

**B.SC.,  
NUTRITION AND DIETETICS**

**SYLLABUS**

**FROM THE ACADEMIC YEAR  
2024-25**

**TAMILNADU STATE COUNCIL FOR HIGHER EDUCATION, CHENNAI – 600 005**

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<b>TANSICHE REGULATIONS ON LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME</b>	
<b>Programme:</b>	<b>B.Sc., Nutrition and Dietetics</b>
<b>Programme Code:</b>	
<b>Duration:</b>	<b>UG - 3 years</b>
<b>Programme Outcomes:</b>	<b>PO1: Disciplinary knowledge:</b> Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study <b>PO2: Communication Skills:</b> 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. <b>PO3: Critical thinking:</b> 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.

**PO10 Information/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

	<p>of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.</p> <p><b>PO 13: Moral and ethical awareness/reasoning:</b> Ability to embrace 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 demonstrating the 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.</p> <p><b>PO 14: Leadership readiness/qualities:</b> 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.</p> <p><b>PO 15: Lifelong learning:</b> 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.</p>
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<p><b>Programme Specific Outcomes:</b></p>	<p><b>PSO1 – Placement:</b> To prepare the students who will demonstrate respectful engagement with others’ ideas, behaviors, beliefs and apply diverse frames of reference to decisions and actions.</p> <p><b>PSO 2 - Entrepreneur:</b> To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations</p> <p><b>PSO3 – Research and Development:</b> Design and implement HR systems and practices grounded in research that comply with employment laws, leading the organization towards growth and development.</p> <p><b>PSO4 – Contribution to Business World:</b></p>
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	<p>To produce employable, ethical and innovative professionals to sustain in the dynamic business world.</p> <p><b>PSO 5 – Contribution to the Society:</b></p> <p>To contribute to the development of the society by collaborating with stakeholders for mutual benefit</p>
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### Credit Distribution for UG Programmes

Sem I	Cr edi t	H	Sem II	Cr edi t	H	Sem III	Cr edi t	H	Sem IV	Cr edi t	H	Sem V	Cr edi t	H	Sem VI	Cr edi t	H
Part 1. Lang uage – Tamil	3	6	Part.. 1. Lang uage – Tamil	3	6	Part..1. Langua ge – Tamil	3	6	Part.. 1. Lang uage – Tamil	3	6	5.1 Cor e Cou rse – CC IX	4	5	6.1 Core Cour se – CC XIII	4	6
Part.2 Engli sh	3	6	Part.. 2 Engli sh	3	6	Part..2 Englis h	3	6	Part.. 2 Engli sh	3	6	5.2 Cor e Cou rse – CC X	4	5	6.2 Core Cour se – CC XIV	4	6
1.3 Core Cours e – CC I	5	5	2..3 Core Cours e – CC III	5	5	3.3 Core Course – CC V	5	5	4.3 Core Cours e – CC VII Core Indust ry Modu le	5	5	5. 3.C ore Cou rse CC -XI	4	5	6.3 Core Cour se – CC XV	4	6
1.4 Core	5	5	2.4 Core	5	5	3.4 Core	5	5	4.4 Core	5	5	5. 4.C	4	5	6.4 Electi	3	5

Course – CC II			Course – CC IV			Course – CC VI			Course – CC VIII			Course –/ Project with viva - voce CC -XII			Course – VII Generic/ Discipline 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	-

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1.7 Skill Enha ncem ent - (Foun dation Cours e)	2	2	2.7 Skill Enha ncem ent Cours e - SEC- 3	2	2	3.7 Skill Enhanc ement Course SEC-5	2	2	4.7 Skill Enha ncem ent Cours e SEC- 7	2	2	5.7 Val ue Edu cati on	2	2	6.7 Profe ssion al Com peten cy Skill	2	2	
						3.8 E.V.S.	-	1	4.8 E.V.S	2	1	5.8 Sum mer Inter nshi p /Ind ustri al Trai ning	2					
	<b>23</b>	<b>3</b>		<b>23</b>	<b>3</b>			<b>22</b>	<b>3</b>		<b>25</b>	<b>3</b>		<b>26</b>	<b>3</b>		<b>21</b>	<b>3</b>
<b>Total – 140 Credits</b>																		



**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**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>No. of Hours</b>
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
		<b>23</b>	<b>30</b>

**Semester-II**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>No. of Hours</b>
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
		<b>23</b>	<b>30</b>

**Second Year – Semester-III**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>No. of Hours</b>
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
		<b>22</b>	<b>30</b>

**Semester-IV**

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>No. of Hours</b>
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			<b>Hours</b>
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
		<b>25</b>	<b>30</b>

### Third Year

#### Semester-V

<b>Part</b>	<b>List of Courses</b>	<b>Credit</b>	<b>No. of Hours</b>
<b>Part-3</b>	Core Courses including Project / Elective Based	22	26
<b>Part-4</b>	Value Education	2	2
	Internship / Industrial Visit / Field Visit	2	2
		<b>26</b>	<b>30</b>

#### Semester-VI

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

### Consolidated Semester wise and Component wise Credit distribution

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

**\*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.**

<b>METHODS OF EVALUATION</b>		
<b>Internal Evaluation</b>	Continuous Internal Assessment Test	<b>25 Marks</b>
	Assignments / Snap Test / Quiz	
	Seminars	
	Attendance and Class Participation	
<b>External Evaluation</b>	End Semester Examination	<b>75 Marks</b>
<b>Total</b>		<b>100 Marks</b>
<b>METHODS OF ASSESSMENT</b>		
<b>Remembering (K1)</b>	<ul style="list-style-type: none"> <li>• The lowest level of questions requires students to recall information from the course content.</li> <li>• Knowledge questions usually require students to identify information in the textbook.</li> </ul>	
<b>Understanding (K2)</b>	<ul style="list-style-type: none"> <li>• Understanding of facts and ideas by comprehending, organizing, comparing, translating, interpolating, and interpreting in their own words.</li> <li>• The questions go beyond simple recall and require students to combine data together.</li> </ul>	
<b>Application (K3)</b>	<ul style="list-style-type: none"> <li>• Students have to solve problems by using/applying concepts learned in the classroom.</li> <li>• Students must use their knowledge to determine an exact response.</li> </ul>	
<b>Analyze (K4)</b>	<ul style="list-style-type: none"> <li>• Analyzing the question asks the students to break down something into its parts.</li> <li>• Analyzing requires students to identify reasons, causes, or motives and reach conclusions or generalisations.</li> </ul>	

<b>Evaluate</b> <b>(K5)</b>	<ul style="list-style-type: none"> <li>• Evaluation requires an individual to make a judgment on something.</li> <li>• Questions to be asked to judge the value of an idea, a character, a work of art, or a solution to a problem.</li> <li>• Students are engaged in decision-making and problem-solving.</li> <li>• Evaluation questions do not have a single right answer.</li> </ul>
<b>Create</b> <b>(K6)</b>	<ul style="list-style-type: none"> <li>• The questions of this category challenge students to get engaged in creative and original thinking.</li> <li>• Developing original ideas and problem-solving skills.</li> </ul>

### 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 in the final semester, a first of its kind.
4. The curriculum is designed so as 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 the 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 to narrow 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.

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### Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	<p><b>Foundation Course</b></p> <p>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.</p>	<ul style="list-style-type: none"> <li>• Instil confidence among students</li> <li>• Create interest in the subject</li> </ul>
I, II, III, IV	<p><b>Skill Enhancement papers</b> (Discipline centric / Generic / Entrepreneurial)</p>	<ul style="list-style-type: none"> <li>• Industry ready graduates</li> <li>• Skilled human resource</li> <li>• Students are equipped with essential skills to make them employable</li> <li>• Training on Computing / Computational skills enable the students gain knowledge and exposure on latest computational aspects</li> <li>• Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc.</li> <li>• Entrepreneurial skill training will provide an opportunity for independent livelihood</li> <li>• Generates self – employment</li> <li>• Create small scale entrepreneurs</li> <li>• Training to girls leads to women empowerment</li> <li>• Discipline centric skill will improve the Technical knowhow of solving real life problems using ICT tools</li> </ul>
III, IV, V & VI	<p>Elective papers-</p> <p>An open choice of topics categorized under Generic and</p>	<ul style="list-style-type: none"> <li>• Strengthening the domain knowledge</li> <li>• Introducing the stakeholders to the State-of Art techniques from the streams of multi-</li> </ul>

	Discipline Centric	<p>disciplinary, cross disciplinary and inter disciplinary nature</p> <ul style="list-style-type: none"> <li>• Students are exposed to Latest topics on Computer Science / IT, that require strong statistical background</li> <li>• Emerging topics in higher education / industry / communication network / health sector etc. are introduced with hands-on-training, facilitates designing of statistical models in the respective sectors</li> </ul>
<b>IV</b>	DBMS and Programming skill, Biostatistics, Statistical Quality Control, Official Statistics, Operations Research	<ul style="list-style-type: none"> <li>• Exposure to industry moulds students into solution providers</li> <li>• Generates Industry ready graduates</li> <li>• Employment opportunities enhanced</li> </ul>
<b>II year Vacation activity</b>	Internship / Industrial Training	<ul style="list-style-type: none"> <li>• Practical training at the Industry/ Banking Sector / Private/ Public sector organizations / Educational institutions, enable the students gain professional experience and also become responsible citizens.</li> </ul>
<b>V Semester</b>	Project with Viva – voce	<ul style="list-style-type: none"> <li>• Self-learning is enhanced</li> <li>• Application of the concept to real situation is conceived resulting in tangible outcome</li> </ul>
<b>VI Semester</b>	Introduction of Professional Competency component	<ul style="list-style-type: none"> <li>• Curriculum design accommodates all category of learners; ‘Statistics for Advanced Explain’ component will comprise of advanced topics in Statistics and allied fields, for those in the peer group / aspiring researchers;</li> <li>• ‘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.</li> </ul>
<b>Extra Credits: For Advanced Learners / Honors degree</b>		<ul style="list-style-type: none"> <li>• To cater to the needs of peer learners / research aspirants</li> </ul>

