



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)**

*(Affiliated to Bharathidasan University, Tiruchirappalli)*  
**Accredited by NAAC-An ISO 9001:2015 Certified Institution**  
**SUNDARAKKOTTAI, MANNARGUDI-614016.**  
**TAMILNADU, INDIA.**

**B.Sc., NUTRITION AND DIETETICS**  
**CHOICE BASED CREDIT SYSTEM– LEARNING OUTCOMES BASED**  
**CURRICULUM FRAME WORK (CBCS–LOCF)**  
*(For the candidates admitted in the academic year 2023–2024)*

**CHOICE BASED CREDIT SYSTEM**

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College has moved to CBCS and implemented the grading system.

**OUTCOME-BASED EDUCATION (OBE)**

**LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)**

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help to formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses within a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education

institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

**Some important aspects of the Outcome Based Education Course:** is defined as a theory, practical or theory cum practical subject studied in a semester.

**Course Outcomes (COs):** are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally three or more course outcomes may be specified for each course based on its weightage.

**Programme:** is defined as the specialization or discipline of a Degree.

**Programme Outcomes (POs):** Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

**Programme Specific Outcomes (PSOs):** PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

**Some important terminologies repeatedly used in LOCF.**

**Core Courses (CC)** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

**Discipline Specific Elective Courses (DSE)** Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

**Generic Elective Courses** An elective course chosen generally from an **unrelated discipline/subject**, with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

**Non Major Elective (NME).** A student shall choose at least two Non – major Elective Courses (NME) from outside his /her department. Non –Major Elective I – Those who choose Tamil in Part

I can choose a non –major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studied in school level or b) Special Tamil if Tamil language was studied upto 10<sup>th</sup> & 12<sup>th</sup> std.

**Skill Enhancement Courses (SECs)** These courses focus on developing skills or proficiencies in the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

**Field Study/Industrial Visit/Case Study:** It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

**Internship:** Students must complete internship during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

**Extra Credit Courses:** In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

#### **Undergraduate Programme:**

**Programme Pattern:** The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III: Core Course (Theory, Practicals, Generic Elective courses , Discipline Specific Elective courses , Compulsory and Optional Allied courses, Project )

Part-IV: Non Major Elective, Foundation Course, Value Education, Environmental studies, Skill Enhancement Courses/ Soft Skills, Internship / field visit / industrial visit/ Case Study), Professional Competency Course

#### **Part –V**

Extension activity, Gender studies

## EXAMINATION

### Continuous Internal Assessment (CIA):

#### UG - Distribution of CIA Marks

#### Passing Minimum: 40 %

Assignment-3	=	30%
Test-3 (Best 2 out of 3)	=	50%
Seminar	=	10%
Attendance	=	10%

#### Question Paper Pattern

##### Part A:

##### Part A 1 (10X1=10 marks)

One word question/ Fill in/ Match the following/True or False/ Multiple Choice Questions  
Two Questions from Each unit

##### Part A 2 (5X2=10 marks)

Short Answers

One question from Each unit

##### Total Marks – 20

##### Part B: (5X5=25 marks)

Paragraph Answers

Either/ or type, One Question from each unit

##### Part C: (10X3=30)

Essay Type Answers

Answer 3 out of 5 Questions

One Question from each unit

**Part A:** K1 Level

**Part B:** K2, K3 and K4 Level

**Part C:** K5 and K6 Level

#### Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S. No.	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/ Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analysing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

**WEIGHTAGE of K – LEVELS IN QUESTION PAPER**

(Cognitive Level) K- LEVELS →	Lower Order Thinking			Higher Order Thinking			Total
	K1	K2	K3	K4	K5	K6	
<b>END SEMESTER EXAMINATIONS (ESE)</b>	20	25			30		<b>75</b>
<b>Continuous Internal Assessment (CIA)</b>	20	25			30		<b>75</b>
<b>QUESTION PATTERN FOR END SEMESTER EXAMINATION/Continuous Internal Assessment</b>							
<b>PART</b>							<b>MARKS</b>
<b>PART –A I.</b> (No choice ,One Mark) <b>TWO</b> questions from each unit					(10x1 =10)	20	
<b>II.</b> (No choice ,Two Mark) <b>ONE</b> question from each unit					(5x2 =10)		
<b>PART -B</b> (Either/ or type ,5-Marks) <b>ONE</b> questions from each unit					(5x5 =25)	25	
<b>PART -C</b> (3 out of 5) (10 Marks) <b>ONE</b> question from each unit					(3x10 =30)	30	
<b>Total</b>							<b>75</b>

<b>BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION</b>							
<b>DURATION: 3. 00 Hours.</b>				<b>Max Mark : 75</b>			
K- LEVELS	K1	K2	K3	K4	K5	K6	Total Marks
<b>PART</b>							
<b>PART –A</b> (One Mark, No choice) (10x1 =10)	10						10
(2-Marks, No choice) (5x2=10)	10						10
<b>PART –B</b> (5- Marks) (Either/or type) (5x5=25)		5	10	10			25
<b>PART -C</b> (10 Marks) (3 out of 5) (3x10=30) Courses having only <b>K5,K6</b> levels, K5 level- 3 Questions, K6 level- 2 Questions <b>(One K6 level question is compulsory)</b>					20	10	30
<b>Total</b>	<b>20</b>	<b>05</b>	<b>10</b>	<b>10</b>	<b>20</b>	<b>10</b>	<b>75</b>

