the health and nutrition of the community at large.

Reference:

1. Wadhwa, A., and Sharma, S. (2003). *Nutrition in the Community – A Textbook*. Elite Publishing House Pvt. Ltd., New Delhi.
2. Park, K. (2011). *Park's Textbook of Preventive and Social Medicine*, 21st Edition. M/s Banarasidas Bhanot Publishers, Jabalpur, India.
3. Jellife, D.B., Jellife, E.F.P., Zerfas, A., and Neumann, C.G. (1989). *Community Nutritional Assessment with Special Reference to Less Technically Developed Countries*. Oxford University Press, Oxford.
4. WHO (2006). *Child Growth Standards: Methods and Development: Height-for-Age, Weight-for-Age, Weight-for-Length, Weight-for-Height and Body Mass Index-for-Age* (http://www.who.int/childgrowth/standards/en/).

5. Gupta, M.C., and Mahajan, B.K. (2003). *Textbook of Preventive and Social Medicine*, 3rd Ed. Jaypee Brothers, Medical Publishers (P) Ltd.

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- Mohfw.nic.in/NRHM/NIDD
- www.nrhmorissa.gov.in/NIDDCP.html
- www.Scripts.mit.edu

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	L	L	L	L	S	L	L	S
CO2	S	S	S	S	M	S	S	S	M	S
CO3	S	S	S	S	M	S	S	S	M	S
CO4	S	S	S	S	M	M	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	1	3
CO2	3	3	3	3	3
CO3	3	3	2	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	14	14	13	15
Weighted percentage (rounded off) of Course Contribution to Pos	3	3	3	3	3

Title of the Course		**WOMEN'S HEALTH AND WELLNESS**								
Category	**Year**	**L**	**T**	**P**	**O**	**Credits**	**Inst Hrs**	**Marks**		
								CIA	**Univ.Exam**	**Total**
	Sem									
Elective / SEC		Y				2	2	25	75	100

Learning Objectives
To enable the students to:
Understand the diverse factors that have a bearing on women's health.
Highlight different aspects of health that contribute to a good lifestyle for women across the globe.

UNIT	CONTENT	HOURS
UNIT I	**Nutrition for Women -** Dietary Guidelines for a healthy lifestyle, Current concepts pertaining to Balanced Diets, Nutrient requirements for young and older women with special focus on Protein, Iron, Vitamin D and Calcium, Factors affecting nutrient intake in women- Socioeconomic, Environmental conditions, Health conditions; Consequences of Eating disorders in young women.	**8**
UNIT II	**Physical Health -** Significance of Body weight and Body composition parameters, Benefits of Aerobic, Flexibility and Strength training exercises- on General health, Bone health, and risk associated with NCD's.	**8**
UNIT III	**Reproductive Health -** Menstrual Health, Pregnancy and Lactation, Pre- and Post-Menopausal concerns-preventive measures, sexually transmitted diseases- an overview.	**8**
UNIT IV	**Mental Health -** Common mental health problems - Trends and issues relating to women, Depression, Anxiety and coping with Stress, Strategies to improve mental health- learning new skills and hobbies, Relaxation techniques such as yoga and meditation.	**8**
UNIT V	**Social Health -** Balancing home and career, strengthening relationships, enhancing communication skills and Personality Development, technological advancements and their impact, Dealing with domestic violence, and harassment issues.	**8**
	TOTAL	**40**

Activity:

- Preparation of simple healthy recipes, Planning Meals based on Balanced diets,
- Workshop on Fitness, Yoga and Meditation,
- Seminars pertaining to Reproductive Health, Communication Skills, Personality Development

COURSE OUTCOMES

After successful completion of the course, the student will be able to:

CO1. Define terms related to nutrition, physical, reproductive, mental, and social health.

CO2. Discuss the need for right nutrition, exercises, and skills needed for the overall well-being of women.

CO3. Explain the significance of maintaining physical, reproductive, mental, and social health for the overall well-being of women.

CO4. Devise strategies to improve women's health in a holistic manner.

CO5. Recommend simple measures for a healthy lifestyle.

References:

1. Lanza di Scalea T, Matthews KA, Avis NE, et al. (2012) Role stress, role reward, andmental health in a multiethnic sample of midlife women: results from the Study of Women's Health Across the Nation (SWAN). J Women's Health; 21(5):481-489.
2. Mahan K and Sylvia E. Stump (2000) Krause's Food Nutrition and Diet Therapy, Saunders, USA.
3. Minkin M. J. and Wright C. V. (2003) The Yale Guide to Women's Reproductive Health from menarche to menopause. Yale University Press, London
4. Sizer F. S. and Whitney E. (2014) Nutrition: Concepts & Controversies. 13th Ed.,Wadsworth, Cengage Learning, USA.
5. Sperry L. (2016) Mental Health and Mental Disorders. ABC-Clio, California
6. Williams M.H., Anderson D.E., Rawson E.S. (2013) Nutrition for Health, Fitness andSport. McGraw Hill, New York.
7. Wrzus C, Hänel M, Wagner J, Neyer FJ. (2013) Social network changes and lifeeventsacross the life span: a meta-analysis. Psychol Bull;139(1):53-80.

e-Learning Resources:

- https://www.nhp.gov.in/social-health_pg
- https://ncert.nic.in/textbook/pdf/jehp112.pdf
- https://ncert.nic.in/textbook/pdf/iehp113.pdf
- https://ncert.nic.in/textbook/pdf/lebo104.pdf
- https://www.nih.gov/health-information/social-wellness-toolkit
- https://www.cdc.gov/reproductivehealth/womensrh/index.htm
- https://www.nimh.nih.gov/health/topics/caring-for-your-mental-health
- https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response
- https://www.cdc.gov/mentalhealth/learn/index.htm

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	L	S	L	L	S
CO2	S	S	S	M	M	M	S	L	M	S
CO3	S	S	M	S	M	M	S	S	M	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	M	S	S	S	S	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded off)of Course Contribution to Pos	3	3	3	3	3

SEMESTER II	
Core/Major Course II	**Food Science**
Paper Code:	**Theory:6hrs/week**

Objectives:

- Critically discuss fundamental and applied aspects of Food Science.
- Apply interdisciplinary principles to solve practical food-related problems.
- Understand food groups, cooking methods, and their application in food processing.
- Identify and control adulterants in foods to evaluate and ensure food quality.

Course Content

Unit-I

Food: Definition, functional classification, groups (4, 5,7 and 11), food pyramid.

Cooking: Definition and objectives; Methods- Moist heat methods, dry heat methods, combination of both and micro wave cooking; Effect of cooking on nutrients.

Beverages: Classification; Coffee beverage- Constituents and methodof preparation; Tea-Types, preparation; Cocoa- Composition, nutritive value and preparation of cocoa beverage; Fruit beverages- Types; Introduction to vegetable juices, milk based beverages, malted beverages, carbonated non-alcoholic beverages and alcoholic beverages.

Unit-II

- Cereals and Millets: Structure, composition and nutritive value of rice, wheat, and oats; Nutritive value of maize, jowar, ragi, and bajra.
- Cereal cookery: Effect of moist heat - Hydrolysis, Gelatinization and factors affecting gelatinization, gel formation, retrogradation and syneresis; Effect of dry heat; Role of cereals in cookery.
- Pulses: Composition, nutritive value, toxic constituents; Pulse cookery - Effect of cooking, factors affecting cooking quality, role of pulses in cookery, germination and its advantages.

Unit-III

- Milk and Milk Products: Composition and nutritive value of milk; Milk cookery - Effect of heat, effect of acid, and effect of enzymes; Milk products - Non-fermented and fermented products (does not include preparation); Role of milk in cookery.

- Egg: Structure, composition, nutritive value; Egg cookery - Effect of heat, factors affecting coagulation of egg proteins, and effect of other ingredients on egg protein; Role of egg in cookery; Home scale method for detecting egg quality.
- Meat: Classification, composition, nutritive value, rigor mortis, ageing, and tenderizing; Meat cookery - Changes during cooking.
- Poultry: Classification, composition, and nutritive value.
- Fish: Classification, composition, nutritive value, selection, and principles of fish cookery.

Unit-IV

Vegetables: Classification (nutritional), composition, nutritive value; Pigments in vegetables- Water soluble and water insoluble; Enzymes, flavor compounds and bitter compounds; Vegetable cookery- Preliminary preparation, changes during cooking, loss of nutrients during cooking, effect of cooking on pigments, role of vegetables in cookery.

Fruits: Classification, composition, nutritive value, ripening of fruits; Browning- Types and preventive measures.

Spices: General functions, role in cookery; Medicinal value of commonly used spices.

Unit-V

Fats and oils: Composition and nutritive value, basic knowledge about commonly used fats and oils (lard, butter, margarine, cotton seed oil, ground nut oil, coconut oil, soya bean oil, olive oil, rice bran oil, sesame oil, rape seed oil, mustard oil and palm oil); Spoilage of fat- Types and prevention; Effect of heating, role of fats and oils in cookery.

Sugar and related products: Nutritive value, characteristics and uses of various types of sugars; Sugar cookery- Crystallization and factors affecting crystallization; Stages of sugar cookery; Role of sugar in cookery.

Reference

1. Maney S (2008). *Foods, Facts and Principles*, 3rd Edition, Published by Wiley Eastern, New Delhi.
2. Usha Chandrasekhar (2002). *Food Science and Application in Indian Cookery*, Phoenix Publishing House P. Ltd., New Delhi.
3. Raina U, Kashyap S, Narula V, Thomas S Suvira, Vir S, Chopra S (2010). *Basic Food Preparation: A Complete Manual*, 4th Edition, Orient Black Swan Ltd., Mumbai.
4. Srilakshmi, B. (2017). *Nutrition Science*, New Age International (P) Ltd., New Delhi.
5. Mahtab, S. Bamji, Kamala Krishnasamy, Brahmam G.N.V (2012). *Text Book of Human Nutrition*, Third Edition, Oxford and IBH Publishing Co. P. Ltd., New Delhi.
6. Sunetra Roday (2017). *Food Science and Nutrition*, Oxford University Press, New Delhi.

Course Learning Outcomes:

1. Summarize and critically discuss and understand both fundamental and applied aspects of Food Science.
2. Identifying nutrient specific force and apply the principles from the various factors of foods and related disciplines to solve practical as well as real world problems.
3. Understand the food groups and their functions, acquire knowledge on different methods of cooking and apply process of different foods.
4. Use combination of foods in the development of food products. 5. Identify and control adulterants in various foods and evaluate food quality.
5. Use current information Technologies to locate and apply evidence- based guidelines and protocol and get imported with critical thinking to take leadership roles in the field of health, diet and special nutritional needs.

Mapping with Programme Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	M	M	L	S	L	L	S
CO2	S	S	S	M	M	M	S	L	M	S
CO3	S	S	M	S	M	M	S	S	M	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	M	S	S	S	S	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded off)of Course Contribution to Pos	3	3	3	3	3

Core/Major Practical II	Food Science
Paper Code:	Practical:3hrs/week

Objectives:

1. Understand fundamental and applied aspects of Food Science through critical discussion and analysis.
2. Apply interdisciplinary principles to solve practical food-related problems involving nutrient-specific forces.
3. Acquire knowledge of food groups, cooking methods, and their application in food processing.
4. Innovate by combining foods to develop new food products.
5. Utilize current information technologies to apply evidence-based guidelinMapping with Programme Outcomes

Course Content

1. Grouping of foods according to ICMR classification.
2. Measurement of food materials using standard measuring cups, spoons and weighing.
3. Find the percentage of edible portions of foods.
4. Observe the microscopic structure of different starches before and after gelatinization (rice, wheat and corn).
5. Study the effect of temperature, time of heating, concentration, and the addition of sugar and acid on the gelatinization of starch.
6. Prepare recipes using the following processes- Gelatinization, gluten formation and gel formation.
7. Demonstrate the best method of cooking rice.
8. Demonstrate the effect of soaking, hardwater, sodium bicarbonate and papaya on cooking quality of pulses.
9. Prepare recipes using whole gram, dhal, pulse flours, sprouted pulses and cereal pulse combination.
10. Demonstrate the factors affecting coagulation of milk protein.
11. Prepare recipes using milk and its products.
12. Demonstrate the formation of ferrous sulphide in boiling egg and its preventive measures.

13. Demonstrate the effect of addition of acid, fat, salt, water and sugar on the texture of omelettes.
14. Prepare recipes where egg acts as – thickening agent, binding agent, emulsifying agent and enriching agent.
15. Demonstrate the effect of acid, alkali and over cooking on vegetables containing different pigments.
16. Demonstrate the effects of different amounts of water added to vegetables during cooking on flavor and appearance.
17. Demonstrate enzymatic browning in vegetables and fruits and any four methods of preventing it.
18. Prepare the following using fruits and vegetables- salads, soups and curries.
19. Determine the smoking point of any 4 cooking oils.
20. Prepare recipes using shallow fat and deep fat frying methods.
21. Demonstrate the stages of sugar cookery
22. Prepare recipes using various stages of sugar cookery and jaggery.
23. Preparation of any one beverage under the following types- refreshing, nourishing, stimulating, soothing and appetizing.