<b>Skills acquired from the Courses</b>	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
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**COURSE OF STUDY AND SCHEME OF EXAMINATION**

<b>SEMESTER I</b>								
<b>Part</b>	<b>Study Component</b>	<b>Course Title</b>	<b>Credit</b>	<b>Exam</b>				<b>Hrs/week</b>
				<b>Dur. Hrs</b>	<b>CIA</b>	<b>Uni. exam</b>	<b>Total</b>	
I	Language	Tamil/Other Languages	3	6	25	75	100	6
II	Language	English	3	6	25	75	100	6
III	CoreI	Human Physiology	5	5	25	75	100	5
III	Core PracticalII	HumanPhysiology Practical	3	3	50	50	100	3
III	Allied I	ChemistryI	3	4	25	75	100	4
III	Allied PracticalII	ChemistryPractical	2	2	50	50	100	2
IV	Skill Enhancement Course	SEC-1-PublicHealth Nutrition	2	2	25	75	100	2
IV	Foundation Course	Women'sHealthandWellness	2	2	25	75	100	2
		<b>TOTAL</b>	<b>23</b>	<b>30</b>	<b>250</b>	<b>550</b>	<b>800</b>	<b>30</b>

**SEMESTER II**

Part	Study Component	Course Title	Credits	Exam				Hrs/week
				Dur. Hrs	CIA	Uni. exam	Total	
I	Language	Tamil/Other Languages	3	6	25	75	100	6
II	Language	English	3	6	25	75	100	6
III	CoreII	FoodScience	5	5	25	75	100	5
III	Core Practical II	Food Science Practical	3	3	50	50	100	3
III	Allied I	Chemistry II	3	4	25	75	100	4
III	Allied Practical I	Chemistry Practical	2	2	50	50	100	2
IV	Skill Enhancement Course SEC-II SEC III	SEC-II Introduction to FashionDesigning	1	2	25	75	100	2
		SEC III -Landscape Design and Ornamental Garden	1	2	25	75	100	2
IV		Naan Mudhalvan-1	2	2	-	-	-	2
		<b>TOTAL</b>	<b>23</b>	<b>30</b>	<b>250</b>	<b>550</b>	<b>800</b>	<b>30</b>

SEMESTER III								
Part	Study Component	Course Title	Credits	Exam				Hrs/ week
				Dur. Hrs	CIA	Uni. exam	Total	
I	Language	Tamil/Other Languages	3	6	25	75	100	6
II	Language	English	3	6	25	75	100	6
III	Core V	Human Nutrition	6	5	25	75	100	4
III	Core VI	Human Nutrition-Practical	3	3	50	50	100	3
III	Elective III	Human Development	4	4	25	75	100	4
III	SEC IV	Changing Trends in Extension Education	1	2	25	75	100	2
IV	EVS	Environmental Studies	2	2	25	75	100	2
IV		Naan Mudhalvan-2	2	2	-	-	-	2
		<b>TOTAL</b>	<b>24</b>	<b>30</b>	<b>150</b>	<b>450</b>	<b>600</b>	<b>30</b>

SEMESTER IV								
Part	Study Component	Course Title	Credits	Exam				Hrs/ week
				Dur. Hrs	CIA	Uni. exam	Total	
I	Language	Tamil/Other Languages	3	6	25	75	100	6
II	Language	English	3	6	25	75	100	6
III	Core VII	Nutrition through Life Cycle	6	5	25	75	100	4
III	Core VIII	Nutrition through Life Cycle- Practical	3	3	50	50	100	3
III	Elective IV	Basics of Food Microbiology	4	4	25	75	100	4
III	SEC V	Fundamentals of Research in Nutritional Sciences	1	2	50	50	100	3
IV		Value-Based Education	2	2	25	75	100	2
V		Naan Mudhalvan-3	2	2	-	-	-	2
		<b>TOTAL</b>	<b>24</b>	<b>30</b>	<b>225</b>	<b>475</b>	<b>700</b>	<b>30</b>

SEMESTER V								
Part	Study Component	Course Title	Credits	Exam			Hrs	
				Dur. Hrs	CIA	Uni. exam		Total
III	Core IX	Dietetics	4	5	25	75	100	5
III	Core X	Food Service Management	4	5	25	75	100	5
III	Core XI	Dietetics- Practical	4	5	50	50	100	5
III	Core XII	Project	3	5	50	50	100	5
III	Elective V	Food Product Development	3	4	25	75	100	4
IV	Elective VI	Foundations of Baking and Confectionery	3	4	25	75	100	4
		Naan Mudhalvan-4	2	2	-	-	-	2
III	Internship	Internship/Industrial Visit/Field Visit	2	0	50	50	100	0
		<b>TOTAL</b>	<b>25</b>	<b>30</b>	<b>250</b>	<b>550</b>	<b>700</b>	<b>30</b>

**SEMESTER VI**

Part	Study Component	Course Title	Credits	Exam			Hrs/ week	
				Dur. Hrs	CIA	Uni. exam		Total
III	Core XIII	Nutritional Biochemistry	4	6	25	75	100	3
III	Core XIV	Sports Nutrition	4	6	25	75	100	6
III	Core XV	Food Preservation and Processing	4	6	25	75	100	6
III	Elective VII	Functional Foods for Chronic Diseases	3	5	25	75	100	4
IV	Elective VIII	Fibre to Fabric	3	5	25	75	100	4
		Naan Mudhalvan-5	2	2	-	-	-	-
V		Extension Activities	1	-	-	-	-	-
		<b>TOTAL</b>	<b>21</b>	<b>30</b>	<b>125</b>	<b>375</b>	<b>500</b>	<b>30</b>

<b>SEMESTER I</b>	
<b>Core/Major Course I</b>	<b>Human Physiology</b>
<b>Paper Code:</b>	<b>Theory:6hrs/week</b>

Course Learning Outcomes:

1. Gain the basic knowledge of human anatomy and physiology.
2. Define the main structures composing the human body.
3. Explains structure and functions of cells, tissues and organs, systems of the human body.
4. Relates structure and functions of tissue.
5. Provides 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. Gastro intestinal and Hepato biliary 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 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.

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,11<sup>th</sup> Edition.
3. Gyton (1996), Test Book of Medical Physiology,9<sup>th</sup> 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 VolumeII, 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 (Parental) Ltd., Calcutta.



<b>SEMESTER I</b>	
<b>Core/Major Practical I</b>	<b>Human Physiology</b>
<b>Paper Code:</b>	<b>Theory:3hrs/week</b>

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 sample-Capillary blood from finger tips and venous blood.
3. Separation of blood components (Centrifugation).
4. Estimation of hemoglobin-Sahli's Acid hematin method.
5. Determination of Hematocrit (Wintrobemethod).
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 radial pulse (pulse rate).
12. Measurement of blood pressure (Sphygmomanometer).
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, Text book of practical physiology, Orient Longman Ltd. 2001.

Title of the Course		PUBLIC HEALTH NUTRITION								
Category	Year I	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem I							CIA	External	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 the health and nutrition of the community

UNIT	CONTENT	HOURS
UNIT I	<p><b>Concept and scope of public nutrition</b> Definition, concept, scope and multidisciplinary nature of public nutrition</p> <p><b>Nutritional problems affecting the community.</b> Etiology, prevalence, clinical features and preventive strategies for malnutrition-related problems and deficiency disorders- Under nutrition (Protein energy malnutrition, Wasting, Stunting), Over nutrition (obesity and related risks), Nutritional anemia, Vitamin A deficiency, Iodine deficiency disorders, Fluorosis.</p>	15
UNIT II	<p><b>Assessment of nutritional status</b> Objectives and importance, Methods of assessment: Direct (Clinical signs, Anthropometry, Biochemical tests); Indirect (Diet surveys, vital statistics)</p>	10
UNIT III	<p><b>Nutrition policy and programs</b> National nutritional policy; Integrated child development scheme (ICDS), Midday Meal Program- State and National (Poshan Abhyan), National programs for the prevention of anemia, Vitamin A deficiency, Iodine deficiency disorders, Fortification of Foods and Public Distribution System as a preventive approach.</p>	15
UNIT IV	<p><b>Nutrition education</b> Objectives, principles and scope of nutrition and health education, creating awareness on concurrent public health issues and devising strategies for prevention and management.</p>	10

<b>UNIT V</b>	<b>Role of National and International agencies in combating malnutrition</b> WHO, FAO, UNICEF; National:FSSAI, ICAR, ICMR, NIN,FNB,CFTRI,NNMB-Role,Targetgroups (if specified), Policies and Programs.	<b>10</b>
<b>Practical</b>	<b>Practical/experimental learning</b> Planning low-cost nutritious recipes for infants,pre-schoolers, pregnant/ lactating mothers for nutrition education. Assessment of nutritional status <ul style="list-style-type: none"> <li>- Anthropometry: Weight and height measurements</li> <li>- Plotting and interpretation of growth charts for children below 5 years</li> <li>- Identification of clinical signs of common nutritional disorders</li> <li>- Dietary assessment: 24-hour recall, Food Frequency Questionnaire, Diet Diversity Score</li> </ul> Planning a Nutrition Education Program and imparting nutrition education to the community	<b>15</b>
	<b>TOTAL</b>	<b>75</b>

### **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

### **Reference:**

1. WadhwaA and SharmaS(2003).Nutrition in the Community –A text book. 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. JellifeDB,JellifeERP,Zerfas A and NeumannCG(1989).Community nutritionalassessment with special reference to less technically developed countries. OxfordUniversityPress. 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,MC.AndMahajanBK.(2003)Text book of Preventive and Social Medicine 3<sup>rd</sup>EdJaypee brothers, Medical Publishers (p) Ltd.