## EVALUATION

### GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) , respectively. These two are calculated by the following formulae:

$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$	$\text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$
Where, C <sub>i</sub> is the Credit earned for the Course i G <sub>i</sub> is the Grade Point obtained by the student for the Course i M <sub>i</sub> is the marks obtained for the course i and n is the number of Courses <b>Passed</b> in that semester.	

**CGPA:** Average GPA of all the Courses starting from the first semester to the current semester.

### CLASSIFICATION OF FINAL RESULTS:

- 1.For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
- 2.For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
- 3.Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
- 4.A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
- 5.Absence from an examination shall not be taken an attempt.

**Table-1: Grading of the Courses - UG**

<b>Marks Range</b>	<b>Grade Point</b>	<b>Corresponding Grade</b>
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	NA	RA

The candidate's performance in every current semester is indicated by **Semester Grade Point Average (SGPA)** and from the second semester onwards, the continuous performance including previous semester /s is indicated by **Cumulative Grade Point Average (CGPA)**.

**Table-3: Final Result**

<b>CGPA</b>	<b>Corresponding Grade</b>	<b>Classification of Final Result</b>
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

The candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the candidate's Grade is O/A+ with more than one attempt, the performance is fixed as "Very Good".

### **Vision**

Providing value based education in Nutritional Sciences, Dietetics and Public Health Nutrition to the rural women students to construct the healthy and blooming society.

### **Mission**

- Mentoring the students by imparting skill based knowledge to suit hospital and hospitality
- Industry requirements and promote a healthy society Conscientise the students on food, nutrition and diet and to develop entrepreneurial skills for self employment

## PROGRAMME OUTCOMES FOR B.Sc..DEGREE PROGRAMMES

PO No.	Programme Outcomes (Upon completion of the B.Sc. Degree Programme, the Undergraduate will be able to)
PO-1	<b>Disciplinary knowledge:</b> Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate program of study in Bachelor of Science.
PO-2	<b>Critical thinking, Problem Solving and Reflective thinking:</b> think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations; show critical sensibility to life experiences, with self awareness and reflexivity of both self and society.
PO-3	<b>Analytical &amp; Scientific Reasoning:</b> 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; critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO-4	<b>Research-related Skills:</b> develop a sense of capability for relevant/appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment or investigation.
PO-5	<b>Digital literacy and Effective Communication:</b> use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas , books, media and technology; efficiently communicate thoughts and ideas in a clear and concise manner.
PO-6	<b>Individual and Team Work:</b> effectively accomplish tasks individually as well as work effectively and respectfully as member or leader 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 interest so for a common cause and work efficiently as a member of a team.
PO-7	<b>Multicultural Competence and Social Interaction:</b> understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO-8	<b>Awareness of Ethical issues, Human values and Gender Issues:</b> 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 and understand the value of relationship between self and the community and aware of the various issues concerning women and society.
PO-9	<b>Awareness of Environment and Sustainability:</b> understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO-10	<b>Self directed and Lifelong learning:</b> acquire knowledge and skills, including learning “how to learn”, that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the broadest context of socio-technological changes.



## PROGRAMME SPECIFIC OUTCOME (PSO)

PSO No.	Program Specific Outcomes (B.Sc., Nutrition and Dietetics)
PSO1	<b>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
PSO2	<b>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
PSO3	<b>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.
PSO4	<b>Contribution to Business World:</b> To produce employable, ethical and innovative professionals to sustain in the dynamic business world.
PSO5	<b>Contribution to the Society:</b> To contribute to the development of the society by collaborating with stakeholders for mutual benefit



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**B.Sc., NUTRITION AND DIETETICS**  
**COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM - LEARNING**  
**OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)**