Reference

1. Srilakshmi, B. *Food Science*, New Age International (P) Ltd. Publishers, Sixth Edition, 2016.
2. Khanna, K., Gupta, S., Seth, R., Mahna, R., Rekhi, T. (2004). *The Art and Science of Cooking: A Practical Manual*, Revised Edition. Elite Publishing House Pvt Ltd.
3. Raina, U., Kashyap, S., Narula, V., Thomas, S., Suvira, Vir, S., Chopra, S. (2010). *Basic Food Preparation: A Complete Manual*, Fourth Edition. Orient Black Swan Ltd.
4. Bamji, M.S., Krishnaswamy, K., Brahmam, G.N.V. (2009). *Textbook of Human Nutrition*, 3rd Edition. Oxford and IBH Publishing Co. Pvt. Ltd.

Course Learning Outcomes:

After successful completion of the course, the student will be able to:

1. Demonstrate skills on determination of edible portion, effect of cooking on volume and weight.
2. Choose appropriate cooking method to conserve nutrients.
3. Acquire skills in different methods of cooking.
4. Understand experimental cookery.
5. Develop recipes by applying knowledge on cooking methods and properties of food

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	M	L	S	L	L	S
CO2	S	S	S	M	M	M	S	L	M	S
CO3	S	S	M	S	M	M	S	S	M	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	M	M	S	S	S	S	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded off)of Course Contribution to Pos	3	3	3	3	3

Title of the Course		**INTRODUCTION TO FASHION DESIGNING**								
Category	**Year I**	**L**	**T**	**P**	**O**	**Credits**	**Inst Hrs**	**Marks**		
	Sem II							**CIA**	**Univ.Exam**	**Total**
SEC	**III**	Y		Y		2	2	25	75	100

Learning Objectives
To enable the students to:
Understand the rudimentary concepts of Fashion Design, Clothing Psychology and Wardrobe Planning.
Acquire knowledge of design elements and colour psychology.

UNIT	CONTENT	HOURS
UNIT I	**Introduction to Fashion Designing:** Terms related to the fashion industry – fashion, style, fad, classic, collection, chic, custom-made, mannequin, fashion show, trend, forecasting, high fashion, fashion cycle, haute couture, fashion director, fashion editor, line, knock-off, avant-garde, bridge, buying house, apparel, fashion merchandising, prêt-à-porter.	**8**
UNIT II	**Design** a) Design - definition and types – structural and decorative design, requirements of a good structural and decorative design. Application of structural and decorative design in a dress, selection and application of trimmings and decorations. b) Elements of design – line, shape or form, colour, size and texture. c) Principles of design - balance – formal and informal, rhythm – through repetition, radiation and gradation, emphasis, harmony and proportion. Application of principles of design in a dress.	**10**
	Practical 1. Application of structural and decorative design in a dress. 2. Application of elements of design in apparel. 3. Application of Principles of design in apparel.	**8**
UNIT III	**Colour** a) Colour - definition, colour theories-prang colour chart and Munsell colour system, b) Dimensions of colour-hue, value, and intensity. c) Colour harmonies- types and their application in dress design.	**7**
	Practical 1. Colour theories- prang colour chart and Munsell colour system. 2. Application of colour harmonies in apparel designing.	**5**

UNIT IV	**UNIT IV** **Figure Drawing and Analysis** a) Basic human proportions, anatomy, and model drawing (8, 10, 12 head theory); Straight, flesh, motion posture. b) Figure analysis and designing dresses for stout figure, thin figure, slender figure, narrow shoulders, broad shoulders, round shoulders, large bust, flat chest, large hip, large abdomen, round face, large face, small face, prominent chin and jaw, prominent forehead.	**8**
	Practical-Model drawing8and10headfigure	**6**
UNIT V	**Wardrobe planning** a) Wardrobe planning for different age groups, factors influencing wardrobe selection, Fashion and season, b) Designing dresses based on different occasions –business meetings, parties/ dinners, evenings/leisure hours, weddings, functions, sports, uniforms for civil service, airhostess, hoteliers, schools–girls and boys.	**8**
	Total	**60**

COURSE OUTCOME

After successful completion of the course, the student will be able to:

CO1. Identify the right choice of colour and design used in apparel design.

CO2. Explain the concepts related to design and colour in apparel design.

CO3. Demonstrate the methodology to be followed in effectively using the principles of design, elements of design, and colour harmonies while designing a garment.

CO4. Identify suitable designs according to the figure of the wearer and the occasion intended.

CO5. Develop skills to draw designs suitable according to body type and plan a wardrobe.

Reference:

1. Sumathi, G.J. (2002). *Elements of Fashion and Apparel Design*. New Age International Publishers, New Delhi.
2. Gini Stephens Frings (1999). *Fashion – From Concept to Consumer*, 6th Edition, Prentice Hall.
3. Gerry Cooklin (2003). *Pattern Grading for Women's Clothes: The Technology of Sizing*, Blackwell Science Ltd., USA.
4. Kaur, N. (2010). *Comdex Fashion Design: Fashion Concepts - Vol. 1*, Dream Tech Press, Delhi.

e-learningResources:

1. https://purushu.com/2010/08/elements-of-design-in-fashion.html
2. https://vanseodesign.com/web-design/color-meaning/
3. http://bieap.gov.in/Pdf/FGMPaperI.pdf
4. http://textilelearner.blogspot.com/2015/07/drafting-procedures-of-line-frock.html
5. http://textilelearner.blogspot.com/2015/06/drafting-procedures-of-ladies-kurti.html

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	L	L	M	M	S
CO2	S	S	S	M	M	L	L	M	M	S
CO3	S	S	S	M	M	L	L	M	M	S
CO4	S	S	S	M	M	L	L	M	M	S
CO5	S	S	S	M	M	L	L	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage(rounded off) Of Course Contribution to POs	3	3	3	3	3

Title of the Course		**LANDSCAPE DESIGN AND ORNAMENTAL GARDEN**								
Category	**Year**	**L**	**T**	**P**	**O**	**Credits**	**Inst Hrs**	**Marks**		
	Sem							**CIA**	**Univ.Exam**	**Total**
Elective / SEC		Y		Y		2	2	25	75	100

Learning Objectives
To enable the students to:
Develop expertise in identifying ornamental flowers, shrubs and trees.
Understand the principles of landscape design and gardening for different types of built environments.
Create designs to integrate landscape and ornamental gardening with the built environment.

UNIT	CONTENT	HOURS
UNIT I	**Landscape Design -** Definition, Importance and Principles of Design in Landscaping. Requirements in Landscape Area- Site & Location, Site Evaluation, Soil Properties, Water Systems, Climatic Conditions and Lighting. Public and Private Garden. Importance of Kitchen Garden.	**6**
	Practical: Identifying and Selecting ornamental plants.	**2**
UNIT II	**Ornamental Garden -** Definition, Components of Garden- Arboretum. Shrubbery, Fernery, Arches and Pergolas, Edges and Hedges. Integral Elements of Garden- Climbers and Creepers, Cacti & Succulents, Herbs, Annuals & Perennials, Flower Borders & Beds. Supplementary Elements of Garden- Ground Covers, Carpet Beds, Bamboo Grooves, Topiary and Garden Adornments.	**6**
	Practical: Practices in preparing home garden designs	**2**
UNIT III	**Styles and Types of Landscape Garden -** Garden Styles: Formal, Informal and Freestyle, Wild Gardening, Types of Gardens: Persian,Mughal, Japanese, English, Italian, Buddha and Spanish garden.	**6**
	Practical: Practices in preparing any one style of garden design.	**2**
UNIT IV	**Special Types of Gardens -** Vertical Garden, Roof Garden, Bog Garden, Sunken Garden, Rock Garden, Clock Garden, Bonsai Gardens, Temple Garden & Sacred Groves.	**6**
	Practical: Project on landscaping	**2**
UNIT V	**Indoor-Outdoor Plants -** Kinds and Classification, Factors Influencing Growth of Plants. Planning and Execution of Landscape Design Based on the Styles and Kinds of Plants.	**6**
	Practical: Visit parks and botanical gardens.	**2**
	Total	**40**

COURSE OUTCOME

After successful completion of the course the student will be able to

CO1: Classify different kinds of indoor and outdoor plants.

CO2: Apply principles of design to create best-suited design in landscaping

CO3: Evaluate the integral and supplementary elements for creating an ornamental garden design

CO4: Assess, understand, and evaluate the different styles and kinds of gardens.

CO5: Create designs in urban landscape applying various styles

References:

1. Alka Singh (2015) *A Colour Handbook: Landscape Gardening*, NIPA Publisher.
2. A.K. Tiwari (2012) *Fundamentals of Ornamentals Horticulture and Landscape Gardening*, NIPA Publisher.
3. Desh Raj (2017) *Floriculture at a Glance*, Kalyani Publishers.
4. G.S. Randhawa, A.N. Mukhopadyay, A. Mukhopadhyay (1998) *Floriculture in India*, Jaideep Publishers, Delhi.
5. Harikrishnan Paliwal (2013) *Ornamental Gardening - A User's Companion*, Jain Publishing Company, New Delhi.
6. M. Kannan, P. Ranchana, S. Vinodh (2016) *Ornamental Gardening and Landscaping*, New India Publishing Agency.

e-Learning Resources:

- http://www.megagriculture.gov.in/PUBLIC/floriculture_objectives.aspx
- http://ncert.nic.in/vocational/pdf/kegr101.pdf
- http://agritech.tnau.ac.in/horticulture/horti_Landscaping_freshflower.html
- https://www.basicsofgardening.com/types-of-garden
- https://www.designcad.com.au/wp/Docs/Landscape%20Design%20and%20CA D.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	M	S	M	S	M	M
CO2	S	M	M	L	S	L	S	M	L	S
CO3	S	L	S	S	S	M	S	L	M	M
CO4	S	L	S	S	S	S	S	S	S	S
CO5	S	S	S	M	M	S	S	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of) of Course Contribution to Pos	3	3	3	3	3

SEMESTER -III

Title of the Course		**HUMAN NUTRITION**								
Category	**Year**	**L**	**T**	**P**	**O**	**Credits**	**Inst. Hrs**	**Marks**		
CORE	**II**							**CIA**	**Univ.Exam**	**Total**
	Sem III									
Core	V	Y		Y		6	5	25	75	100

Learning Objectives
To enable the students to:
Understand the importance of various macronutrients in relation to health.
Highlight dietary guidelines for various nutrients and contribute towards a better lifestyle for Prevention of non-communicable diseases.

UNIT	**CONTENT**	**HOURS**
UNIT I	**Introduction to Nutrition** History of Nutrition– Development of Nutrition as a Science Food as a source of nutrients, definition of nutrients, Balanced diets and dietary guidelines – current concepts Signs and symptoms of adequate, optimum and good nutrition, malnutrition (Undernutrition, and overnutrition), Assessment of Nutritional Status-Anthropometric, Biochemical, Clinical and Dietary aspects.	**7**
	Activity-Plan meals based on My-Plate concepts, Record Height and body Weight, calculate Body Mass Index (BMI) in a small sample and categorize according to BMI.	**3**

UNIT II	**Carbohydrates** Classification, Food Sources, Requirements and Functions of carbohydrates in the body. Review of digestion, absorption and metabolism. Physiological significance of Monosaccharides, Disaccharides and Polysaccharides Glycemic Index, Glycemic load of Foods, and factors affecting it, Hormonal control of Blood sugar. Role of fibre in prevention of non-communicable diseases. **Proteins** Amino acids- Indispensable and dispensable amino acids. Classification, Sources, Requirements and functions of protein. Mutual supplementation of proteins. Protein deficiency-Protein-Energy Malnutrition- Kwashiorkor and Marasmus–etiology, clinical features, treatment and prevention Evaluation of protein quality-PER, BV, NPU and NPR, chemical score. Protein Supplements and Novel Protein sources-Benefits and Health concerns	**17**
	Activity-List foods based on their GI, and Protein supplements available in the market.	**3**
UNIT III	**Lipids** Classification, Sources, Requirements and functions, Essential fatty acids-deficiency, food sources and functions, Healthy and Unhealthy Fats in the diets, Dietary lipids and its relation to cardiovascular diseases. **Energy** Determination of energy value of foods using Bomb calorimeter, Physiological value of foods, relation between oxygen used and calorific value, Direct and Indirect calorimetry direct calorimetry, Respiratory quotient, Components of Energy expenditure-Basal metabolism, factors affecting BMR, Food related thermogenesis, Physical activity Energy requirements for different age groups and for various types of activities.	**17**
	Activity-List healthy and unhealthy sources of fats in one's diet. Learn to estimate BMR.	**3**
UNIT IV	**Fat Soluble Vitamins** Food sources, Requirements, Functions, Effects of deficiency or Toxicity (wherever applicable). **Water Soluble Vitamins** Food sources, Requirements, Functions, Effects of deficiency. Antioxidant role of certain Vitamins in Health promotion	**10**

UNIT V	**Macro minerals** Calcium, Phosphorous, Magnesium, Potassium, Sodium and Chloride- Distribution in the body, functions, food sources, requirements, effects of deficiency and toxicity. **Micro/Trace minerals** Iron, Zinc, Iodine, Selenium, Manganese, Chromium, Fluoride and Copper - Distribution in the body; functions, effects of deficiency, food sources and requirements, Role of Anti-oxidant minerals **Water** As a nutrient, functions, sources, requirements. Distribution of water in the body, exchange of water in the body, composition of body fluids. Water balance, factors regulating it, dehydration, water intoxication.	**15**
	TOTAL	**75**

COURSE OUTCOMES

After successful completion of the course, the student will be able to:

CO1. Define nutrients and terms related to nutrition.