### **WebReferences:**

- [Mohfw.nic.in/NRHM/NIDD](http://Mohfw.nic.in/NRHM/NIDD)
- [www.nrhmorissa.gov.in/NIDDCP.html](http://www.nrhmorissa.gov.in/NIDDCP.html)

### MappingwithProgrammeOutcomes

	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

### MappingwithProgrammeSpecific 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
Weightedpercentage(roundedof) of Course Contribution to Pos	3	3	3	3	3

TitleoftheC ourse		WOMEN'S HEALTH AND WELLNESS								
Category	Year	L	T	P	O	Credit s	Ins t Hr s	Mark s		
	Se m							CIA	External	Total
Elective / SE		Y				2	2	2 5	7 5	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	<p><b>Nutrition for Women-</b></p> <ul style="list-style-type: none"> <li>• Dietary guidelines for a healthy lifestyle.</li> <li>• Current concepts pertaining to balanced diets.</li> <li>• Nutrient requirements for young and older women, with a special focus on protein, iron, vitamin D, and calcium.</li> <li>• Factors affecting nutrient intake in women: socioeconomic factors, environmental conditions, and health conditions.</li> <li>• Consequences of eating disorders in young women</li> </ul>	8
UNIT II	<p><b>Physical Health-</b></p> <ul style="list-style-type: none"> <li>• Significance of body weight and body composition parameters.</li> <li>• Benefits of aerobic, flexibility, and strength training exercises on general health, bone health, and risks associated with NCDs.</li> </ul>	8
UNIT III	<p><b>Reproductive Health-</b></p> <ul style="list-style-type: none"> <li>• Menstrual health, pregnancy, and lactation.</li> <li>• Pre- and post-menopausal concerns and preventive measures.</li> <li>• Sexually transmitted diseases: an overview.</li> </ul>	8
UNIT IV	<p><b>Mental Health</b></p> <ul style="list-style-type: none"> <li>• Common mental health problems: trends and issues relating to women.</li> <li>• Depression, anxiety, and coping with stress.</li> <li>• Strategies to improve mental health: learning new skills and hobbies.</li> <li>• Relaxation techniques such as yoga and meditation.</li> </ul>	8
UNIT V	<p><b>Social Health</b></p> <ul style="list-style-type: none"> <li>• Balancing home and career.</li> <li>• Strengthening relationships and enhancing communication skills.</li> <li>• Personality development and technological advancements and their impact.</li> <li>• Dealing with domestic violence and harassment issues.</li> </ul>	8
	<b>TOTAL</b>	<b>40</b>

### **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, and 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 the 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 holistically.

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, and mental health in a multiethnic sample of midlife women: results from the Study of Women's Health Across the Nation (SWAN). *JWomen'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*. 13<sup>th</sup> 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 and Sport*. McGraw Hill, New York.
7. Wrzus C, Hänel M, Wagner J, Neyer FJ. (2013) Social network changes and life events across the lifespan: a meta-analysis. *Psychol Bull*; 139(1):53-80.

### **e-Learning Resources:**

- [https://www.nhp.gov.in/social-health\\_pg](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 ProgrammeOutcomes

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

### MappingwithProgrammeSpecificOutcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage (roundedoff)ofCourse Contribution to POs</b>	3	3	3	3	3

<b>SEMESTER II</b>	
<b>Core/Major Course II</b>	<b>Food Science</b>
<b>Paper Code:</b>	<b>Theory:6hrs/week</b>

### **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.

### **CourseContent**

#### **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 method of 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, BrahmamG.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	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

<b>SEMESTER II</b>	
<b>Core/Major Practical II</b>	<b>Food Science</b>
<b>PaperCode:</b>	<b>Practical:3hrs/week</b>

**Course Learning Outcomes:**

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 on different methods of cooking.
4. Understand experimental cookery.
5. Develop recipes by applying knowledge on cooking methods and properties of food

**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 portion 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, addition of sugar and acid on 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, hard water, 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 the 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 overcooking 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 MS, Krishnaswamy K, BrahmamGNV (2009). Textbook of Human Nutrition, 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd.

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

Learning Objectives
To enable the students to:
Understand the basic concepts of fashion design clothing psychology and wardrobe planning
Acquire knowledge on design elements and colour psychology.

UNIT	CONTENT	HOURS
UNIT I	<p><b>Introduction of fashion designing</b></p> <p>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.</p>	8
UNIT II	<p><b>Design</b></p> <p>a) Design- definition and types- structural and decorative design, requirements of a good structural and decorative design. Application of structural and decorative sign in address, selection and application of trimmings and decorations.</p> <p>b) Elements of design- line, shape or form, colour, size and texture.</p> <p>c) Principles of design -balance- formal and in formal, rhythm-through repetition, radiation and gradation, emphasis, harmony and proportion. Application of principles of design in address.</p>	10

	<p><b>Practical</b></p> <p>1. Application of structural and decorative design in a dress.</p> <p>2. Application of elements of design in apparel.</p> <p>3. Application of Principles of design in apparel.</p>	<b>8</b>
<b>UNIT III</b>	<p><b>Colour</b></p> <p>a) Colour - definition, colour the ories-prang colour chart and Munsell colour system,</p> <p>b) Dimensions of colour-hue, value, and intensity.</p> <p>c) Colour harmonies- types and its application in dress design.</p>	<b>7</b>
	<p><b>Practical</b></p> <p>1. Colour theories- prang colour chart and Munsell colour system.</p> <p>2. Application of colour harmonies in apparel designing.</p>	<b>5</b>

<b>UNIT V</b>	<p><b>Figure drawing and analysis</b></p> <p>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, and large abdomen, round face, large face, small face, prominent chin and jaw, prominent forehead.</p>	<b>8</b>
	<p><b>Practical-Model drawing 8 and 10 head figure</b></p>	<b>6</b>
<b>UNIT VI</b>	<p><b>Wardrobe planning</b></p> <p>a) Wardrobe planning for different age groups, factors influencing wardrobe selection, Fashion and season, d) Designing dresses based on different occasions –business meetings, parties/ dinners, evenings/leisure hours, weddings, functions, sports, uniforms for civil service, air hostess, hoteliers, schools–girls and boys.</p>	<b>8</b>
	<b>Total</b>	<b>60</b>

## COURSE OUTCOME

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

**CO1.** Identify the right choice of colour, design used in apparel designing

**CO2.** Explain the concepts related to the design and colour in apparel designing **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 the body type and plan 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-learning Resources:**

1. <https://purushu.com/2010/08/elements-of-design-in-fashion.html>
2. <https://vansedesign.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

<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedoff) ofCourseContributiontoPos</b>	3	3	3	3	3

MSSU



<b>Title of the Course</b>		<b>LANDSCAPE DESIGN AND ORNAMENTAL GARDEN</b>								
<b>Category</b>	<b>Year</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>O</b>	<b>Credits</b>	<b>Inst Hr s</b>	<b>Marks</b>		
	<b>Sem</b>							<b>CIA</b>	<b>External</b>	<b>Total</b>
Elective / SE		Y		Y		2	2	25	75	100

<b>Learning Objectives</b>
To enable the students to:
Acquire skill in identifying the ornamental flowers, shrubs and trees.
Develop a conceptual understanding of landscape design principles and gardening components for various built forms.
Create designs in integrating landscape and ornamental gardening with built environment.

<b>UNIT</b>	<b>CONTENT</b>	<b>HOURS</b>
<b>UNIT I</b>	<b>Landscape Design</b> - 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.	<b>6</b>
	<b>Practical:</b> Identifying and Selection of ornamental plants.	<b>2</b>

<b>UNIT II</b>	<b>Ornamental Garden</b> - 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.	<b>6</b>
	<b>Practicals:</b> Practices in preparing home garden designs	<b>2</b>
<b>UNIT III</b>	<b>Styles and Types of Landscape Garden</b> - Garden Styles: Formal, Informal and Freestyle, Wild Gardening, Types of Gardens: Persian, Mughal, Japanese, English, Italian, Buddha and Spanish garden.	<b>6</b>
	<b>Practicals:</b> Practices in preparing any one style of garden design.	<b>2</b>
<b>UNIT IV</b>	<b>Special Types of Gardens</b> - Vertical Garden, Roof Garden, Bog Garden, Sunken Garden, Rock Garden, Clock Garden, Bonsai Gardens, Temple Garden & Sacred Groves.	<b>6</b>
	<b>Practicals:</b> Project on landscaping	<b>2</b>
<b>UNIT V</b>	<b>Indoor-Outdoor Plants</b> - Kinds and Classification, Factors Influencing Growth of Plants. Planning and Execution of Landscape Design Based on the Styles and Kinds of Plants.	<b>6</b>
	<b>Practicals:</b> Visit to parks and botanical gardens.	<b>2</b>
	<b>Total</b>	<b>40</b>

### **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 ornamental garden design.

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

CO5: Create designs in urban landscape by applying various styles.

### **References:**

1. AK Tiwari (2012) Fundamentals of Ornamentals Horticulture and Landscape Gardening, NIPA publisher
2. Alkasingh (2015) A colour handbook: Landscape gardening, NIPA publisher
3. Deshraj (2017) Floriculture at a glance, Kalyani publishers
4. G.S. Randhawa, A.N. Mukhopadhyay, 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. [MKannan, PRanchana, SVinodh](#) (2016) Ornamental Gardening and Landscaping, New India publishing agency

e-Learning Resources:

- [http://www.megagriculture.gov.in/PUBLIC/floriculture\\_objectives.aspx](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](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%20CAD.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	PSO 1	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 -III

TitleoftheCourse		HUMAN NUTRITION								
Category	Year	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem							CIA	External	Total
Core	III	Y		Y		4	5	25	75	100

LearningObjectives
Toenablethestudents to:
Understandtheimportanceofvariousmacronutrientsinrelationtohealth.
Highlightdietaryguidelinesforvariousnutrientsandcontribute towardsabetterlifestylefor Preventionofnon-communicablediseases.