CO2. Describe the sources, recommended allowances of macronutrients, micronutrients, and water.

CO3. Interpret the significance of macro and micro nutrients, and water for maintenance of optimum health.

CO4. Explain the functions, deficiency or toxicity of macro and micronutrients and water.

CO5. Evaluate the role of macronutrients, micronutrients, and water in health and disease.

References:

1. Anderson J. J.B., Root M.M., Garner S.C.(2015)Human Nutrition: Healthy Options for Life. Jones & Bartlett Learning, Massachusetts, USA.
2. Guthrie,H.A.(1989)IntroductoryNutrition.7thed.TimesMirror/MosbyCollegePublishing, St.Louis
3. Insel P., Ross D., McMahon K., Bernstein M. (2016) Discovering Nutrition. 5th Ed., Jones &Bartlett Learning, Massachusetts, USA.
4. Mahan K and Sylvia E. Stump (2000) Krause's Food Nutrition and Diet Therapy, Saunders, USA.
5. Medeiros D. M., and Wildman R. E. C. (2019) Advanced Human Nutrition. 4th Ed., Jones & Bartlett Learning, Massachusetts, USA.
6. Ross A. C., Caballero B., Cousins R. J., Tucker K. L., Ziegler T. R. (2014) Modern Nutrition in Health and Disease. 11th Ed., Wolters Kluwer | Lippincott Williams

&Wilkins, Philadelphia, USA.
7. Sizer F. S. and Whitney E. (2014) Nutrition: Concepts & Controversies. 13th Ed., Wadsworth, Cengage Learning, USA.
8. Whitney, E.R. and Rolfes S.R. (1996) Understanding nutrition. 7th Ed., West Publishing Company, USA.

E -Learning Resources:

- http://www.merck.com/mmhe/seciz/ch155/ch155a.html
- http://www.whereincity/medical/vitamins

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	L	L	M	S
CO2	S	S	S	M	M	M	L	L	M	S
CO3	S	S	S	S	M	M	S	M	M	S
CO4	S	S	S	M	M	M	L	M	M	S
CO5	S	S	S	S	M	M	L	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage(rounded of) of Course Contribution to Pos	3	3	3	3	3

Title of the Course		HUMAN NUTRITION PRACTICAL								
Category CORE	Year II Sem III	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Core	VI			Y		3	3	50	50	100

Learning Objectives
To enable the students to:
Understand the various analytical techniques.
Develop analytical skills required for nutrition research.

CONTENT
• Assessment of Nutritional Status ▪ Body Composition parameters ▪ Body Circumference measurements • Ashing of food and preparation of ash solution
• Estimation of Iron in food - Demonstration • Estimation of calcium in food - Demonstration • Estimation of Vitamin C by Titrimetric method
• Estimation of calorific value of food using the Bomb Calorimeter-Demonstration • Estimation of protein content in food by the Kjeldahl method-Demonstration • Estimation of moisture content of food using Infra-red moisture balance- Demonstration
▪ Estimation of glucose in blood (colorimetric estimation and use of glucometer) ▪ Estimation of hemoglobin in blood
▪ Determination of plasma cholesterol, Triglycerides, HDL and LDL cholesterol (with the use of the semi-auto analyzer) – Demonstration. ▪ Estimation of acid value in oil/fat ▪ Visit to a food analytical lab

COURSE OUTCOMES

After successful completion of the course, the student will be able to:

CO1. Describe the principles and procedures for the various experiments.

CO2.Identify appropriate laboratory procedures suited for the estimation of select nutrients in food and body fluids.

CO3. Estimate select nutrients in food and metabolites in serum.

CO4. Compare the results with standard values and interpret the findings.

CO5. Develop skills to assess nutritional status of individuals and the community.

References:

1. Oser. D.l.(1979) Hawk's Physiological Chemistry. Tata-McGraw Hill Publishing Co., New Delhi
2. Plummer, D.T.(1987) Introduction to Practical Biochemistry. Tata-McGraw Hill Publishing Co., New Delhi
3. Raghuramulu. N., Nair .K.M. and Kalyanasundaram.S.(1983) A Manual of Laboratory
4. Sharma, B.K.(1999).8th Ed. Instrumental Methods of Chemical Analysis. Gel Publishing House.
5. Srivastava, A.K and Jain, P.C.(1986).2nd,Ed. Chemical Analysis: An Instrumental Approach.S Chand and Company Ltd.
6. Techniques. NIN, Hyderabad
7. Varley, H.; Gowenlock, A.H. and Bell, M. (1980). 5thed. Practical Clinical Biochemistry. Heinemann Medical Books Ltd.
8. Winton, A.L. and Winton,K.B.(1999).Techniques of Food Analysis. Allied Scientific

e- Learning Resources:

- http://www.merck.com/mmhe/seciz/ch155/ch155a.html
- http://www.whereincity/medical/vitamins

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
CO 1	S	L	S	M	S	L	M	L	S	S
CO 2	S	L	S	M	S	L	M	L	M	S
CO 3	S	L	S	S	S	L	L	M	M	S
CO 4	S	L	S	M	S	L	L	M	M	S
CO 5	S	L	S	S	S	L	L	M	M	S

Mapping with Programme-Specific Outcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15

Weighted percentage (rounded off) of Course Contribution to Pos	3	3	3	3	3

Title of the Course		**HUMAN DEVELOPMENT**								
Category Elective	**Year II**	**L**	**T**	**P**	**O**	**Credits**	**Inst. Hrs**	**Marks**		
	Sem III							**CIA**	**Univ.Exam**	**Total**
Elective	III	Y		Y		4	4	25	75	100

Learning Objectives
To enable the students to:
Familiarize with the growth process from conception to confinement.
Know the development of an individual from infancy to old age.
Understand the physical, psychological and social development of the individual from infancy to old age.
Develop an awareness of the problems of children, adolescent and exceptional children.

UNIT	**CONTENT**	**HOURS**
UNIT I	**Growth and development** Meaning- growth and development, principles of governing growth and development, developmental task of different stages. Methods of study of human development. **Practical -** preparation of case study - observing various development- physical, motor, cognitive, creative, social, emotional, and intellectual of a particular child.	**15**
UNIT II	**Infancy and Childhood** Characteristics, physical, social, and emotional development, cognitive and language development during infancy, early childhood, and late childhood. Children's play – meaning, types, importance stages. Parental disciplinary Techniques–merits and demerits	**10**

	Practical - Socio-metric study of early adolescents. Analysis of various play techniques.	
UNIT III	**Adolescence** Adolescence –physical and psychological changes, emotional, moral and social development, Problems of adolescence. Delinquency–causes, prevention, and rehabilitation. Educational and vocational guidance, role of family and schools and colleges in guiding adolescence	**15**
	Practical - A survey on Juvenile Delinquency prevalence.	
UNIT IV	**Adulthood and Old Age** Adulthood- Characteristics and developmental tasks, all aspects of development and vocational adjustments. Old age-Characteristics of old age, physical changes, psychological changes. Place of the Aged in Indian Society	**10**
	Practical –Survey on problems of old age.	
UNIT V	**Exceptional Children** Introduction to Children with Special Needs and Identification & Educational Rehabilitation - Gifted children, orthopedically challenged, Mentally retarded, hearing impaired, visually handicapped, Learning disability	**10**
	Practical- Visit to an institution for exceptional children.	
	TOTAL	**60**

COURSE OUTCOMES

After successful completion of the course the student will be able to

CO1. Describe the meaning and principles of Growth & Development

CO2. Explain developmental aspects during infancy, early and late childhood.

CO3. Evaluate developmental aspects during adolescence.

CO4. Identify the developmental tasks during adulthood and old age.

CO5. Introduction to Children with Special Needs and identification & Educational Rehabilitation

References:

1. Hurlock E.B.,(1972).Child Development, New York: McGraw Hill Book company.
2. Hurlock, E.B.,(1995):Developmental Psychology-A Life Span Approach,5th(Ed.) New York: McGraw Hill Book Co.
3. Nanda V.K., (1998): Principles of Child Development, New Delhi: Anmol Publications Pvt. Ltd.
4. Rajammal P.Devadas and Jaya N. Muthu (2002).A Text book of Child Development, New Delhi: Macmillan Publishers.
5. Singh,A.(2015).Foundations of Human Development: A Life Span Approach. New Delhi: Orient Black Swan.
6. Suriakanthi A.,(1997).Child Development–An Introduction, Tamil Nadu: Kavitha Publishers
7. Swaminathan, M (1998).The First Five Years: A Critical Perspective on Early Childhood Care and Education in India. New Delhi: Sage Publications.
8. Suriakanthi, A.,(2009). Child Development. Kavitha Publications, Tamil

e- Learning Resources

i. http://www.wbnsou.ac.in/online_services/SLM/BED/SEM-01_A1.pdf

ii. https://ncert.nic.in/textbook/pdf/kepy104.pdf

iii. https://egyankosh.ac.in/bitstream/123456789/17134/1/Unit-3.pdf

iv. https://www.cukashmir.ac.in/departmentdocs_16/Growth%20&%20Development%20-%20Dr.%20Ismail%20Thamarasseri.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	M	S
CO2	S	S	S	M	S	M	S	S	M	S
CO3	S	S	S	M	S	M	S	S	M	S
CO4	S	S	S	M	S	M	S	S	S	S
CO5	S	S	S	M	S	M	S	S	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of)of Course Contribution to Pos	3	3	3	3	3

Title of the Course		FOUNDATIONS OF BAKING AND CONFECTIONERY								
Category	Year II Semester III	L	T	P	O	Credits	Inst hrs.	Marks		
								CIA	Univ.Exam	Total
SEC	IV	Y				1	2	25	75	100

Learning Objectives
To enable the students to:
Gain insight into the planning and operation of the bakery unit.
Familiarize with the equipment and tools, hygienic practices relating to baking
Understand the role of various ingredients used in the making of breads, cakes, cookies, pastries And various confectioneries
Acquire skills in baking and confectionery with an emphasis on special dietary needs.

UNIT	CONTENT	HOURS
UNIT I	**An Overview of Bakery Industry** Current status and growth of bakery industry in India. Baking– principles, Layout and organization of a bakery unit. Equipment and tools used in baking and confectionery.	6
UNIT II	**Ingredients in Bakery and Confectionery** Ingredients - Flour, Sugar, Shortenings, Egg, Leavening agents-yeast, baking soda, baking powder. Other ingredients- salt, milk, dough improver, oxidizing agents, flavors and colors, nuts, spices and Condiments preserved and candied fruit peels.	6
UNIT III	**Breads and Cakes** **Bread-**ingredients, types of breads, faults and its prevention **Cakes**–ingredients, types of cakes, **c**ake judging, faults and remedies. Different types and techniques of cake decoration -icings and fillings. **Related experience** Preparation of angel food cake, butter cake, sponge cake, Chocolate cake, pound cake.	6

UNIT IV	**Pastries, Cookies and Biscuits** **Pastries-** types of pastries- puff pastry, short crust, phyllo pastry, flaky pastry, choux pastry **Cookies & biscuits**–ingredients, types and processing. **Related experience** Preparation of biscuits, cookies. Preparation of pastries- short crust pastry, flaky pastry, puff pastry, choux pastry.	**6**
UNIT V	**Confectionery and Marketing of Baked Products-** Chocolates-production, types, chocolate decorations Sugar-based confectionery–fudge, fondant, sugar candies. **Related experience** Preparation of plain chocolate, fudge, and fondant.	**6**
	TOTAL	**30**

COURSE OUTCOMES

After successful completion of the course, the student will be able to

CO1. Understand the principles and process of baking and confectionery.

CO2. Acquire knowledge of role of various ingredients used in baking and confectionery.

CO3.Develop skills to design baked goods using alternative healthy ingredients to cater to special dietary needs

CO4. Identify and control faults in baking.

CO5. Enhance entrepreneurial skills in bakery and confectionery to establish a bakery unit.

References

1. John Kingslee (2006) A Professional Textbook to Bakery and Confectionary. New Age International Pvt Limited Publisher, New Delhi.
2. Uttam K Singh (2011).Theory of Bakery and Confectionary-An Operational Approach. Kanishka Publishers and Distributors, NewDelhi.
3. Yogambal Ashok Kumar (2012) Theory of Bakery and Confectionary, PHI publication. NewDelhi.
4. Nicolello, I.and Foote,R (2000). Complete Confectionary Techniques. Hodder and Solution, London.
5. Bakers and Book on Practical Baking (2000) Published by U.S. Wheat Associates, NewDelhi.
6. Dubey.S.C (2002) BasicBaking.4thEdition. Published by the Society of Indian Bakers, NewDelhi.
7. Sarah R. Lebensky, Pricilla et al., (2004) Textbook of Baking and Pastry Fundamentals,

third edition, Pearson Education Ltd.

8. The Culinary Institute of America, Baking & Pastry: Mastering the Art and Craft, John Wiley& Sons, Inc New Jersy.2009.

e- LEARNING RESOURCES

- https://www.youtube.com/watch?v=dfvkplBBO2g
- https://www.lifestyleasia.com/ind/food-drink/dining/bookmark-the-best-baking-youtube-channels-to-bake-like-a-pro/
- www.bakels.in

Mapping with Programme Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO9	PO10
CO 1	S	S	S	S	M	S	M	M	M	S
CO 2	S	S	S	S	M	M	S	M	M	S
CO 3	S	S	S	S	S	S	S	M	S	S
CO 4	S	S	S	M	M	M	L	L	M	S
CO 5	S	S	S	S	S	M	S	S	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO 1	3	3	3	3	3
CO 2	3	3	3	3	3
CO 3	3	3	3	3	3
CO 4	3	3	3	3	3
CO 5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of) Of Course, Contribution to Pos	3	3	3	3	3

SEMESTER-IV

Title of the Course		NUTRITION THROUGH LIFE CYCLE								
Category	Year II Sem IV	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Core	VII	Y		Y		6	5	25	75	100

Learning Objectives
To enable the students to:
Embrace the profound impact of nutrition on growth and development throughout every stage of life.
Learn the principles of effective meal planning to gain valuable insights.
Imperative to comprehend the nutritional requirements of different age groups.
Acquire skills to plan diets for various age groups across the lifecycle.

UNIT	CONTENT	HOURS
UNIT I	**Introduction to meal planning -** Balanced diet, food groups, Food Guide Pyramid (ICMR), Food plate, RDA, factors affecting RDA. Principles of meal planning – steps involved in planning a diet. **Nutrition for Adults** - nutritional requirements, planning balanced diets for adult men and women, promoting healthy lifestyles through a holistic approach.	**15**
UNIT II	**Nutrition during pregnancy**- Physiological demands of pregnancy, nutritional needs, the effect of nutrition on pregnancy outcome, optimal weight gain, nutrition-related problems in pregnancy, complications of pregnancy. **Nutrition during lactation**- Physiology of lactation, nutritional requirements, concerns of breast-feeding mothers.	**15**
UNIT III	**Nutrition during infancy**- Growth and development, growth standards, food and nutritional requirements, breastfeeding, artificial feeding, low birth weight babies, complementary feeds. **Nutrition for preschool children**- Growth and development, food and nutritional requirements, eating habits and food behaviors, nutrition-related problems- PEM, VAD and their dietary interventions.	**15**

UNIT IV	**Nutrition for school children**- Growth pattern, nutritional requirement, importance of healthy snacks, factors affecting eating habits, school lunch. **Nutrition during adolescence-** Growth and development, nutritional requirements, food habits, nutritional problems – obesity, underweight, anaemia and eating disorders.	**15**
UNIT V	**Nutrition for old age-** Physiological changes in elderly, food and nutritional requirements, nutritional and health concerns in old age, healthy lifestyle.	**15**
	PRACTICAL 1. Preparation of Complementary feed. 2. Planning and preparation of diets for different activitylevels and income groups. a. Pre-school child b. School-going children c. Adolescents d. Adult e. Expectant mother f. Nursing mother g. Old age 3. Planning and preparation of diets (low and mediumcost) for deficiency diseases- a. PEM b. Vitamin A deficiency c. Nutritional anemia 4. Packed lunch for school-going children	**15**
	TOTAL	**90**

COURSE OUTCOMES

After successful completion of the course the student will be able to

CO1. Explain the physiological basis for nutritional needs through the human lifecycle
CO2. Identify nutrition-related concerns and deficiency disorders at every stage of the lifecycle**CO3**. Discuss appropriate dietary guidelines for various age groups
CO4. Develop Indigenous, value-added and low-cost complementary feeds.
CO5. Demonstrate skills to plan and prepare appropriate and sustainable diets fordeficiency diseases

REFERENCE BOOKS

1. Srilakshmi B. (2011) Dietetics, sixth edition, New age Publishing Press, New Delhi.
2. Gopalan,C., Ramanathan, P.V. Balasubramanian, S.C. (2001) Nutritive value of Indian foods, NIN, Hyderabad.
3. Longvah T, Ananthan R, Bhaskar K, Venkaiah K. (2017) Indian Food Composition Tables, National Institute of Nutrition.
4. Abraham S, Nutrition through Lifecycle. (2016) 1st edition, New Age International Publishers, New Delhi.
5. Stacy N, William's Basic Nutrition and Diet Therapy. (2005) 12th edition, Elsevier publications, United Kingdom.
6. Whitney EN and Rolfes SR, Understanding Nutrition. (2002) 9th edition West/Wordsworth, London.
7. Groff JL, Gropper SS, Advanced Nutrition and Human Metabolism.(2000) 3rd edition, West / Wadsworth, United Kingdom.
8. Cataldo, DeBruyne and Whitney, Nutrition and Diet therapy– Principles and Practice.(1999) 5th edition, West/ Wadsworth, London.

e-LEARNING RESOURCES

- http://vikaspedia.in/health/nutrition/dietary-guidelines-1/dietary-guideline-1
- https://www.nhp.gov.in/healthlyliving/healthy-diet
- https://motherchildnutrition.org/india/complementary-feeding-guidelines.html
- http://vikaspedia.in/health/nutrition/dietary-guidelines-1/diet-for-children-and-adolescents
- https://motherchildnutrition.org/india/complementary-feeding-guidelines.html
- https://sol.du.ac.in/mod/book/view.php?id=1422&chapterid=1288

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	M	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	S	M	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of) of Course Contribution to Pos	3	3	3	3	3

Title of the Course		NUTRITION THROUGH LIFE CYCLE PRACTICAL								
Category	Year II	L	T	P	O	Credits	InstHrs	Marks		
								CIA	Univ.Exam	Total
	Sem IV									
Core	VIII	Y		Y		3	3	50	50	100

Course Content

1. Display raw and cooked food materials according to the exchange lists given below. Record their nutritive value. Milk exchange list, Meat exchange list, Pulse exchange list, Cereal exchange list, Vegetable-A exchange list, Vegetable-B exchange list, Fruit exchange list and Fat exchange list.
2. Prepare and display one serving of common cooked foods given below. Record their weight and nutritive value. Cereal preparations, pulse preparations, vegetable preparations, fried snacks, non-vegetarian preparations, bakery products, chutneys, and sweets.
3. Planning, preparing and serving a meal for low-income family, middle-income family and high-income family.
4. Planning, preparing and serving a meal for a pregnant woman in first, second and third trimesters.
5. Planning, preparing and serving a meal for a lactating woman (0-6 months and 6-12 months).
6. (a) Planning, preparing and serving a meal for an infant. (b) Planning and preparing indigenous weaning mixes.
7. Planning, preparing and serving a meal for a preschooler.
8. Planning, preparing and serving a meal for a school-going child (a boy and a girl).
9. (a) Planning, preparing and serving a meal for an adolescent. (b) Planning and preparation of any five packed lunches.
10. Planning, preparing and serving a meal for an adult (sedentary, moderate and heavy worker).
11. Planning, preparing and serving a meal for an old-age person.

Reference

1. Srilakshmi,B. Dietetics, New Age International, P.Ltd., New Delhi, 2018.
2. Dietary Guidelines of Indians–A Manual National Institute of Nutrition, Hyderabad, 2015.
3. Dietary Guidelines of Indians–A Manual National Institute of Nutrition, Hyderabad, 2011

Title of the Course		FIBRE TO FABRIC								
Category	Year II Sem IV	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	External	Total
Elective	IV	Y		Y		4	4	25	75	100

Learning Objectives
To enable the students to :
Understand the concepts in textiles, the properties of textile fibre, yarn and fabric.
Acquire knowledge about different types of fabric, make wise selection of textiles and its contribution to clothing and interior.

UNIT	CONTENT	HOURS
UNIT I	**Introduction to Textile -** Introduction, Terms and definition related to textiles, importance of textiles.	10
UNIT II	**Textile fibres** a) Properties of fibers- primary and secondary properties b) Classification of fibres – natural and man-made fibres. c) Manufacturing processes/Cultivation, properties and uses of Cotton, Silk, Wool, Polyester, Rayon and Nylon.	10
	Practical - Identification of fibres.	
UNIT III	**Yarns** a) Definition of yarn b) Spinning process- Conventional yarn spinning - Cotton system and Unconventional yarn spinning. c) Types of yarn- spun yarns, filament yarns, sewing threads, simple and complex yarns. d) Properties of yarn-Yarn twist, Yarn count/ number (definition, unit of yarn count), e) Texturization - types	15
	Practical - Identification of yarns	
UNIT IV	**Woven Fabric Construction** a) Weaving- Warp and weft yarns, grain line, selvedge and Fabric count. b) Parts of a simple loom and basic weaving operations. c) Types of weaves- Basic weaves (Plain weave, variations in plain weave, Twill weave, variations in Twill weave, Satin weave and Sateen weave) Decorative weaves (Dobby weave, Jacquard weave, Leno weave, Surface figure weave, Pile, Double weave)	10

	Practical - Identification of weaves – Collection of samples for basic weaves.	
UNIT V	**Other fabric construction** a) Knitted fabric- warp and weft knitting b) Non-Woven fabric- method of manufacture – web formation- parallel laid, cross laid, random laid, high velocity sprayed. Types- bonded fabrics, felts and care of non-woven, Other fabric construction process- Braided fabric, Net, Laces, Film fabric, tufted fabric.	**15**
	Practical - Field visits to various textiles units	
	Total	**60**

COURSE OUTCOMES

After successful completion of the course, the student will be able to:

CO1. Describe the essential properties of textile fibres, yarns and the basic fabric constructiontechniques

CO2. Explain the manufacturing process of man-made fibres, yarn construction and fabricconstruction.

CO3. Classify textile fibres, yarns and fabrics.

CO4. Categorize the fibres, yarns and fabrics for its appropriate end use.

CO5. Assess the sequence of developing fibres into yarns and fabric

Reference:

1. Corbman, B.P (1975) Textiles fiber to fabric. Mc. Graw hill, New York.
2. Klein W.D A Practical Guide to Ring Spinning Textile Institute, Manchester
3. Marjory L. J (1977) Introductory Textile Sciences Holt Reinhart and Winston, New York
4. Sara.K.J, Langford.A (2002) Textiles. 9th ed Prentice Hall, London
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6. Robert, R. & Mather, R. H. (2015). The Chemistry of Textile Fibers. Cambridge: RSCPublishers.
7. Sekhri, S. (2011) Textbook of Fabric Science: Fundamentals to Finishing. India: PHI Learning Pvt. Ltd.
8. Smith, J.L. (2015).Textile Processing: Printing Dyeing Finishing. Chandigarh: AbhishekPublication.

e-learning Resources:

1. http://fibersource.com/f-tutor/rayon.htm
2. http://www.fibersource.com/f-tutor/nylon.htm

3. http://www.ehow.com/facts 5016460 parts-loom.html
4. http://www.fabrics-manufacturers.com/

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	L	L	M	M	S
CO2	S	S	S	M	M	L	L	M	M	S
CO3	S	S	S	M	M	L	L	M	M	S
CO4	S	S	S	M	M	L	L	M	M	S
CO5	S	S	S	M	M	L	L	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of)of Course Contribution to Pos	3	3	3	3	3

Title of the Course		FUNDAMENTALS OF RESEARCH IN NUTRITIONAL SCIENCES								
Category	**Year II** **Sem IV**	**L**	**T**	**P**	**O**	**Credits**	**Inst Hrs**	**Marks**		
								CIA	**Univ.Exam**	**Total**
SEC	V	Y				1	2	25	75	100

Learning Objectives
To enable the students to :
Understand basic concepts of research methodology.
Use simple statistical methods for analysis of data.
Develop skills to carry out a project and present a report

UNIT	CONTENT	HOURS
UNIT I	**Introduction to research** Research- Meaning, objectives, significance. Research problem- Definition and selection of research problem. Research design –Types of research design Method of sampling - probability and non-probability sampling – Merits and demerits. Determining sample size	**6**
UNIT II	**Data Collection** Primary and secondary data, selection of appropriate method for data collection. Tools used for data collection- Questionnaire and Interview schedule.	**6**
UNIT III	**Coding and tabulation of data** Data entry and computation, Tabulation of data – parts of the table Presentation of data- use of bar graph and pie chart	**6**

UNIT IV	**Basic statistical tools for analysis and interpretation** Measures of central tendency – Mean, Median, Mode. Variations-the range and standard deviation Correlation –Karl Pearson's coefficient of correlation. Test of significance- Student's t test	**6**
UNIT V	**Report writing** Steps in report writing, Layout of a report. Bibliography-citing references-any one style. **EXPERIENTIAL LEARNING** Carry out a small survey, code and tabulate data and present data using tables and graphs. Interpret data using simple statistical tools and present report following rules for report writing.	**6**
	TOTAL	**30**

COURSE OUTCOMES

After successful completion of the course, the student will be able to:

CO1. Define terms associated with conduct of research.