UNIT	CONTENT	HOURS
<b>UNIT I</b>	<b>Introductiontonutrition</b> HistoryofNutrition– DevelopmentofNutritionasa Science Foodasasourceofnutrients,definitionofnutrients,Balanceddietsanddietary guidelines-currentconcepts Signsandsymptomsofadequate,optimumandgoodnutrition,malnut rition(Undernutrition,andovernutrition), AssessmentofNutritionalstatus- Anthropometric,Biochemical,ClinicalandDietaryaspects.	7
	<b>Activity-</b> PlanmealsbasedonMy- Plateconcepts, RecordHeight,Body weight, andcalculateBodyMassIndex(BMI)in asmallsample,andcategorizeaccordingtoBMI	3

<p><b>UNIT II</b></p>	<p><b>Carbohydrates:</b>  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.</p> <p><b>Proteins</b>  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</p>	<p>17</p>
	<p><b>Activity-</b>  List foods based on their GI, and Protein supplements available in the market.</p>	<p>3</p>
<p><b>UNIT III</b></p>	<p><b>Lipids</b>  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.</p> <p><b>Energy</b>  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.</p>	<p>17</p>
	<p><b>Activity-</b> List the healthy and unhealthy sources of fats in one's diet.  Learn to estimate BMR.</p>	<p>3</p>

<b>UNIT IV</b>	<p><b>Fat Soluble Vitamins</b>          Food sources, Requirements, Functions, Effects of deficiency or Toxicity (wherever applicable).</p> <p><b>Water Soluble Vitamins</b>          Food sources, Requirements, Functions, Effects of deficiency. Antioxidant, Role of certain Vitamins in Health promotion</p>	<b>10</b>
<b>UNIT V</b>	<p><b>Macrominerals</b>          Calcium, Phosphorous, Magnesium, Potassium, Sodium and Chloride- Distribution in the body, functions, food sources, requirements, effects of deficiency and toxicity.</p> <p><b>Micro/Trace minerals</b>          Iron, Zinc, Iodine, Selenium, Manganese, Chromium, Fluoride and Copper          Distribution in the body; functions, effects of deficiency, food sources and requirements, Role of Antioxidant minerals</p> <p><b>Water</b>          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.</p>	<b>15</b>
	<b>TOTAL</b>	<b>75</b>

### **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 micronutrients, 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.

### **Reference:**

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) Introductory Nutrition. 7<sup>th</sup> ed. Times Mirror/Mosby College Publishing, St. Louis
3. Insel P., Ross D., McMahon K., Bernstein M. (2016) Discovering Nutrition. 5<sup>th</sup> Ed., Jones & Bartlett Learning, Massachusetts, USA.
- Mahan K. and Sylvia E. Stump (2000) Krause's Food Nutrition and Diet Therapy, Saunders, USA
4. Medeiros D. M., and Wildman R. E. C. (2019) Advanced Human Nutrition. 4<sup>th</sup> Ed., Jones & Bartlett Learning, Massachusetts, USA.
5. Ross A. C., Caballero B., Cousins R. J., Tucker K. L., Ziegler T. R. (2014) Modern Nutrition in Health and Disease. 11<sup>th</sup> Ed., Wolters Kluwer | Lippincott Williams & Wilkins, Philadelphia, USA.
- 6.Sizer F. S. and Whitney E. (2014) Nutrition: Concepts & Controversies. 13<sup>th</sup> Ed., Wadsworth, Cengage Learning, USA.
7. Whitney, E.R. and Rolfe S.R. (1996) Understanding nutrition. 7<sup>th</sup> Ed., West Publishing Company, USA

e-Learning Resources:

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

**Mapping with Programme Outcomes**

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

**Mapping with Programme-Specific Outcomes**

<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedof)of CourseContributionto Pos</b>	3	3	3	3	3

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Title of the Course		HUMAN NUTRITION PRACTICAL								
Category	Year	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem							CIA	External	Total
Core	III			Y		4	5	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 -Circumference measurements -Clinical signs -Dietary assessment Ashing of food and preparation of ash solution
Estimation of Iron in food Estimation of calcium in food 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 Infrared moisture balance- Demonstration
Estimation of glucose in blood (colorimetric estimation and use of glucometer) Estimation of haemoglobin in blood
Determination of plasma cholesterol, Triglycerides, HDL and LDL cholesterol (with the use of the semi auto analyser) Estimation of acid value in oil/fat Visit to a food analytical lab

## COURSE OUTCOME

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

- CO1. Describe the principle and procedures for the various experiments.
- CO2. Identify appropriate laboratory procedures suited for estimation of selected nutrients in food and body fluids.
- CO3. Estimate selected 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.I. (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). 8<sup>th</sup> Ed. Instrumental Methods of Chemical Analysis. Gel Publishing House.
5. Srivastava, A.K. and Jain, P.C. (1986). 2<sup>nd</sup> 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). 5<sup>th</sup> ed. 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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	L	S	M	S	L	M	L	S	S
CO2	S	L	S	M	S	L	M	L	M	S
CO3	S	L	S	S	S	L	L	M	M	S
CO4	S	L	S	M	S	L	L	M	M	S
CO5	S	L	S	S	S	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 of) Of Course Contribution to Pos	3	3	3	3	3

Title of the Course		HUMAN DEVELOPMENT								
Category	Year	L	T	P	O	Credits	Inst. Hrs	Marks		
	Sem							CIA	External	Total
Core		Y		Y		5	6	25	75	100

<b>Learning Objectives</b>
<b>To enable the student to:</b>
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, adolescents, and exceptional children.

UNIT	CONTENT	HOURS
UNIT I	<p><b>Growth and development</b>  <b>Meaning</b> – growth and development, principles of governing growth and development, developmental tasks of different stages.  <b>Methods of Study of Human Development.</b></p>	10
	<p><b>Practical</b> - preparation of case study - observing various development-physical, motor, cognitive, creative, social, emotional, and intellectual of a particular child.</p>	10
UNIT II	<p><b>Infancy and Childhood</b>  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.</p>	16
	<p><b>Practical</b> - Socio-metric study of early adolescents.  Analysis of various play techniques.</p>	4
UNIT III	<p><b>Adolescence</b>  <b>Adolescence</b> – physical and psychological changes, emotional, moral and social development, problems of adolescence.  <b>Delinquency</b> – causes, prevention, and rehabilitation.  <b>Educational and Vocational Guidance</b> – role of family and schools and colleges in guiding adolescence.</p>	10

	<b>Practical</b> - A survey on juvenile delinquency prevalence.	5
<b>UNITIV</b>	<b>Adulthood and Old Age</b> <b>Adulthood</b> – characteristics and developmental tasks, all aspects of development, and vocational adjustments. <b>Old Age</b> – characteristics of old age, physical changes, psychological changes, place of the aged in Indian society.	7
	<b>Practical</b> -Surveyonproblemsof old age.	3
<b>UNITV</b>	<b>ExceptionalChildren</b> Introduction to Children with Special Needs and Identification & Educational Rehabilitation Gifted children, Orthopedically challenged, Mentally retarded, Hearing impaired, Visually handicapped, Learning disability.	7
	<b>Practical</b> - Visit to an Institution for Exceptional Children	3
	<b>TOTAL</b>	75

## 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 Textbook 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.

### e - Learning Resources

- i. [http://www.wbnsou.ac.in/online\\_services/SLM/BED/SEM-01\\_A1.pdf](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/departmentsdocs\\_16/Growth%20&%20Development%20-%20Dr.%20Ismail%20Thamarasseri.pdf](https://www.cukashmir.ac.in/departmentsdocs_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
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### 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		CHANGING TRENDS IN EXTENSION EDUCATION								
Category	Year	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem							CIA	External	Total
Elective/ SEC		Y		Y		3	4	25	75	100

### Learning Objectives

To impart knowledge to the students on 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 approach 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	<p><b>Home Science Extension Education</b></p> <p>Extension education – meaning, scope, characteristics, objectives, need, principles, process, models and philosophy</p> <p>Emergence of Home Science Extension Education in India</p> <p>Extension Education as a profession–adult education and distance education.</p> <p>Leadership–role, styles and management grid, Qualities of a good extension manager: Changing role of extension managers caused by globalization in Home Science.</p>	8
	<p><b>Practical</b>–Exercises on presentations skills, listening skills, writing skills, exercises on distortion of communication message.</p>	2
UNIT II	<p><b>Diffusion and Adoption of Innovations</b></p> <p><b>Predicting innovativeness:</b> simulation of innovation, innovation decision process - types of innovation decision, consequence on innovations, desirable or undesirable, direct or indirect, anticipated or unanticipated consequence.</p> <p>Concept of homophily and heterophily and their influence on the flow of innovation; concept of diffusion and its elements.</p> <p><b>Adoption Process</b> – concept of stage, shade of agreement, neglected element.</p> <p><b>Adopter Categories</b> – innovativeness and adopter categories, adopter categories as idea types,</p>	15
	<p><b>Practical</b></p> <p>Designing and Preparation of low-cost charts, posters, flashcards, pamphlet, leaflet etc.</p>	2



<b>UNIT III</b>	<p><b>Communication process</b></p> <p>Communication process – concept, elements and their characteristics Models and theories of communication</p> <p>Communication skills– fidelity of communication, communication competence and empathy, communication effectiveness and credibility, feedback in communication, social networks and Development communication – Barriers in communication</p> <p>Message – Meaning, dimensions of a message, characteristics of a good message, Message treatment and effectiveness, distortion of message.</p>	<p><b>8</b></p>
	<p><b>Practical-Generating computer-aided presentation</b></p>	