CO2. Explain research design, methods of research, collection, tabulation andpresentation of data.

CO3. Choose a sampling method and identify the appropriate statistical methods.

CO4. Analyze the data and draw conclusions.

CO5. Evaluate data, draw inferences and prepare a report**.**

References:

1. Goode, WJ and Hatt, PK (1981) Methods in Social Research, McGrawHill International Editions, Sociology Series.
2. Gupta, S.P. (2019) Statistical methods. 46th ed. Sultan Chand and Co, New Delhi.
3. Kerlinger F. N. and Lee, H.B. (2000) Foundations of Behavioura Research 4thEd. Harcourt College Publishers.
4. Kothari, C.R. (2019). Research methodology methods and techniques, NewAge International publishers, New Delhi.

5. Kumar, R. (2005) Research Methodology: A Step-by-Step Guide for Beginners.Sage Publications, New Delhi.

e-Learning Resources:

- http://www.socialresearchmethods.net/tutorial/mugo/tutorial.htm
- https://ebooks.lpude.in/library_and_info_sciences/MLIS/year_1/DLIS401_METHODOLOGY_OF_RESEARCH_AND_STATISTICAL_TECHNIQUES.pdf
- https://mfs.mkcl.org/images/ebook/Fundamental%20of%20Research%20Methodology%20and%20Statistics%20by%20Yogesh%20Kumar%20Singh.pdf

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10
CO1	M	S	M	M	M	S	M	M	M	S
CO2	S	S	S	S	M	S	L	S	M	S
CO3	S	S	S	S	M	M	S	S	M	S
CO4	S	S	S	S	M	M	L	M	M	S
CO5	S	S	S	S	S	S	S	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of) of Course Contribution to Pos	3	3	3	3	3

SEMESTER-V

Title of the Course		NUTRITIONAL BIOCHEMISTRY								
Category	Year III	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
	Sem V									
Core	IX	Y		Y		4	5	25	75	100

Learning Objectives
To enable the students to:
Study the basic concepts of metabolism of proximate principles and others.
To learn the metabolic pathways of nutritional significance.

UNIT	CONTENT	HOURS
UNIT I	**Biological oxidation and Enzymes** Biological oxidation, Electron transport chain and Oxidative Phosphorylation. Enzymes – Definition, Types, Mechanism of action, Factors affecting enzyme activity, Coenzyme, Role of b vitamin as coenzyme. Free radicals – Definition, Formation in biological systems. Antioxidants – definition, Role of antioxidants in prevention of degenerative disorders	10
UNIT II	**Metabolism of Carbohydrates** Classification, Glycolysis, The Citric Acid Cycle Glycogenesis, Glycogenolysis, Gluconeogenesis, The Hexose Monophosphate Shunt and bioenergetics.	10
UNIT III	**Metabolism of Protein** Classification of amino acids, Oxidative Deamination, decarboxylation, transamination and transmethylation of amino acids, urea cycle, biosynthesis of non-essential amino acids, catabolism of essential amino acids. Protein biosynthesis.	10
UNIT IV	**Metabolism of Lipids** Classification of fatty acid, Biosynthesis of fatty acids, beta-oxidation of saturated fatty acids, ketone bodies. Essential fatty acids – types and functions. Lipoproteins – classification and function. Biosynthesis of cholesterol.	15
UNIT V	**Intermediary Metabolism, Nucleic acid & Recent concepts** Overview of intermediary metabolism of carbohydrates, protein and lipid. Hormonal regulation of carbohydrate, protein and fat metabolism Structural components and functions of nucleic acid, Structure of DNA, RNA types and functions. Recombinant DNA technology, Metabolism of Xenobiotics, Nutrigenomics	15

	Practical Qualitative tests for sugars-glucose, fructose, lactose, maltose and glucose. Quantitative estimation of reducing sugar. Qualitative tests for proteins Demonstration Experiments. Estimation of total nitrogen in foods (Micro or Macro Kjeldahl methods) Determination of Iodine value Determination of fat content in food using Soxhlet method.	**15**
	TOTAL	**75**

COURSE OUTCOME

After successful completion of the course, the students will be able to

CO1. Describe the role of enzymes and co-enzymes in biological oxidation.

CO2. Explain the metabolism and regulation of carbohydrates, lipids and proteins

CO3. Analyze the integration of carbohydrate, lipid and protein metabolism

CO4. Comprehend the significance of recent biochemical concepts namely xenobiotics, recombinant DNA technology and Nutrigenomics.

CO5. Discuss the structure and functions of nucleic acids.

References

1. Albanese, A. (Ed.). (2012). Newer methods of nutritional biochemistry V3: With applications and interpretations. Elsevier.
2. Bettelheim, F. A., Brown, W. H., Campbell, M. K., & Farrell, S. O. (2009). General, Organic & Biochemistry. Brooks/Cole Cengage Learning.
3. Champe, P. C., Harvey, R. A., & Ferrier, D. R. (2005). Biochemistry. Lippincott Williams & Wilkins, 6th Edition, Wolters Kluwer, London.
4. Harvey, R. and Ferrier, D., Lippincott's Illustrated Reviews: Biochemistry, 6th edition, Lippincott Williams and Wilkins, Philadelphia.
5. Lehninger, A.L. (1993) Biochemistry. 3rd ed. CBS Publishers, New Delhi.
6. Lieberman, M., & Ricer, R. E. (2009). Lippincott's Illustrated Q&A Review of Biochemistry. Lippincott Williams & Wilkins.
7. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2000): 25th Ed. Harpers Biochemistry.Macmillan Worth publishers.
8. Shanmugham Ambika (1985) Fundamentals of Bio-chemistry to Medical Students. NVA Bharat Printers, and Traders 56, Peters Road, Madras-86.

e- LEARNING RESOURCES:

- https://www.udemy.com/share/1027yA/
- https://www.classcentral.com/course/swayam-biochemistry-5229
- https://www.classcentral.com/course/edx-biochemistry-biomolecules-methods-and-mechanisms-12585
- https://www.classcentral.com/course/swayam-experimental-biochemistry-12909
- https://youtu.be/y6YGZfcAegw

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10
CO1	S	S	S	M	M	M	L	L	M	S
CO2	S	S	S	M	M	M	L	L	M	S
CO3	S	S	S	S	M	M	S	M	M	S
CO4	S	S	S	S	M	M	L	M	M	S
CO5	S	S	S	S	M	M	L	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of) of Course Contribution to Pos	3	3	3	3	3

Title of the Course		DIETETICS								
Category	Year III Sem V	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Core	X	Y				4	5	25	75	100

Learning Objectives
To enable the students to :
Understand the causes and symptoms and dietary management of various disease conditions.
Gain comprehensive knowledge on principles and planning of therapeutic diets
Acquire knowledge on nutritional needs of sick persons and develop aptitude and skills for taking up dietetics as a profession

UNIT	CONTENT	HOURS
UNIT I	**Concept of diet therapy and role of dietitian** Principles of therapeutic diets, modification of normal diet, classification of therapeutic diets. Different feeding techniques -enteral and parenteral feeding. –Indications, contraindications and complications, Dietitian- Definition, role and code of ethics, classification of dieticians in nutritional care	**20**
UNIT II	**Diseases of Gastrointestinal tract** Etiology, symptoms, dietary management of: Diarrhoea, dysentery, and constipation Peptic ulcer, irritable bowel syndrome & inflammatory bowel disease (ulcerative colitis), Crohn's disease and celiac disease	**20**
UNIT III	**Diseases of liver, gall bladder & febrile conditions** Etiology, symptoms, dietary management of: Disease of liver & Gall bladder- Hepatitis, cirrhosis, gall stones Febrile conditions - Acute & Chronic fevers (Typhoid, influenza, malaria, tuberculosis, COVID)	**10**
UNIT IV	**Metabolic disorders** Etiology, symptoms, and dietary management of: Obesity and PCOS Diabetes mellitus- types, symptoms and metabolic changes, treatment with diet and insulin, GI, GL, carbohydrate counting, artificial sweeteners and complications Cardiovascular diseases – hypertension, atherosclerosis.	**10**

UNIT V	**Diseases of excretory system and cancer** Etiology, symptoms, dietary management of: Glomerular nephritis Nephrotic syndrome, urinary calculi, renal failure. Cancer – Risk factors, modification of diet in cancer, nutritional problems of cancer therapy Role of antioxidants in prevention of degenerative diseases.	**15**
	SELF STUDY/EXPERIENTIAL LEARNING Conduct a group discussion to understand various diseases andpresentation of case-studies. Planning of various low-cost recipes using locally available ingredients for dietetics real-world Conducting a nutrition exhibition to display sample menus for variousdiseased conditions for different sections of society.	
	Suggested Activity Internship in dietary unit of a hospital	
	TOTAL	**75**

COURSE OUTCOMES:

After successful completion of the course the student will be able to:

CO1. Explain the concepts of diet therapy and role of dietitian.

CO2. Identify the etiology symptoms and principles of dietary management for various diseases.

CO3. Apply the principles of dietetics to plan therapeutic diets for variousdisease conditions.

CO4. Examine the physiological condition of the individual and explain the role offoods and diet in treating that condition.

CO5. Summarize the causes, symptoms of a disease/ disorder and design a suitable diet plan using principles of nutritional management and recommend dietary allowances.

References:

1. Antia F. P. (2002), Clinical Dietetics and Nutrition, 4th edition, Oxford University Press, Chennai.
2. Guthrie H. A, Picciano M. F (1995) Human Nutrition, Mosby, St. Louis Missouri.
3. Joshi. S.A. (2005), Nutrition and Dietetics, Tata Mc Graw-Hill PublishingCompany Limited, New Delhi
4. Passmore R. and Davidson S. (1986) Human Nutrition and Dietetics. Liming stone publishers
5. Sharma.A.(2017), Principles of Therapeutic Nutrition and Dietetics, CBS Publishers &Distributors Pvt Ltd, New Delhi.
6. Srilakshmi B, Dietetics (2019),8th edition, New Age International Publishing Ltd,New Delhi
7. Williams S.R, (2000) Basic Nutrition and Diet Therapy, Mosby publication.

e-learning resources:

- https://www.cdss.ca.gov/agedblinddisabled/res/VPTC2/9%20Food%20Nutrition%20and%20Preparation/Types_of_Therapeutic_Diets.pdf
- http://www.differencebetween.net/science/health/difference-between-enteral-and-parenteral-nutrition/
- https://www.medicinenet.com/difference_between_diarrhea_and_dysentery/article.html
- https://my.clevelandclinic.org/health/diseases/15587-inflammatory-bowel-disease-overview

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	L	L	M	M	M	L	S
CO2	S	M	S	M	L	S	M	S	M	S
CO3	S	S	S	M	L	S	M	S	L	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	M	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	3	3
CO2	3	3	2	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	13	15	15
Weighted percentage (rounded of)of Course Contribution to Pos	3	3	3	3	3

Title of the Course		DIETETICS PRACTICAL								
Category	Year III Sem V	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Core	XI			Y		4	5	50	50	100

Learning Objectives
To enable the students to :
Gain knowledge and develop skills and techniques in planning and preparation of therapeuticdiets.
Plan diets based on the medical history of the patients and nutritional assessments –anthropometric measurements
Calculate the nutrient content of diets

CONTENT
Planning, Calculation of nutrient content, Preparation andService of diets for: Tube feeds for special conditions Fevers – Typhoid and Tuberculosis
Planning, Calculation of nutrient content, Preparation and Service of diets for: Peptic Ulcer, Diarrhoea and constipation
Planning, Calculation of nutrient content, Preparation andService of diets for: Viral hepatitis Cirrhosis of liver
Planning, Calculation of nutrient content, Preparation andService of diets for: Obesity, Diabetes Mellitus,Atherosclerosis
Planning, Calculation of nutrient content, Preparation andService of diets for: Hypertension, Chronic kidney disease

SELF-STUDY/EXPERIENTIAL LEARNING

1. Initiate a diet counseling center in the institution for students, teaching, andnon-teaching faculty.
2. Conduct exhibitions to display diets for various disease conditions.
3. Prepare a pamphlet indicating foods to be included/avoided/ restricted indifferent disease conditions.
4. Commemorate days such as National Nutrition Week, World Food Day, World Diabetes Day and World Heart Day and organizeSeminars and awareness programs.