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		5
<b>UNITIV</b>	<p><b>Teaching and Learning</b></p> <p>Concept of teaching and learning</p> <p>Classification of Extension teaching methods</p> <p>Various extension teaching aids– selection of appropriate methods, features, advantage, limitation of various methods of teaching (mass, group, individual)</p> <p>Audio visual aids – planning, selection and types of visual, audio and audio–visual aids</p> <p>Contribution of AV Aids in Extension Education.</p>	8
	<p><b>Practical</b></p> <p>Report writing and Analysis of (Any2)-</p> <ul style="list-style-type: none"> <li>● 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.</li> <li>● 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.</li> <li>● Critical analysis report of any one development programmes for women or children in India.</li> </ul>	2

<b>UNIT V</b>	<p><b>Current approaches in extension education</b>-Farming situation-based extension, market-led extension, farm field school, ATIC, Kissan Call Centers, and NAIP. Problems in rural GO's assistance available to voluntary agencies from different ministries/departments of the Government of India include details of functions in the Central/State Social Welfare Board and CAPART, Employment Generation Programmes such as NREGP, Women Development Programmes like ICDS, Self Help Groups, MSY, and RMK.</p>	<b>8</b>
	<p><b>Practical</b></p> <p><b>Applications of Extension Education – Methods and Techniques (Any 3)</b></p> <ul style="list-style-type: none"> <li>● Design and conduct training modules for target groups and follow up on the training conducted. Preparation of a suitable audio-visual aid for community extension work.</li> <li>● Visit training and development institutions (KVKs, FTCs, TICs, EEs, MANAGE, MAARM, etc.) to share their experiences on different aspects of training.</li> <li>● Visit Gram Panchayat to study ongoing rural development programmes, visit KVK, NGO, and extension centers of State Agricultural Universities and State Departments, focusing on bottom-up planning, report preparation, and presentations.</li> <li>● Conduct a socio-economic diet survey.</li> <li>● Preparation of plans, projects, and programme proposals. Exercises on participatory methods such as RRA, PRA, PLA, etc., and evaluation of plans. Exercises on PERT. Visit development organizations and NGOs.</li> </ul>	<b>2</b>
	<b>TOTAL</b>	<b>60</b>

**COURSE OUTCOME**

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

**CO1. Describe key Concept of Home Science Extension Education**

**CO2.** Explain 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. Albrecht, 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.
6. Waghmare, S.K. (1989): Exploring of Extension Excellence, Multi Tech. Pub. Company.

#### e- Learning Resources

- <http://ecoursesonline.iasri.res.in/course/view.php?id=243>
- [https://onlinecourses.swayam2.ac.in/cec19\\_mg32/preview](https://onlinecourses.swayam2.ac.in/cec19_mg32/preview)

#### Mapping with Programme Outcomes

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

#### Mapping with Programme Specific Outcomes

<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
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<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedof)of CourseContributionto Pos</b>	3	3	3	3	3

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### SEMESTER-IV

<b>Title of the Course</b>		<b>NUTRITION THROUGH LIFE CYCLE</b>								
<b>Category</b>	<b>Year</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>O</b>	<b>Credits</b>	<b>Inst Hrs</b>	<b>Marks</b>		
	<b>Sem</b>							<b>CIA</b>	<b>External</b>	<b>Total</b>
Core		Y		Y		4	5	25	75	100

<b>Learning Objectives</b>
To enable the students to:
Understand the role of nutrition in the growth and development through the lifecycle.
Gain insight into the principles of effective meal planning.
Understand the nutritional needs of various age groups
Acquire skills to plan diets for various age groups across the lifecycle.

<b>UNIT</b>	<b>CONTENT</b>	<b>HOURS</b>
<b>UNIT I</b>	<p><b>Introduction to Meal Planning</b> Balanced diet, food groups, Food Guide Pyramid (ICMR), food plate, RDA, factors affecting RDA.</p> <p>Principles of meal planning – steps involved in planning a diet.</p> <p>Nutrition for Adults – nutritional requirements, planning balanced diets for adult men and women, promoting a healthy lifestyle through a holistic approach.</p>	<b>10</b>

<b>UNITII</b>	<p><b>Nutrition During Pregnancy and Lactation</b></p> <p>Physiological demands of pregnancy, nutritional needs, effect of nutrition on pregnancy outcome, optimal weight gain, nutrition-related problems in pregnancy, complications of pregnancy.</p> <p>Nutrition during lactation – physiology of lactation, nutritional requirements, concerns of breastfeeding mother.</p>	<b>15</b>
<b>UNITIII</b>	<p><b>Nutrition during infancy-</b> Growth and development, growthstandards, food and nutritional requirements, breast feeding,artificialfeeding,lowbirthweightbabies,complementar yfeeds.</p> <p><b>Nutrition for Preschool Children</b></p> <p>Growth and development, food and nutritional requirements, eating habits and food behaviors, nutrition-related problems – PEM, VAD, and their dietary interventions.</p>	<b>15</b>
<b>UNITIV</b>	<p><b>Nutrition for school children-</b> Growth pattern, nutritional requirements,importanceofhealthysnacks, factors affecting habits, school lunch.</p> <p><b>Nutrition during adolescence- growth and development,</b> nutritional requirements, food habits, nutritional problems – obesity,underweight,anaemiaandeatingdisorders.</p>	<b>15</b>
<b>UNITV</b>	<p><b>Nutrition for old age-</b>Physiological changes in the elderly, Food and nutritional requirements, nutritional and health concerns in old age,healthy lifestyle.</p>	<b>5</b>
	<p><b>PRACTICAL</b></p> <ol style="list-style-type: none"> <li>1. Preparation of complementary feed.</li> <li>2. Planning and preparation of diets for different activity levels and income groups:</li> </ol>	

	<ul style="list-style-type: none"> <li>a. Pre-school child</li> <li>b. School-going children</li> <li>c. Adolescents</li> <li>d. Adults</li> <li>e. Expectant mother</li> <li>f. Nursing mother</li> <li>g. Old age</li> </ul> <p>3. Planning and preparation of diets (low and medium cost) for deficiency diseases:</p> <ul style="list-style-type: none"> <li>a. PEM</li> <li>b. Vitamin A deficiency</li> <li>c. Nutritional anemia</li> </ul> <p>4. Packed lunch for school.</p>	<b>15</b>
	<b>TOTAL</b>	<b>75</b>

## 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 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 for deficiency 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) 1<sup>st</sup> edition, New age international publishers, New Delhi.
5. Stacy N, William's Basic Nutrition and Diet Therapy. (2005) 12<sup>th</sup> edition, Elsevier publications, United Kingdom.
6. Whitney EN and Rolfes SR, Understanding Nutrition. (2002) 9<sup>th</sup> edition West/Wordsworth, London.

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7. Groff JL, Gropper SS, Advanced Nutrition and Human Metabolism. (2000) 3<sup>rd</sup> edition, West/ Wadsworth, United Kingdom.
8. Cataldo, DeBruyne and Whitney, Nutrition and Diet therapy – Principles and Practice. (1999) 5<sup>th</sup> edition, West/ Wadsworth, London.

#### e-LEARNING RESOURCES

- <http://vikaspedia.in/health/nutrition/dietary-guidelines-1/dietary-guideline-1>
- <https://www.nhp.gov.in/healthyliving/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	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3

<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedof) OfCourseContributiontoPos</b>	3	3	3	3	3

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<b>SEMESTER IV</b>	
<b>Core/Major Practical V</b>	<b>Nutrition through Life Cycle</b>
<b>Paper Code:</b>	<b>Practical:3hrs/week</b>

### **Course Content**

1. Display raw and cooked food materials according to 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 an 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		BASICS OF FOOD MICROBIOLOGY								
Category	Year III	L	T	P	O	Credits	InstHrs	Marks		
	Sem VI							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
<b>UNIT I</b>	<b>Introduction to Microbes in Foods</b> 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.	<b>15</b>
<b>UNIT II</b>	<b>Microbial spoilage and contamination of common food</b> 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.	<b>15</b>
<b>UNIT III</b>	<b>Beneficial uses of microorganisms in food and health</b> Microorganisms used in fermented products - Alcoholic drinks, Dairy products, Bread, Vinegar, Pickled foods. Single-cell protein Food Biopreservatives of microbial origin. Intestinal Bacteria and Probiotics.	<b>10</b>
<b>UNIT IV</b>	<b>Food poisoning and Food borne disease</b> 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.	<b>15</b>
<b>UNIT V</b>	<b>Microorganisms found in water, soil, air and sewage-</b> List of microorganisms and diseases caused; Test for sanitary quality of water, Purification of water <b>Control of Microorganisms in food</b> 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)	<b>20</b>
<b>TOTAL</b>		<b>75</b>

## 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 apply the 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 S.C. (2012) Textbook of Microbiology and Immunology, 2<sup>nd</sup> edition, Elsevier India.
2. Garbutt J. (1997) Essentials of Food Microbiology, 2<sup>nd</sup> edition, Arnold publication, New York, 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. 5<sup>th</sup> 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, MJ Publishers, Chennai.
8. Gerald McDonell. (2020). Block's Disinfection, Sterilization and Preservation. 6<sup>th</sup> 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/>

### MappingwithProgrammeOutcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	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

### MappingwithProgrammeSpecificOutcomes

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
Weightedpercentage(roundedof)of CourseContributionto Pos	3	3	3	3	3



## 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 apply the 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 foodborne infections.

CO4. Identify the microscopic structure of algae, molds, yeast, viruses, 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, 2<sup>nd</sup> edition, Elsevier India.
2. Garbutt J. (1997) Essentials of Food Microbiology, 2<sup>nd</sup> edition, Arnold publication, New York, 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. 5<sup>th</sup> 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, MJ Publishers, Chennai.
8. Gerald McDonell. (2020). Block's Disinfection, Sterilization and Preservation. 6<sup>th</sup> 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 equipments 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) to food processing units or any other organization dealing with advanced methods in food microbiology.