COURSE OUTCOMES:

After successful completion of the course the student will be able to:

CO1. List the principlesof dietary management for various conditions.

CO2. Calculate the nutrient content of the diet for various conditions and compare it.with

the recommended allowances

CO3. Apply the principles of dietary management in planning diets for various conditions.

CO4. Justify choice of foods, preparation methods, content, and consistency for different disease conditions

CO5. Plan and prepare diets for various disease conditions.

REFERENCES:

1. Antia, F.B. (2010), Clinical Nutrition and Dietetics, Oxford University Press, London.
2. IDA. (2018), Clinical Dietetic Manual, 2nd edition, Elite Publishing House, New Delhi
3. Sri Lakshmi. B.,(2019) Dietetics, 8th Ed, New Age International Pub. Co, Chennai.
4. Vimala V. (2010). Advances in Diet Therapy, 1st Ed., National Institute of Nutrition – Hyderabad.
5. Williams S.R, (2000) Basic Nutrition and Diet Therapy, Mosby publication.
6. Sharma.A.(2017), Principles of Therapeutic Nutrition and Dietetics, CBS Publishers & Distributors Pvt Ltd, New Delhi.
7. Bajaj .M (2019) Diet Metrics: Handbook of Food Exchanges, Norton Press, Chennai.

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	L	L	L	M	L	L	S
CO2	S	S	S	S	S	S	M	M	M	S
CO3	S	S	S	S	S	S	S	S	L	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	2	2	3
CO2	3	3	3	3	3
CO3	3	3	2	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	13	14	15
Weighted percentage (rounded of)of Course Contribution to Pos	3	3	3	3	3

CORE COURSE – XII PROJECT VIVA-VOCE

Guidelines: 1. It shall be a Group activity with 4-6 students in each group.

2. A Group project report should be submitted at the end of 5th semester, during the practical examination.

3. The Group Project Report shall have a minimum of 25 to 100 pages.

4. Evaluation scheme for the Project - (50:50 for Internal: External)

5. The external examiner will evaluate the external 50 marks.

COURSE OUTCOME

CO1: The project allows students to experience real research.

CO2: Students will have greater problem-solving skills.

CO3: Students will gain a better understanding of research methods.

CO4: A deeper understanding of the discipline of the research.

Title of the Course		**FOOD SERVICE MANAGEMENT**								
Category	**Year III**	**L**	**T**	**P**	**O**	**Credits**	**Inst Hrs**	**Marks**		
								CIA	**Univ.Exam**	**Total**
	Sem V									
Elective	V	Y		Y		3	4	25	75	100

Learning Objectives
To enable the students to :
Gain basic understanding of organizing and managing a food service institution.
Impart knowledge regarding purchase and storage of food to ensure quality service.
Familiarize with the layout of food service outlet and food service equipment.

UNIT	**CONTENT**	**HOURS**
UNIT I	**Organisation Management** Types of Organisation, Management - definition, principles, functions and tools of management-Tangible tools-organization chart, job description, job specification, job analysis, work schedule, Intangible tools-budget, leadership styles, decision making, and communication skills.	**10**
UNIT II	**Personnel Management** Definition, functions of personnel department, Recruitment-sources, Selection- steps, Induction - definition, methods, uses, Training- advantages, methods, supervision, performance appraisal, promotion, demotion, transfer, retirement, terminationand dismissal of employees. Labor laws pertaining to the food service establishment.	**10**

UNIT III	**Food Management** **Food purchase** – purchasing process, functions of food buyer, methods of buying open market, formal, negotiated, wholesale, blanket order, contract. **Storage in food service** – types of stores, storeroom management, purchase, stores records- Physical and perpetualinventory order form, requisition slip, invoice, goods received book, stock book, bin card, stores ledger.	**10**
UNIT IV	**Plant and equipment management** **Planning of food service unit** - Layout of a food service, planningof storage, production and service areas, concepts of workflow and work simplification technique. Environmental hygiene-pest control-types of pests and pest control methods; garbage disposalmethod. **Safety** in food service institution - Accidents - causes and prevention. **Equipment** in food service - Classification of equipment, factors affecting selection of equipment.	**15**
UNIT V	**Financial Management** **Book- keeping** – definition, advantages of double entry system,books of accounts– an introduction. **Costing and Cost control**: Basic cost concepts – elements of cost (material, labour, overheads), behavior of cost (fixed, variable, semi-fixed / semi-variable), methods of costing (Dish, meal, menucosting & costing for events), cost control, concept of break-even, break-even point. **Pricing** - factors affecting pricing, pricing methods (cost plus,factor, rate of return, subsidy, discount).	**15**
	Total	**60**

SELF STUDY/EXPERIENTIAL LEARNING

1. Group discussion and power point presentation, job descriptions, recruitment advertisements in print media / online sites.
2. Prepare resumes for job interview and conducing of mock interview.
3. Role plays of different leadership skills.

COURSE OUTCOMES

After successful completion of the course the student will be able to:

CO1. Apply the principles, tools of management to ensure for effective functioning of organization.

CO2. Develop the managerial skills to select, train, and appraise human resources.

CO3. Recognize the use and operation of equipment and acquire skills in the selection

of equipment, and sketch sample layout of the food service units.

CO4. Evaluate and implement food safety and environmental sanitation in the workspace.

CO5. Use the basic concept of bookkeeping and elements of cost to assess the financial viability of the organization.

References:

1. Andrews and Sudhir. (2000). Introduction to Hospitality Industry, Tata-McGraw Hill Pub. Co., New Delhi.
2. Dhawan and Vijay. (2001). Food and Beverage Service, Frank Boss and Co, NewDelhi.
3. Foskett David. (2011). The Theory of Hospitality and Catering, Hodder Education, London.
4. Lillicarp, D.R. and Cousins, J. (2010). Food and beverage Service, 8th edition, Hodder Education, London.
5. Sethi, Mohini, Malhan, Surjeet. (2015). Catering Management – An Integrated Approach, 3rd ed, New Age International Publishers, New Delhi.

6. Suganthi, V and Premakumari, C. (2017). Food Service Management, Dipti Press (OPC) Pvt. Ltd, Chennai.
7. Verghese and Brian. (2000). Professional Food and Beverage Service Management, Macmillan India Ltd., India.

e- Learning Resources

- http://open.lib.umn.edu/principlesmanagement/chapter/1-5-planning-organizing-leading-and-controlling-2/
- https://www.managementstudyguide.com/management_functions.htm
- http://www.bngkolkata.com/web/food-and-beverage-service-equipment/
- http://www.fcijammu.org/food/food/orders/F&B%20Service-Unit-2.pdf
- https://www.scribd.com/doc/29362905/Equipments-in-Food-amp-Beverage

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	M	M	M	S
CO2	S	S	S	S	S	M	S	S	S	S
CO3	S	S	S	S	S	M	S	M	M	S
CO4	S	S	S	S	S	M	S	M	M	S
CO5	S	S	S	S	S	M	M	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of) of Course Contribution to Pos	3	3	3	3	3

Title of the Course		FOOD PRODUCT DEVELOPMENT								
Category	Year III Sem V	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Elective	VI	Y		Y		3	4	25	75	100

Learning Objectives
To enable the students to :
Understand the steps involved in new food product development.
Learn about consumer preferences and market trends.
Understand concepts about subjective and objective evaluation of new product.

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UNIT	CONTENT	HOURS
UNIT I	**Introduction to New Food Product development** Food products, definition, Classification, Characterization Reasons for new food product development Factors shaping new product development-Social concerns, health concerns impact of technology and marketplace influence. Utilizing traditional foods, unconventional sources, functional, nutraceuticals foods for new product development Market Survey to identify the new product.	7
UNIT II	**Product Development:** a) New Product Development Team b) Sources of New Product ideas c) Designing new product d) Stages of product development e) Causes of product failure/ success in product development	8

UNIT III	**Product Evaluation and Quality Control** Quality attributes – physical, chemical, nutritional, microbial, and sensory indicators Principles and types of assessment of quality. Subjective and objective methods of evaluation of product quality. Role of sensory evaluation in consumer product acceptance; requirements for sensory analysis - Sensory panel Evaluation of New Product: Nutritional evaluation (estimation of relevant parameters) Evaluation of shelf-life of the product (testing for appropriate quality parameters- physical, chemical, microbiological and nutrient content, acceptability studies) Food safety standards and regulations: Domestic regulations FSSAI, AGMARK, BIS Quality management systems in India; (ISO9001,	**15**

	ISO22000); Global Food safety Initiative; International food standards Various national and international organizations dealing with inspection, traceability and authentication, certification, and quality assurance.	
UNIT IV	**Packaging and labelling** Packaging Material-types; factors affecting type of packaging material used; Aseptic packaging, modified atmosphere packaging, Controlled Atmosphere Packaging and active packaging. Packaging and Labelling of the product – Packaging design, graphics and labelling – FSSAI regulations for food labelling.	**10**
UNIT V	**Marketing the product** Product life cycle Costing the product and determining the sales priceAdvertising and test marketing the product	**10**
	PRACTICAL 1. Survey of types of convenience foods / novel foods inthe market or Survey of markettrends and consumer behavior in the food sector. 2. Sensory analysis: conduct sensory tests for basic tastes and sensory attributes of products. 3. Basic evaluation of shelf -life acceptability and quality of a food product. 4. Evaluate consumer responses utilizing prepared food products, analyse and present data on acceptability of product based on sensory evaluation or 5. Project Development of a new food product, standardization, selection of suitable packaging and preparing label with product information.	**10**
	TOTAL	**60**

COURSE OUTCOMES

After successful completion of the course the student will be able to:

CO1. Define the basic concepts in food product development, packaging, costing advertising and marketing.

CO2. Explain the need, characteristics and factors influencing the new product;test-marketing, packaging and quality attributes.

CO3. Illustrate the quality attributes, food safety, packaging and labellingregulations, and marketing tools for a food product.

CO4. Analyse the significance of packaging, labelling, advertising, costing and quality concepts for the new food product

CO5. Develop a new food product and evaluate its quality and acceptability.

References:

1. Earle M., Earle RL. and Anderson A. (2001) Food Product Development: Maximizing success, Woodhead Publishing Ltd, Food Series, No. 64,2001.
2. Fuller, GW (2011). New food product development: From concept to marketplace.3rded. New York, NY: CRC Press
3. Lawless HT and Klein BP (1991) Sensory Science Theory and Applications in Foods. Marcel Dekker Inc.
4. Moskowitz HR, Saguy IS and Straus T (2009). An Integrated approach to New FoodProduct Development. ed. New York, NY: CRC Press
5. Paine FA, Paine HY (Eds.) (1992) A handbook of Food Packaging (2nd ed.),Blackie Academic and Professional.
6. Sharma A (2018). Food product Development. CBS Publishers & Distributors Pvt Ltd

e-Learning Resources:

- https://www.destechpub.com/wp-content/uploads/2015/01/Methods-for-Developing-New-Food-Products-preview.pdf
- https://www.youtube.com/watch?v=iL0iIGpa4vg
- https://www.youtube.com/watch?v=5kOXUH8kaCs

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO9	PO10
CO1	S	S	M	M	M	L	S	L	M	S
CO2	S	S	S	S	M	M	S	M	M	S
CO3	S	S	S	M	M	M	S	M	M	S
CO4	S	S	S	S	M	M	S	S	M	S
CO5	S	S	S	M	M	M	S	S	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	1	3	3
CO2	3	3	3	3	3
CO3	3	3	2	3	3
CO4	3	3	3	3	3
CO5	3	3	1	3	3
Weightage	15	15	10	15	15
Weighted percentage (rounded of) of Course Contribution to Pos	3	3	2	3	3

Title of the Course		INTERNSHIP / INDUSTRIAL VISIT / FIELD VISIT								
Category	Year III Sem V	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Internship					Y	2		25	75	100

**The students are expected to undergo an internship for a minimum of 15 days at any one ofthe following: Hospital / Health care facility / Fitness Centre / Food Industry / Catering Establishment / NGO / Interior Design Firm.

Learning Objectives
To enable the students to :
The internship is committed to preparing graduates in Home Science to join as entry level Dietitians/Nutritionists/Food Analysts/ Catering Staff/ Interior Designer

EXPECTED OUTCOME OF INTERNSHIP AT HOSPITAL/ HEALTH CARE FACILITY/ FITNESS CENTRE/ FOOD INDUSTRY / CATERING ESTABLISHMENT / NGO / INTERIOR DESIGN FIRM.

On completing the internship, the student:

- Learns the functions of the Dietary Department / Health care facility/ Fitness Centre
- Gets acquainted with the role and responsibilities of a Dietitian/Nutritionist in the respective facility
- Develops skills in nutrition screening and assessment of patient/ client
- Acquires training in nutritional diagnoses of each patient/client
- Demonstrates the ability to implement nutrition care plans; document nutrition care provided, maintain internship logbook and monitor outcomes of the nutritionplan

EXPECTED OUTCOME OF INTERNSHIP AT CATERING ESTABLISHMENT

On completing the internship, the student:

- Gains knowledge about the functions and operations of a catering establishment
- Develop managerial skills in the areas of managing kitchen, organizing stock,cooking schedules and customer service.
- Learns the strategies used in cost control
- Is trained in menu management and recipe development
- Learns the culinary art of planning, preparing and serving food that is deliciousand appealing.
- Familiar with the standards of safety and hygiene followed in the industry/company

EXPECTED OUTCOME OF INTERNSHIP AT FOOD INDUSTRY / NUTRACEUTICAL COMPANY

On completing the internship, the student:

- Learns the organizational setup and the process flow in manufacturing goods/ delivering services
- Gets hands-on experience in serving in the various departments fromprocurement to-end delivery of finished product
- Develop managerial skills to maintain stock, ensure smooth flow inproduction/services rendered
- Acquires the ability to work in a team
- Learns the quality standards laid by the industry/company and efforts taken to meet these standards

EXPECTED OUTCOME OF THE INTERNSHIP AT INTERIOR DESIGN FIRM

On completing the internship, the student:

- Gains knowledge about industry/company process.
- Develops skills in 2D and 3D software.
- Analyze cost estimation of building materials and finishes.
- Learns the methods and strategies used in cost control.
- Develops managerial skills in the areas of managing works required by the client.
- Adapts to working in a team and contributes to needs as they arise.
- Demonstrates competency in professional presentation, communication andwriting skills.

Mapping with Programme Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO 8**	**PO9**	**PO10**
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

Mapping with Programme Specific Outcomes

CO/PSO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15

Weighted percentage (rounded of) of Course Contribution to Pos	3	3	3	3	3

SEMESTER –VI

Title of the Course		**FUNCTIONAL FOODS FOR CHRONIC DISEASES**								
Category	**Year III**	**L**	**T**	**P**	**O**	**Credits**	**Inst Hrs**	**Marks**		
								CIA	**Univ.Exam**	**Total**
	Sem VI									
Core	XIII	Y				4	6	25	75	100

Learning Objectives
To enable the students to :
Gain a basic understanding of functional foods and their use in managing chronic diseases.
Understand the properties and functions of active compounds in functional foods.
Identify the potential sources of functional foods that could be beneficial in the management of specific chronic diseases.

UNIT	**CONTENT**	**HOURS**
UNIT I	**Introduction** Functional foods - Definition, History, types and classification of functional foods, Relation of functionalfoods (FF) to chronic diseases. **Food sources** Functional foods in different foods: cereal products (oats, wheat bran, rice bran, etc.), fruits and vegetables, milk and milk products, legumes, nuts, oil seeds and sea foods, herbs, spices and medicinal plants. Coffee, tea and other beveragesas functional foods/drinks and their protective effects.	**20**
UNIT II	**Antioxidants** Concept of free radicals and antioxidants, antioxidant roleas functional foods. Antioxidant and chronic diseases. **Properties and functions of various functional food ingredients** Protein, complex carbohydrates (dietary fiber) as functional food ingredients; probiotic, prebiotics and symbiotic foods, and their functional role. Sources and role of isoprenoids, isoflavones, flavonoids, carotenoids, tocotrienols, chlorophyll, polyunsaturated fatty acids, lecithin, choline, terpenoids, Glucosamine, lycopene, proanthocyanins.	**20**
UNIT III	**Functional foods and cardiovascular diseases (CVD)** Epidemiology of cardiovascular diseases, Biomarkers of different cardiovascular diseases, effect of functional foodson biomarkers of CVD, Effect of functional foods like greentea, grapes, oats, soybean, sunflower seeds or pumpkin seeds on CVD	**20**

UNIT IV	**Functional foods and cancer** Functional Food Components in Cancer Disease, Effect of functional foods like cruciferous vegetables, green tea, garlic, walnuts, berries on cancer. **Functional foods and renal diseases** Epidemiology of kidney disease, functional foods for	**15**
	kidney diseases, Effect of functional foods like garlic, buckwheat on the kidney.	
UNIT V	**Functional foods and obesity** Functional foods and obesity, biomarkers of obesity, bioactive compounds in functional foods to manage healthy weight. Effect of functional foods like dietary fibres, psyllium husk, and apple on obesity. **Functional foods and diabetes** Epidemiology of Diabetes, Functional Foods for Type 2 diabetes, effect of functional foods like turmeric, garlic, green tea, dietary fibre on diabetes.	**15**
	Total	**90**

Activity

- Prepare a list of functional foods and its benefits.
- Make a Power point presentation of Biomarkers for obesity, CVD, cancer, diabetes, kidney failure.
- Group discussion on Bioactive compounds and its functions that are beneficial for chronic diseases.

COURSE OUTCOMES

After successful completion of the course the student will be able to:

CO1. Define functional foods and recall the components of functional foods and their healthBenefits.

CO2. List out different functional foods, properties, and their functions.

CO3. Explain the impact of functional foods in the prevention and management of CVD andkidney diseases.

CO4. Evaluate the role of functional foods in the prevention and management of cancer.

CO5. Summarize the role of functional foods in the prevention and management of obesity and type 2 diabetes mellitus.

Reference:

1. Cho S. S. and Dreher, M.L. (2001): Handbook Dietary Fibre, Marcel Dekker Inc.,New York.
2. Gibson, G.R. and C.M.Willams (2000), "Functional Foods : Concept to

Product".Woodhead.
3. Giuseppe Mazza (1998), "Functional Foods: Biochemical and ProcessingAspects", Volume 1; CRC Press
4. Goldberg, I. Ed (1994): Functional Foods: Designer Foods, Pharma Foods, Nutraceuticals, Chapman & Hall, New York.
5. Ikan, Raphael (2005), "Natural Products: A Laboratory Guide", 2nd Edition, Academic Press / Elsevier.
6. Webb, P P (2006), "Dietary Supplements and Functional Foods". Blackwell.
7. Wildman, Robert E.C (2006), "Handbook of Nutraceuticals and Functional Foods".CRC.

e- learning resources

- https://youtu.be/uFf0zxQ3rBU
- http://epgp.inflibnet.ac.in/Home/Download

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	L	M	M	S
CO2	S	S	S	M	M	M	L	M	M	S
CO3	S	S	S	M	M	M	L	M	M	S
CO4	S	S	S	M	M	M	L	M	M	S
CO5	S	S	S	M	M	M	L	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of)of Course Contribution to Pos	3	3	3	3	3

Title of the Course		BASICS OF FOOD MICROBIOLOGY								
Category	Year III SemVI	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Core	XIV	Y		Y		4	6	25	75	100

Learning Objectives
To enable the students to :
Gain knowledge on the characteristics of micro-organisms in food and environment.
Understand the role of microorganisms in food spoilage, health and illness.
Familiarize with the methods of controlling microorganisms.

UNIT	CONTENT	HOURS
UNIT I	**Introduction to Microbes in Foods** History and Development of Food Microbiology Classification of microorganisms. General morphological characteristics of bacteria, yeast, algae. mold, virus. Characteristics of predominant microorganisms in food, sources of microorganisms in foods.	**15**
UNIT II	**Microbial spoilage and contamination of common food** Factors affecting growth of microorganisms- intrinsic and extrinsic. Sources of contamination and spoilage of common foods -Cereal and cereal products, fruits and vegetables, egg, meat and fish, milk and milk products.	**15**
UNIT III	**Beneficial uses of microorganisms in food and health** Microorganisms used in fermented products - Alcoholic drinks, Dairy products, Bread, Vinegar, Pickled foods. Single-cell protein Food Bio preservatives of microbial origin. Intestinal Bacteria and Probiotics.	**10**
UNIT IV	**Food poisoning and Food borne disease** Food poisoning/ intoxication and food infection- definition. Bacterial food poisoning – Staphylococcus aureus, Clostridium botulinum, Clostridium perfringens, Bacillus cereus Food Infection- Salmonellosis, Shigellosis, Cholera, Gastroenteritis. Measures to prevent food poisoning and food borne infection.	**15**
UNIT V	**Microorganisms found in water, soil, air and sewage-** List of microorganisms and diseases caused; Test for sanitary quality of water, Purification of water **Control of Microorganisms in food** Control of Access of Microorganisms: sanitation, sterilization and disinfection Control by Heat (Thermal Processing), Low Temperature, Reduced Water Activity and Drying, Low pH and Organic Acids, Modified Atmosphere, Reducing O-R Potential) Antimicrobial Preservatives and Bacteriophages Irradiation, Novel Processing Technologies, Combination of Methods (Hurdle Concept)	**20**
	TOTAL	**75**

COURSE OUTCOMES

After successful completion of the course the student will be able to

CO1. Comprehend the characteristics of microorganisms in food and its environment and applythe knowledge to control them.

CO2. Differentiate between organisms that are beneficial from those causing spoilage.

CO3. Explain the causes and prevention of food poisoning and food borne infections.

CO4. Identify the microscopic structure of algae, molds, yeast, virus and bacteria.

CO5. Perform appropriate tests to identify the size, shape, arrangement and motility of organisms.

References

1. Parija SC. (2012) Textbook of Microbiology and Immunology, 2nd edition, Elsevier India.
2. Garbutt J. (1997) Essentials of Food Microbiology, 2nd edition, Arnold publication, NewYork,1997
3. Adams M.R, Moss M.O and Peter.M (2016). Food Microbiology. 4th edition. Royal Society of Chemistry, United Kingdom.
4. Frazier W.C and Westhoff D.C. (1995). Food Microbiology. 5th edition. Tata Mc Graw Hill Publishing Company Ltd, New Delhi.
5. Jay J.M, Loessner MJ and Golden D.A. (2005). Modern Food Microbiology. 7th edition,CBS Publishers and Distributors, New Delhi.
6. Ananthanarayan and Paniker. (2017). Text book of Microbiology, Tenth Edition, Orient Longman Limited, Hyderabad.
7. Ramesh. V. (2007). Food Microbiology, MJP publishers, Chennai.
8. Gerald McDonell. (2020). Block's Disinfection, Sterilization and Preservation. 6th edition.Lippincott Williams and Wilkins, Philadelphia.

e-learning resources

- http://people.uleth.ca/~selibl/Biol3200/CourseNotes/MicroTaxonomyCh10.pdf
- https://www.cdc.gov/vaccines/hcp/conversations/downloads/vacsafe-understand-color-office.pdf
- https://www.who.int/news-room/fact-sheets/detail/food-safety
- https//epi.dph.ncdhhs.gov/cd/diseases/food.html
- http://vikaspedia.in/health/nutrition/food-borne-diseases-or-food-poisoning
- https://www.microrao.com/micronotes/sterilization.pdf
- https://ehs.colorado.edu/resources/disinfectants-and-sterilization-methods/

PRACTICAL

1. Study of different equipment in a microbiology lab.
2. Safety practices in microbiology laboratory.
3. Microscopy- principles, parts, function and operation.
4. Microscopic structure of algae, molds, yeast, virus and bacteria.
5. Examination of organisms using simple staining technique.
6. Examination of organisms using gram staining technique.
7. Examination of motility of bacteria using hanging drop technique.
8. Demonstration of sterilization of glassware using hot air oven, autoclave.
9. Demonstration of media preparation-Broth, deep, slant and plates.
10. Demonstration of culture techniques-streak, pour plate.
11. Visit (at least one) food processing units or any other organization dealing with advanced methods in food microbiology.