### Mapping with Programme Outcomes

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

### Mapping with Programme Specific Outcomes

<b>CO/PSO</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedof)of CourseContributionto Pos</b>	3	3	3	3	3

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

<b>Learning Objectives</b>
<b>To enable the student to:</b>
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	<b>Introduction to research</b> Research-Meaning, objectives, significance. Research problem- Definition and selection of research problem. Research design- Types of research design Methods of sampling-probability and non-probability sampling-Merits and demerits. Determining sample size	6
UNIT II	<b>Data Collection</b> Primary and secondary data, selection of appropriate method for data collection. Tools used for data collection- Questionnaire and Interview schedule.	6
UNIT III	<b>Coding and tabulation of data</b> Data entry and computation, Tabulation of data -part of the table Presentation of data-use of bar graph and pie chart	6
UNIT IV	<b>Basic statistical tools for analysis and interpretation</b> 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

<b>UNIT</b>	<b>Reportwriting</b> Steps in report writing,Layout of a report.Bibliography-citingreferences-anyonestyle. <b>EXPERIENTIALLEARNING</b> Carryoutasmallsurvey,codeandtabulatedataandpresentdatausingtablesandgraphs.Interpretdatausingsimplestatisticaltoolsandpresentreport followingrulesforreportwriting.	<b>6</b>
<b>TOTAL</b>		<b>30</b>

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## COURSE OUTCOMES

After successful completion of the course, the student will be able to: **CO1.** Define terms associated with the conduct of research.

**CO2.** Explain research design, methods of research, collection, tabulation and presentation 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, W.J. and Hatt, PK (1981) *Methods in Social Research*, McGraw Hill International Editions, Sociology Series.
2. Gupta, S.P. (2019) *Statistical methods*. 46<sup>th</sup> ed. Sultan Chand and Co, New Delhi.
3. Kerlinger F. N. and Lee, H.B. (2000) *Foundations of Behavioural Research* 4<sup>th</sup> Ed. Harcourt College Publishers.
4. Kothari, C.R. (2019). *Research methodology methods and techniques*, New Age 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://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	PO7	PO8	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	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

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## SEMESTER V

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

<b>Learning Objectives</b>
<b>To enable the student to:</b>
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
<b>UNIT I</b>	<b>Concept of diet therapy and role of dietitian</b> 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 dietitians in nutritional care	<b>20</b>
<b>UNIT II</b>	<b>Diseases of Gastrointestinal tract</b> 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	<b>20</b>
<b>UNIT III</b>	<b>Diseases of liver, gallbladder &amp; febrile conditions</b> Etiology, symptoms, dietary management of: Disease of liver & Gallbladder- Hepatitis, cirrhosis, gallstones Febrile conditions- Acute & Chronic fevers  (Typhoid, influenza, malaria, tuberculosis, COVID)	<b>10</b>
<b>UNIT IV</b>	<b>Metabolic disorders</b> 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.	<b>10</b>



<b>UNITY</b>	<b>Diseases of excretory system and cancer</b> 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.	<b>15</b>
	<b>SELF STUDY/EXPERIENTIAL LEARNING</b> Conduct a group discussion to understand various diseases and presentation 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 various diseased conditions for different sections of society.	
	<b>Suggested Activity</b> Internship in dietary unit of a hospital	
	<b>TOTAL</b>	<b>75</b>

### 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 various disease conditions.
- CO4.** Examine the physiological condition of the individual and explain the role of foods 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, 4<sup>th</sup> 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 McGraw-Hill Publishing Company Limited, New Delhi
4. Passmore R. and Davidson S. (1986) Human nutrition and Dietetics. Livingstone publishers
5. Sharma. A. (2017), Principles of Therapeutic Nutrition and Dietetics, CBS Publishers & Distributors Pvt Ltd, New Delhi.
6. Srilakshmi B, Dietetics (2019), 8<sup>th</sup> edition, New Age International Publishing Ltd, New Delhi
7. Williams S.R. (2000) Basic Nutrition and Diet Therapy, Mosby publication.

**e-learningresources:**

- [https://www.cdss.ca.gov/agedblinddisabled/res/VPTC2/9%20Food%20Nutrition%20and%20Preparation/Types\\_of\\_Therapeutic\\_Diets.pdf](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://www.medicinenet.com/difference_between_diarrhea_and_dysentery/article.html)
- <https://my.clevelandclinic.org/health/diseases/15587-inflammatory-bowel-disease-overview>

**MappingwithProgrammeOutcomes**

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

**MappingwithProgrammeSpecificOutcomes**

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	2	3	3
<b>CO2</b>	3	3	2	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	13	15	15
<b>Weightedpercentage(roundedoff)of CourseContributionto Pos</b>	3	3	3	3	3

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

Learning Objectives
<b>To enable the student to:</b>
Gain knowledge and develop skills and techniques in planning and preparation of therapeutic diets.
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 and Service 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 and Service of diets for: Viral hepatitis Cirrhosis of liver
Planning, Calculation of nutrient content, Preparation and Service of diets for: Obesity, Diabetes Mellitus, Atherosclerosis
Planning, Calculation of nutrient content, Preparation and Service of diets for: Hypertension, Chronic kidney disease

#### SELF-STUDY/EXPERIENTIAL LEARNING

1. Initiate a diet counseling center in the institution for students, teaching, and non-teaching faculty.
2. Conduct exhibition to display diets for various disease conditions.
3. Prepare pamphlet indicating food to be included/avoided/restricted in different disease conditions.
4. Commemorate days such as World Diabetes Day, World Heart Day and organize Seminars and awareness programs.

#### COURSE OUTCOMES:

**After successful completion of the course the student will be able to: CO1.** List the principles of 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, 2<sup>nd</sup> edition, Elite Publishing House, New Delhi
3. Sri Lakshmi. B., (2019) Dietetics, 8<sup>th</sup> Ed, New Age International Pub. Co, Chennai.
4. Vimala V. (2010). Advances in Diet Therapy, 1<sup>st</sup> 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	PSO2	PSO3	PSO4	PSO5
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 off) of Course Contribution to Pos	3	3	3	3	3

Title of the Course		FOOD SERVICE MANAGEMENT								
Category	Year III	L	T	P	O	Credits	InstHrs	Marks		
	Sem V							CIA	Univ. Exam	Total
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	<b>Organisation Management</b> 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	<b>Personnel Management</b> Definition, functions of personnel department, Recruitment- sources, Selection- steps, Induction - definition, methods, uses, Training- advantages, methods, supervision, performance appraisal, promotion, demotion, transfer, retirement, termination and dismissal of employees. Labor laws pertaining to the food service establishment.	10
UNIT III	<b>Food Management</b> <b>Food purchase</b> – purchasing process, functions of food buyer, methods of buying open market, formal, negotiated, wholesale, blanket order, contract. <b>Storage in food service</b> – types of stores, storeroom management, purchase, stores records- Physical and perpetual inventory order form, requisition slip, invoice, goods received book, stock book, bin card, stores ledger.	10
UNIT IV	<b>Plant and equipment management</b> <b>Planning of food service unit-</b> Layout of a food service, planning of storage, production and service areas, concepts of workflow and work simplification technique. Environmental hygiene- pest control- types of pests and pest control methods; garbage disposal method. <b>Safety</b> in food service institution- Accidents- causes and prevention. <b>Equipment</b> in food service - Classification of equipment, factors affecting selection of equipment.	15

<b>UNIT V</b>	<p><b>Financial Management</b>  <b>Book-keeping</b> –definition, advantages of double entry system, books of accounts – an introduction.  <b>Costing and Cost control:</b> Basic cost concepts – elements of cost (material, labour, overheads), behavior of cost (fixed, variable, semi-fixed/semi-variable), methods of costing (Dish, meal, menu costing &amp; costing for events), cost control, concept of break-even, break-even point.  <b>Pricing-</b> factors affecting pricing, pricing methods (cost plus, factor, rate of return, subsidy, discount).</p>	<b>15</b>
	<b>Total</b>	<b>60</b>

### 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 conducting 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, New Delhi.
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, 8<sup>th</sup> edition, Hodder Education, London.
5. Sethi, Mohini, Malhan, Surjeet. (2015). Catering Management – An Integrated Approach, 3<sup>rd</sup> ed, New Age International Publishers, New Delhi.

6. Suganthi, VandPremakumari, 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](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	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
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage (rounded off) of Course Contribution to Pos</b>	3	3	3	3	3

Title of the Course		PROJECT								
Category	Year	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem							CIA	External	Total
Elective/ SEC		Y				3	4	50	50	100

### PROJECT & VIVA-VOCE:

Students are encouraged to work on group projects (4-6 members) to get acquainted with real-life problem-solving and hands-on experience. The outcomes of the projects will be submitted as reports, and viva voce shall be conducted for students individually.

### 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.

### Mapping

Project Viva Voce											
CO	PO					PSO					
	1	2	3	4	5	1	2	3	4	5	6
1	2	3	3	3	2	3	3	3	3	3	3
2	3	3	3	2	2	3	3	2	3	3	2
3	3	2	3	3	2	3	3	2	3	3	2
4	3	3	3	1	2	3	3	2	3	3	2
5	3	3	2	3	3	3	3	2	3	3	2

Strongly Correlated(3); Moderately Correlated(2); Weakly Correlated(1); No Correlation(0)



Title of the Course		FOOD PRODUCT DEVELOPMENT								
Category	Year III	L	T	P	O	Credits	InstHrs	Marks		
	Sem V							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.

UNIT	CONTENT	HOURS
UNIT I	<p><b>Introduction to New Food Product development</b>            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.</p>	7
UNIT II	<p><b>Product Development:</b>            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</p>	8

<p><b>UNIT III</b></p>	<p><b>Product Evaluation and Quality Control</b></p> <p>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.</p> <p>Role of sensory evaluation in consumer product acceptance; requirements for sensory analysis - Sensory panel</p> <p>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)</p> <p>Food safety standards and regulations: Domestic regulations FSSAI, AGMARK, BIS Quality management systems in India; (ISO 9001,</p>	<p><b>15</b></p>
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	ISO22000); Global Food safety Initiative; International food standards Various national and international organizations dealing with inspection, traceability and authentication, certification, and quality assurance.	
<b>UNIT IV</b>	<b>Packaging and labelling</b> 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.	<b>10</b>
<b>UNIT V</b>	<b>Marketing the product</b> Product lifecycle Costing the product and determining the sales price Advertising and test marketing the product	<b>10</b>
	<b>PRACTICAL</b> 1. Survey of types of convenience foods/novel foods in the market or Survey of market trends and consumer behavior in the food sector. 2. Sensory analysis: conducts 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.	<b>10</b>
	<b>TOTAL</b>	<b>60</b>

## 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 and 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 labelling regulations, 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. 3rd ed. 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 Food Product Development. 2nd 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=iL0iGpa4vg>
- <https://www.youtube.com/watch?v=5kOXUH8kaCs>

## Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	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	PSO2	PSO3	PSO4	PSO5
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 off) of Course Contribution to Pos	3	3	2	3	3

Title of the Course		FOUNDATIONS OF BAKING AND CONFECTIONERY								
Category	Year	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem							CIA	External	Total
Elective/ SEC		Y				3	4	25	75	100

Learning Objectives
To enable the students to:
Gain insight into the planning and operation of bakery unit.
Familiarize with the equipments 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
<b>UNIT I</b>	<b>An Overview of Bakery Industry</b> Current status and growth of bakery industry in India. Baking – principles, process. Layout and organization of a bakery unit. Equipment and tools used in baking and confectionery. Bakery sanitation and personnel hygiene.	<b>10</b>
<b>UNIT II</b>	<b>Ingredients in Bakery and Confectionery</b> Ingredients - Flour, Sugar, Shortenings, Egg, Leavening agents- yeast, baking soda, baking powder, chocolates, cocoa powder. Other ingredients- salt, milk and milk derivatives, malt products, dough improver, oxidizing agents, flavours and colors, nuts, spices and condiments, preserved and candied fruit peels.	<b>10</b>
<b>UNIT III</b>	<b>Breads and Cakes</b> <b>Bread</b> - ingredients, types of breads, faults and its prevention <b>Cakes</b> – ingredients, types of cakes, cake judging, faults and remedies. Different types and techniques of cake	

	<p>decoration -icings and fillings.<b>Relatedexperience</b>  Preparationofbuns,rolls, soupsticks,ruskandpizzabase.  Preparationofangelfoodcake,buttercake,spongecake, chocolate  cake,poundcake.</p>	<b>15</b>
	<p>Modifiedbakedproducts-  highfiber,low/alternatesugar,lowfat,glutenfree, and millet based  bakery products for special nutritionalrequirements.</p>	
<b>UNITIV</b>	<p><b>Pastries,CookiesandBiscuits</b>  <b>Pastries-</b> types of pastries- puff pastry, short crust, phyllo pastry,  flakypastry,chouxpastry  <b>Cookies&amp;biscuits</b>–ingredients,typesandprocessing.  <b>Relatedexperience</b>  Preparationofbiscuits,cookies.  Preparationofpastries-  Shortcrustpastry,flakypastry,puffpastry,chouxpastry.</p>	<b>15</b>
<b>UNITV</b>	<p><b>Confectionery and Marketing of Baked  Products</b>Chocolates-  production,types,chocolatedecorationsSugarbasedconfecti  onery–fudge,fondant,sugarcandies.  <b>Marketingandsalespromotion</b>-costing,packagingandlabelling.  <b>Relatedexperience</b>  Preparationofplainchocolate,fudge,fondant.</p>	<b>10</b>
	<b>TOTAL</b>	<b>60</b>

#### COURSEOUTCOMES

**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 on 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 Text book to Bakery and Confectionery. New Age International Pvt Limited Publisher, New Delhi.
2. Uttam K Singh (2011). Theory of Bakery and Confectionery - An Operational Approach. Kanishka Publishers and Distributors, New Delhi.
3. Yogambal Ashokkumar (2012) Theory of Bakery and Confectionery, PHI publication. New Delhi.
4. Nicoletto, I. and Foote, R (2000). Complete Confectionery Techniques. Hodder and Stoughton, London.
5. Bakers Handbook on Practical Baking (2000) Published by U.S. Wheat Associates, New Delhi.
6. Dubey, S.C (2002) Basic Baking. 4<sup>th</sup> Edition. Published by the Society of Indian Bakers, New Delhi.
7. Sarah R. Lebensky, Priscilla 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 Jersey. 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](http://www.bakels.in)

### MappingwithProgrammeOutcomes

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

### MappingwithProgrammeSpecificOutcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedof) ofCourseContributiontoPos</b>	3	3	3	3	3



Title of the Course		INTERNSHIP / INDUSTRIAL VISIT / FIELD VISIT								
Category	Year III	L	T	P	O	Credits	InstHrs	Marks		
	Sem V							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 of the 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:**

- Learn 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
- Acquire 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 nutrition plan

**EXPECTED OUTCOME OF INTERNSHIP AT CATERING ESTABLISHMENT**

**On completing the internship, the student:**

- Gains knowledge about the functions and operations of a catering establishment
- Develops managerial skills in the areas of managing kitchen, organizing stock, cooking schedules and customer service.
- Learn the strategies used in cost control
- Is trained in menu management and recipe development

- Learnstheculinaryartofplanning,preparingandservingfoodthatistastefuland appealing.
- Isfamiliar withthestandardsofsafetyand hygienefollowedintheindustry/company

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## EXPECTED OUTCOME OF INTERNSHIP AT FOOD INDUSTRY/NUTRACEUTICAL COMPANY

### On completing the internship, the student:

- Learn the organizational setup and the process flow in manufacturing goods/delivering services
- Get hands-on experience in serving in the various departments from procurement to end delivery of finished product
- Develop managerial skills to maintain stock, ensure smooth flow in production/services rendered
- Acquire the ability to work in a team
- Learn 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:

- Gain knowledge about industry/company process.
- Develop skills in 2D and 3D software.
- Analyze cost estimation of building materials and finishes.
- Learn the methods and strategies used in cost control.
- Develop managerial skills in the areas of managing works required by the client.
- Adapt to working in a team and contribute to needs as they arise.
- Demonstrate competency in professional presentation, communication and writing skills.

### Mapping with Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	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	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
<b>Weightage</b>	15	15	15	15	15
<b>Weighted percentage (rounded off) of Course Contribution to Pos</b>	3	3	3	3	3

Title of the Course		NUTRITIONAL BIOCHEMISTRY								
Category	Year	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem							CIA	External	Total
Core		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	<p><b>Biological oxidation and Enzymes</b></p> <p>Biological oxidation, Electron transport chain and Oxidative Phosphorylation. Enzymes – Definition, Types, Mechanism of action, Factors affecting enzyme activity, Coenzyme, Role of vitamins as coenzyme.</p> <p>Free radicals – Definition, Formation in biological systems. Antioxidants – definition, Role of antioxidants in prevention of degenerative disorders</p>	10
UNIT II	<p><b>Metabolism of Carbohydrates</b></p> <p>Classification, Glycolysis, The Citric Acid Cycle, Glycogenesis, Glycogenolysis, Gluconeogenesis, The Hexose Monophosphate Shunt and bioenergetics.</p>	10
UNIT III	<p><b>Metabolism of Protein</b></p> <p>Classification of amino acids, Oxidative Deamination, decarboxylation, transamination</p>	10

	andtransmethylationofaminoacids,ureacycle,biosynthesisofnon-essentialaminoacids,catabolismofessentialaminoacids.Proteinbiosynthesis.	
<b>UNITIV</b>	<b>MetabolismofLipids</b> Classificationoffattyacid,Biosynthesisoffattyacids,betaoxidation of saturatedfattyacids, ketone bodies. Essential fattyacids–typesandfunctions.Lipoproteins–classificationand function.Biosynthesisofcholesterol.	<b>15</b>
<b>UNITV</b>	<b>IntermediaryMetabolism, Nucleicacid&amp;Recentconcepts</b> Overviewofintermediarymetabolismofcarbohydrates,proteinandlipid. Hormonalregulationofcarbohydrateproteinandfatmetabolism Structural components and functions of nucleic acid,StructureofDNA,RNAtypesandfunctions.RecombinantDNA technology,MetabolismofXenobiotics,Nutrigenomics	<b>15</b>
	<b>Practicals</b> 1. Qualitativetestsforsugars-glucose, fructose,lactose,maltoseandglucose. 2. Quantitativeestimationofreducingsugar. 3. Qualitativetestsforproteins	<b>15</b>
	4. DemonstrationExperiments. 5. Estimationoftotalnitrogeninfoods(MicroorMacrokjeldahlmet hods) 6. DeterminationofIodinevalue 7. DeterminationoffatcontentinfoodusingSoxhletmethod.	
	<b>TOTAL</b>	<b>75</b>

#### COURSEOUTCOME

**Aftersuccessfulcompletionofthecoursethestudentwillbeableto**

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

- CO2.** Explain metabolism and regulation of carbohydrate, 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, 6<sup>th</sup> Edition, Wolters Kluwer, London.
4. Harvey, R. and Ferrier, D., *Lippincott's Illustrated Reviews: Biochemistry*, 6<sup>th</sup> edition, Lippincott Williams and Wilkins, Philadelphia.
5. Lehninger, A. L. (1993) *Biochemistry*. 3<sup>rd</sup> 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): 25<sup>th</sup> Ed. *Harpers Biochemistry*. Macmillan worth publishers.
8. Shanmugham Ambika (1985) *Fundamentals of biochemistry 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>