Mapping with Programme Outcomes

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO 7**	**PO 8**	**PO 9**	**PO10**
CO1	S	S	S	S	S	M	S	M	M	S
CO2	S	S	S	S	L	S	M	M	M	S
CO3	S	S	S	S	M	S	M	M	M	S
CO4	S	S	S	S	M	S	M	M	M	S
CO5	S	S	S	S	M	M	M	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	**PSO1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of) of Course Contribution to Pos	3	3	3	3	3

Title of the Course		FOOD PRESERVATION AND PROCESSING								
Category	Year III Sem VI	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Core	XV	Y		Y		4	6	25	75	100

Learning Objectives
To enable the students to :
Gain knowledge on principles of food preservation of foods
Understand the techniques used in processing foods to preserve their shelf life
Apply skills learnt to develop preserved food product

UNIT	CONTENT	HOURS
UNIT I	**Food Spoilage** - Definition, causes, microorganisms involved in spoilage of bread,fruits and vegetables, meat, fish, egg, milk, juices andpickles. **Food preservation -** Definition, principles and importance, classification – bactericidal and bacteriostatic methods.	15
UNIT II	**Processing by high temperature** Processing and preservation by high temperature: blanching, pasteurization, sterilization and UHT processing, canning, extraction cooking, dielectric heating, Dehydration.	20
UNIT III	**Processing by low temperature** Processing and preservation by low temperature – refrigeration, freezing, dehydro-freezing.	20
UNIT IV	**Preservation by drying** Processing and preservation by drying, concentration and evaporation: various methodssun – drying, tray or tunnel drying, spray drying, drum drying freeze drying, fluidized bed drying, advantages anddisadvantages.	15
UNIT V	**Preservation by non - thermal treatments and food packaging** Processing and preservation by non – thermal methods: salt, sugar, chemicals, smoking. Irradiation Food additives: Definition, types and functions, permissible limits and safety aspects. Food packaging- its types and uses **Practical -** Preparation of jams, jellies and squashes using seasonal fruitsand vegetables. Preparation of pickles using fruits and vegetables. Preparation of sauce and ketchup.	20
	TOTAL	75

COURSE OUTCOMES

After successful completion of the course the student will be able to:

CO1. Define and explain the principles of food preservation and relate the role of microorganisms in food spoilage.

CO2. Explain the causes of food spoilage, need and principles of food preservation. **CO3.** Apply the various techniques of food preservation to preserve different foods so as to increase the shelf life of foods.

CO4. compare the principles and techniques of various food preservation methods and explain the role of packaging in food processing.

CO5. Justify the use of various preservation techniques, and packaging materialsthe terms related to food preservation and classify foods based on their shelf life.

Reference:

1. Arthey, D and Ashurst, P.R (1996), Fruit processing, Blackie academic and professional. London.
2. Fellows, P.J (2016): Food Processing Technology: Principles and Practice,second edition, CRC Wood head Publishing Ltd, Cambridge.
3. Gould. G.W (1995), New methods of food preservation. Blackie academicand professional. London.
4. Rahman M S (2020) Handbook of Food Preservation CRC Press, USA
5. Srilakshmi B (2017) Food Science, New Age International Publications, New Delhi.
6. Suganthi.V and Subaratinam.R (2021) Textbook on Food preservation, DiptiPress(OPC) Pvt. Ltd, Chennai.

e- learning resources

- https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/food-spoilage.
- http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111436
- http://ecoursesonline.iasri.res.in/mod/page/view.php?id=111435
- http://www.homepreservingbible.com/2247-an-introduction-to-the-drying-food-preservation-method/

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	M	S	M	M	M	L	M	M	S
CO2	S	S	S	M	M	M	M	M	M	S
CO3	S	S	M	S	M	M	M	M	M	S
CO4	S	S	S	M	M	M	M	M	M	S
CO5	S	S	M	M	M	M	S	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded off)of Course Contribution to Pos	3	3	3	3	3

Title of the Course		SPORTS NUTRITION								
Category	Year III Sem VI	L	T	P	O	Credits	Inst Hrs	Marks		
								CIA	Univ.Exam	Total
Elective	VII	Y		Y		3	5	25	75	100

Learning Objectives
To enable the students to:
Understand the basic concepts of nutrition for physical fitness and sports.
Enumerate ~~on~~ the special nutritional requirements for athletes.

UNIT	CONTENT	HOURS
UNIT I	**Introduction to Physical Fitness** Components of fitness, Health and Sports related fitness, Description of Aerobic and anaerobic sports- Types and Benefits Body weight and composition for health and sport, Strategies forweight management	10
UNIT II	**Energy Systems for Exercise** Types of muscle fibres, Fuel sources and energy systems for exercise, energy pathways, regulation of energy metabolism-metabolic response to exercise and metabolic adaptation to exercise training	10
UNIT III	**Role of Macronutrients in Physical Fitness** Carbohydrates – Utilization of carbohydrate before, duringand after exercise, importance of glycogen loading. Proteins – role of proteins for exercise, requirements before, during and after exercise. Fats – role of fats in exercise, requirements before, during and after exercise,Fat loading-effects on exercise performance. Macronutrients Requirements for Power, endurance sports and strength training Activities.	15
UNIT IV	**Role of Micronutrients and Water for Exercise** Role of vitamins and minerals for exercise, Role ofAntioxidant nutrients for exercise, Relative energy deficiency. Water, electrolyte and temperature regulation. Effect of dehydration and hyperhydration on performance.	15

	Fluid guidelines before, during and after exercise.	
UNIT V	**Nutrition for Athletes** Importance of pre-event, during and post-event meals, preparing for competition, dealing with cramps, GI distress,electrolyte balance-sports drinks. Role of Sports supplements, Ergogenic aids to improve performance. Nutrient requirements for children, adults and elderly involved in different sports. Eating disorders – types, prevalence, risk factors, effect on sports performance, treatment and prevention.	**15**
	Practical/ Project component: Planning of diets for athletes (for all age groups) involved in different sports. **Industrial Tie-up**- With Sports Organizations, Fitness Centre's	**10**
	TOTAL	**75**

COURSE OUTCOMES

After successful completion of the course, the student will be able to:

CO1. Define terms related to physical fitness, nutrients and supplements for exercise.

CO2. Discuss the benefits of different exercise, significance of body weight and composition parameters, fuel system, nutrients, supplements and ergogenic aidsfor exercise.

CO3. Explain the significance of body composition parameters, fuel systems, energy pathways and utilization of nutrients, sports supplements and ergogenic aids for exercise.

CO4. Analyze the role of energy pathways, macro and micronutrients, sports supplements and ergogenic aids used by athletes to improve performance.

CO5. Assess the functions of nutrients before, during and after exercise, and recommend meal plans for athletes involved in different sports.

References:

1. Fink H.H., Burgoon L.A., Mikesky A.E.(2018) Practical applications in Sports Nutrition. Jones and Bartlett Publishers. Sudbery, Massachusetts.
2. Mahan K and Sylvia E. Stump (2000) Krause's Food Nutrition and Diet Therapy,Saunders, USA.
3. McArdle .W.D., Frank. I. Katch, Victor L Katch (2005) Sports and Exercise Nutrition.Lippincott, Williams and Wilkins, Philadelphia
4. Sharkey B.J. (2002) Fitness and Health: Human Kinetics, Hong Kong
5. Williams M.H., Anderson D.E., Rawson E.S. (2013) Nutrition for Health, Fitness andSport. McGraw Hill, New York.

e-Learning Resources:

- sportsmedicine.about.com
- http://sportsmedicine.about.com/od/sportsnutrition/a/carbohydrates.htm

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	L	L	M	S
CO2	S	S	S	M	M	M	L	M	M	S
CO3	S	S	S	S	M	M	S	M	M	S
CO4	S	S	S	S	M	M	M	M	M	S
CO5	S	S	S	S	M	M	M	M	M	S

Mapping with Programme Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded of)of Course Contribution to Pos	3	3	3	3	3

Title of the Course		CHANGING TRENDS IN EXTENSION EDUCATION								
Category	Year III	L	T	P	O	Credits	InstHrs	Marks		
	Sem VI							CIA	Univ.Exam	Total
Elective	VIII	Y		Y		3	5	25	75	100

Learning Objectives
To impart knowledge to the students on the concept, objectives, philosophy and principles of extension education as well as pioneering extension efforts and analysis of the extension system of ICAR and SAU. Course also gives exposure to the student on current approaches in extension as well as various development programmes
To understand the changing concept of extension
To get acquainted with the trends in extension approaches and models
To identify the support system development for extension education.

UNIT	CONTENT	HOURS
UNIT I	**Home Science Extension Education** Extension education – meaning, scope, characteristics, objectives, need, principles, process, models and philosophy Emergence of Home Science Extension Education in India Extension Education as a profession – adult education and distance education. Leadership – role, styles and management grid, Qualities of a good extension manager: Changing role of extension managers caused by globalization in Home Science.	8
	Practical - Exercises on presentation skills, listening skills, writing skills,exercises on distortion of communication message.	2
UNIT II	**Diffusion and Adoption of Innovations** Predicting innovativeness: Simulation of innovation, innovation-decision process - Types of innovation decision, consequence on innovations, desirable or undesirable, direct or indirect anticipated or unanticipated consequence. Concept of homophily and heterophony and their influenceon flow of innovation, Concept of Diffusion and its elements. Adoption Process - concept of stage, shade of agreement, neglectedelement. Adopter categories - Innovativeness and adopter categories, adopter categories as idea types, characteristics of adopter categories. Diffusion - perceived attributes of innovation and their rate of	15

	adoption.	

	Practical Designing and Preparation of low-cost charts, posters, flash cards, pamphlet, leaflet etc	**2**
UNIT III	**Communication process** Communication process – concept, elements and their characteristics Models and theories of communication communication skills – fidelity of communication, communication competence and empathy, communication effectiveness and credibility, feedback in communication, social network and Development communication – Barriers in communication Message – Meaning, dimensions of a message, characteristics of a good message, Massage treatment and effectiveness, distortion of message.	**8**
	Practical - Generating computer-aided presentation	**5**
UNIT IV	**Teaching and Learning** Concept of teaching and learning Classification of Extension teaching methods Various extension teaching aids – selection of appropriate methods, features, advantage, limitation of various methods of teaching (mass, group, individual) Audio visual aids – planning, selection and types of visual, audio and audio – visual aids Contribution of AV Aids in Extension education.	**8**
	Practical Report writing and Analysis of (Any 2) - Choose any one programme like Pulse Polio Immunization (PPI) or Kanyashree Prakalpa or Swachh Bharat Mission to write a report on their agencies of implementation, purpose, target group and their probable effectiveness in a particular chosen area or population. A survey report on any one rural institution: village school, mahila mandal, youth clubs, NGO/Co-operative/ Mahila Mandal/ Health-Centre in mass media, Poverty alleviation programmes, employment generating programmes of GOI. Critical analysis report of any one development programmes for women or children in India.	**2**

UNIT V	**Current approaches in extension education** Farming situation-based extension, market – led – extension, farm fieldschool, ATIC, Kissan Call Centers, and NAIP. Problems in Rural Development. Need for Volunteerism in Rural Development, Role of NGO's Assistance available to Voluntary agencies from different ministries/Departments of Govt. of India. - Details of function in to Central/State Social Welfare Board and CAPART Employments Generation Programmes – NREGP, Women DevelopmentProgrammes – ICDS, Self Help Groups, MSY, RMK	**8**
	Practical Applications of Extension education –Methods and Techniques (Any - 3) Design and conduct training modules for target groups and follow up on training conducted. Preparation of a suitable Audio-visual aid for community extension work. Visit training and development institutions (KVKs, FTCs, TICs EEls, MANAGE, MAARM etc.) to share their experience on different aspects of training. Visit Gram Panchayat to study ongoing rural development programmes, visit KVK, NGO and extension centres of State Agricultural University and State Departments, bottom-up planning, report preparation and presentations. Conducting socio-economic diet survey. Preparation of plans, projects programme proposals. Exercises on participatory methods - RRA, PRA, PLA etc. evaluation of plans, Exercises of PERT, Visit to development organizations and NGOs	**2**
	TOTAL	**60**

COURSE OUTCOME

After successful completion of the course the student will be able to

CO1. Describe key Concepts of Home Science Extension Education

CO2. Explain the Diffusion and Adoption of Innovations

CO3. Understand the criteria for Communication process

CO4. Identify importance and Planning teaching and learning

CO5. Introduction to Current approaches in extension education

References

1. Albrecsht, H. et al (1989): Rural Development Series, Agricultural Extension, Vol I & II, Basic concepts and methods, Wiley Eastern Limited, New Delhi.
2. Chaubey, B.K. (1979): A Hand Book of Education Extension, Jyoti Prakashan, Allahabad.
3. Extension Education in Community Development (1981): Ministry of Food and Agriculture, Government of India, New Delhi.
4. Pankajam, G. (2000): Extension – Third Dimension of Education, Gyan Publishing House, New Delhi.
5. Reddy, A. (1999): Extension Education, Sree Lakshmi Press, Bapatla.
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e- Learning Resources

- http://ecoursesonline.iasri.res.in/course/view.php?id=243
- https://onlinecourses.swayam2.ac.in/cec19_mg32/preview

Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	S	M	S	S	M	S
CO2	S	S	S	M	S	M	S	S	M	S
CO3	S	S	S	M	S	S	S	S	M	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	M	S	S	S	S

Mapping with Programme-Specific Outcomes

CO/PSO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage (rounded off) of Course Contribution to Pos	3	3	3	3	3