MappingwithProgrammeOutcomes

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

MappingwithProgrammeSpecificOutcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedof)of CourseContributionto Pos</b>	3	3	3	3	3

Title of the Course		SPORTS NUTRITION								
Category	Year	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem							CIA	External	Total
Core		Y		Y		4	5	25	75	100

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

UNIT	CONTENT	HOURS
UNIT I	<b>Introduction to Physical Fitness</b> 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 for weight management	10
UNIT II	<b>Energy systems for Exercise</b> 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



<b>UNIT III</b>	<p><b>Role of Macronutrients in Physical Fitness</b> Carbohydrates – Utilization of carbohydrate before, during and after exercise, importance of glycogen loading.</p> <p>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.</p> <p>Macronutrients Requirements for Power, endurance sports and strength training Activities.</p>	<b>15</b>
<b>UNIT IV</b>	<p><b>Role of Micronutrients and Water for Exercise</b> Role of vitamins and minerals for exercise, Role of Antioxidant nutrients for exercise, Relative energy deficiency.</p> <p>Water, electrolyte and temperature regulation. Effect of dehydration and hyperhydration on performance.</p> <p>Fluid guidelines before, during and after exercise.</p>	<b>15</b>
<b>UNIT V</b>	<p><b>Nutrition for Athletes</b></p> <p>Importance of pre-event, during and post-event meals, preparing for competition, dealing with cramps, GI distress, electrolyte balance-sports drinks.</p> <p>Role of Sport supplements, Ergogenic aids to improve performance.</p> <p>Nutrient requirements for children, adults and elderly involved in different sports.</p> <p>Eating disorders – types, prevalence, risk factors, effect on sports performance, treatment and prevention.</p>	<b>15</b>
	<p><b>Practical/Project component:</b> Planning of diets for athletes (for all age groups) involved in different sports.</p> <p><b>Industrial Tie-up-</b> With Sports Organizations, Fitness Centre</p>	<b>10</b>
	<b>TOTAL</b>	<b>75</b>

## 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 aids for 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 and Sport. McGraw Hill, New York.

e-Learning Resources:

- [sportsmedicine.about.com](http://sportsmedicine.about.com)
- <http://sportsmedicine.about.com/od/sportsnutrition/a/carbohydrates.htm>

Mapping with Programme Outcomes

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

### Mapping with Programme Specific Outcomes

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

Title of the Course		FOOD PRESERVATION AND PROCESSING								
Category	Year	L	T	P	O	Credits	Inst Hrs	Marks		
	Sem							CIA	External	Total
Core		Y		Y		4	5	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 food to preserve their shelf life
Apply skills learnt to develop preserved food product

UNIT	CONTENT	HOURS
UNIT I	<b>Food Spoilage-</b> Definition, causes, microorganisms involved in spoilage of bread, fruits and vegetables, meat, fish, egg, milk, juices and pickles. <b>Food preservation-</b> Definition, principles and importance, classification – bactericidal and bacteriostatic methods.	13
UNIT II	<b>Processing by high temperature</b> Processing and preservation by high temperature: blanching, pasteurization, sterilization and UHT processing, canning, extraction cooking, dielectric heating, Dehydration.	12
UNIT III	<b>Processing by low temperature</b> Processing and preservation by low temperature – refrigeration, freezing, dehydro-freezing.	10
UNIT IV	<b>Preservation by drying</b> Processing and preservation by drying, concentration and evaporation: various methods sun – drying, tray or tunnel drying, spray drying, drum drying, freeze drying, fluidized bed drying, advantages and disadvantages	10

	es.	
<b>UNIT V</b>	<b>Preservation by non - thermal treatments and food packaging</b> 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	<b>20</b>
	<b>Practical-</b> Preparation of jams, jellies and squashes using seasonal fruits and vegetables. Preparation of pickles using fruits and vegetables. Preparation of sauce and ketchup.	<b>10</b>
	<b>TOTAL</b>	<b>75</b>

## 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 materials describe the terms related to food preservation and classify foods based on the shelf life.

Reference:

1. Arthey, D and Ashurst, P.R (1996), Fruit processing, Blackie academic and professional. Lon

don.

2. Fellows, P.J (2016): Food Processing Technology: Principles and Practice, second edition, CRC Woodhead publishing Ltd, Cambridge.
3. Gould, G. W (1995), New methods of food preservation. Blackie academic and professional. London.
4. Rahman MS (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, Dipti Press (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	PSO2	PSO3	PSO4	PSO5
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<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedof)of CourseContributionto Pos</b>	3	3	3	3	3

MSU

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

Learning Objectives
To enable the students to:
Gain 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	<p><b>Introduction</b> Functional foods - Definition, History, types and classification of functional foods, Relation of functional foods (FF) to chronic diseases.</p> <p><b>Food sources</b> 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 seafoods, herbs, spices and medicinal plants. Coffee, tea and other beverages as functional foods/drinks and their protective effects.</p>	20
UNIT II	<p><b>Antioxidants</b> Concept of free radicals and antioxidants, antioxidant role as functional foods. Antioxidant and chronic diseases.</p> <p><b>Properties and functions of various functional food ingredients</b> 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.</p>	20
UNIT III	<p><b>Functional foods and cardiovascular diseases (CVD)</b> Epidemiology of cardiovascular diseases, Biomarkers of different cardiovascular diseases, effect of functional foods on biomarkers of CVD, Effect of functional foods like green tea, grapes, oats, soybean, sunflower seeds or pumpkin seeds on CVD</p>	20



<b>UNIT IV</b>	<b>Functional foods and cancer</b> Functional Food Components in Cancer Disease, Effect of functional foods like cruciferous vegetables, green tea, garlic, walnuts, berries on cancer.	<b>15</b>
	<b>Functional foods and renal diseases</b> Epidemiology of kidney disease, functional foods for kidney diseases, Effect of functional foods like garlic, buckwheat on the kidney.	
<b>UNIT V</b>	<b>Functional foods and obesity</b> 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.	<b>15</b>
	<b>Functional foods and diabetes</b> Epidemiology of Diabetes, Functional Foods for Type 2 diabetes, effect of functional foods like turmeric, garlic, green tea, dietary fibre on diabetes.	
	<b>Total</b>	<b>90</b>

#### Activity

- Prepare a list of functional foods and its benefits.
- Make a Powerpoint 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 health benefits.

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

**CO3.** Explain the impact of functional foods in the prevention and management of CVD and kidney 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. Williams (2000), "Functional Foods: Concept to Product". Woodhead.
3. Giuseppe Mazza (1998), "Functional Foods: Biochemical and Processing Aspects", Volume 1; CRC Press
4. Goldberg, I. Ed (1994): Functional Foods: Designer Foods, Pharma Foods, Nutraceuticals,



Elective	IV	Y	Y	4	4	25	75	100
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<b>Learning Objectives</b>
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
<b>UNIT I</b>	<b>Introduction to Textile-</b> Introduction, Terms and definition related to textiles, importance of textiles.	<b>10</b>
<b>UNIT II</b>	<b>Textile fibres</b> 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.	<b>10</b>
	<b>Practical-</b> Identification of fibres.	
<b>UNIT III</b>	<b>Yarns</b> 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	<b>15</b>
	<b>Practical-</b> Identification of yarns	
<b>UNIT IV</b>	<b>Woven Fabric Construction</b> 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, Lenoweave, Surface figure weave, Pile, Doubleweave)	<b>10</b>
	<b>Practical-</b> Identification of weaves – Collection of samples for basic weaves.	
	<b>Other fabric construction</b> a) Knitted fabric- warp and weft knitting b) Non-Woven fabric- method of manufacture – web formation-	

<b>UNITY</b>	parallellaid,crosslaid,randomlaid,highvelocitysprayed.Types- bonded fabrics, felts and care of non-woven, Other fabricconstructionprocess- Braidedfabric,Net,Laces,Filmfabric, tuftedfabric.	<b>15</b>
	<b>Practical</b> - Fieldvisitstovarioustextilesunits	
	<b>Total</b>	<b>60</b>

## 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 construction techniques
- CO2.** Explain the manufacturing process of man-made fibres, yarn construction and fabric construction.
- 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 fibertofabric. Mc. Grawhill, 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. 9<sup>th</sup> ed Prentice Hall, London
5. Rastogi, D., & Chopra, S. (2017). Textile Science. India: Orient Blackswan Private Limited.
6. Robert, R. & Mather, R. H. (2015). The Chemistry of Textile Fibers. Cambridge: RSC Publishers.
7. Sekhri, S. (2011) Textbook of Fabric Science: Fundamental to Finishing. India: PHI Learning Pvt. Ltd.
8. Smith, J. L. (2015). Textile Processing: Printing Dyeing Finishing. Chandigarh: Abhishek Publication.

### e-learning Resources:

2. <http://fibersource.com/f-tutor/rayon.htm>
3. <http://www.fibersource.com/f-tutor/nylon.htm>
4. <http://www.ehow.com/facts5016460parts-loom.html>
5. <http://www.fabrics-manufacturers.com/>

### MappingwithProgrammeOutcomes

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

### MappingwithProgrammeSpecificOutcomes

CO/PSO	PSO1	PSO2	PSO3	PSO4	PSO5
<b>CO1</b>	3	3	3	3	3
<b>CO2</b>	3	3	3	3	3
<b>CO3</b>	3	3	3	3	3
<b>CO4</b>	3	3	3	3	3
<b>CO5</b>	3	3	3	3	3
<b>Weightage</b>	15	15	15	15	15
<b>Weightedpercentage(roundedof)of CourseContributionto Pos</b>	3	3	3	3	3

MSU