*(For the candidates admitted from the academic year 2023-2024)*

**ELIGIBILITY:** A Pass in 10+2 with Biology and Chemistry as two of the core subjects

Sem	Part	Nature of the Course	Course Code	Title of the Paper	Ins. Hours/Week	Ins. Hours/Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
I	I	Language Course-I	U23LC101	Pothu Tamil - I	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-I	U23ELC101	General English - I	6	5	1	-	-	3	3	25	75	100
	III	Core Course-I	U23ND101	Food Science	5	3	1	1	-	5	3	25	75	100
		Core Practical I	U23ND102P	Food Science	4	-	-	4	-	4	3	25	75	100
		Allied Course-I	U23AND101	Food Chemistry	3	2	1	-	-	2	3	25	75	100
	IV	Allied Practical I	U23AND102P	Food Chemistry	2	-	-	2	-	-	-	-	-	-
	IV	Non Major Elective -I			2	1	1	-	-	2	3	25	75	100
IV	Foundation Course	U23FCND11	Introduction to Nutrition and Dietetics	2	1	1	-	-	2	3	25	75	100	
<b>TOTAL</b>					<b>30</b>	<b>17</b>	<b>6</b>	<b>7</b>	<b>-</b>	<b>21</b>	-	-	-	<b>700</b>
II	I	Language Course- II	U23LC202	Pothu Tamil - II	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-II	U23ELC202	General English - II	6	5	1	-	-	3	3	25	75	100
	III	Core Course-II	U23ND203	Human Physiology	5	4	1	-	-	5	3	25	75	100
		Core Practical -II	U23ND204P	Human Physiology	4	-	-	4	-	4	3	25	75	100
		Allied Practical -I	U23AND102P	Food Chemistry	2	-	-	2	-	2	3	25	75	100
	IV	Allied Course-II	U23AND203	Food Microbiology	3	2	1	-	-	2	3	25	75	100
	IV	Non Major Elective -II			2	1	1	-	-	2	3	25	75	100
IV	Skill Enhancement Course-I	U23SEND21	Human Development	2	1	1	-	-	2	3	25	75	100	
<b>TOTAL</b>					<b>30</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>-</b>	<b>23</b>	-	-	-	<b>800</b>
III	I	Language Course- III		Pothu Tamil - III	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-III		General English - III	6	5	1	-	-	3	3	25	75	100
	III	Core Course-III		Nutrition Through Life Cycle	5	4	1	-	-	5	3	25	75	100
		Core Practical- III		Nutrition Through Life Cycle	4	-	-	4	-	4	3	25	75	100
		Allied Course-III		Food Preservation and Processing	3	2	1	-	-	2	3	25	75	100
	IV	Allied Practical -II		Food Preservation and Processing	2	-	-	2	-	--	--	--	--	--
	IV	Skill Enhancement Course -II		Bakery and Confectionary	2	1	1	-	-	2	3	25	75	100
IV	Skill Enhancement Course -III		Human Nutrition	2	1	1	-	-	2	3	25	75	100	
<b>TOTAL</b>					<b>30</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>-</b>	<b>21</b>	-	-	-	<b>700</b>
IV	I	Language Course - IV		Pothu Tamil-IV	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-IV		General English-IV	6	5	1	-	-	3	3	25	75	100
		Core Course-IV		Nutritional Biochemistry	5	4	1	-	-	5	3	25	75	100

Sem	Part	Nature of the Course	Course Code	Title of the Paper	Ins. Hours/ Week	Ins. Hours/ Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
IV	III	Core Practical IV		Nutritional Biochemistry	4	-	-	4	-	4	3	25	75	100
		Allied Practical - II		Food Preservation and Processing	2	-	-	2	-	2	3	25	75	100
		Allied Course-IV		Resource Management and Interior Design	3	2	1	-	-	2	3	25	75	100
	IV	Skill Enhancement Course-IV		Public Health Nutrition	2	1	1	-	-	2	3	25	75	100
		Skill Enhancement Course-V		Computer Applications in Home Science	2	1	1	-	-	2	3	25	75	100
	<b>TOTAL</b>					<b>30</b>	<b>18</b>	<b>6</b>	<b>6</b>	<b>-</b>	<b>23</b>	-	-	-
V	III	Core Course-V		Dietetics I	6	5	1	-	-	5	3	25	75	100
		Core Course-VI		Food Service Management	5	4	1	-	-	5	3	25	75	100
		Core Course-VII		Functional foods for Chronic Disease	5	4	1	-	-	4	3	25	75	100
		Core Practical - V		Dietetics I	4	-	-	4	-	4	3	25	75	100
		Elective Course-I		Textile Science	4	3	1	-	-	3	3	25	75	100
		Elective Course-II		Changing Trends in Extension Education	4	2	1	1	-	3	3	25	75	100
	IV	Environmental Studies		Environmental Studies	2	2	-	-	-	2	3	25	75	100
		Internship/ Industrial visit/ Field visit		Internship/ Industrial visit/ Field visit	-	-	-	-	-	2	-	-	-	-
<b>TOTAL</b>					<b>30</b>	<b>20</b>	<b>5</b>	<b>5</b>	<b>-</b>	<b>28</b>	-	-	-	<b>700</b>
VI	III	Core Course-VIII		Dietetics II	6	4	1	1	-	4	3	25	75	100
		Core Practical - VI		Dietetics II	6	-	-	6	-	4	3	25	75	100
		Core Project		Project with viva- voce/ Group Project	5	-	1	4	-	5	3	25	75	100
		Elective Course-III		Food Product Development	4	3	1	-	-	3	3	25	75	100
		Elective Course-IV		Front Office Management and House keeping	4	3	1	-	-	3	3	25	75	100
	IV	Value Education		Value Education	2	2	-	-	-	2	3	25	75	100
		Professional competency Course		Aptitude and reasoning skills for competitive examinations	2	2	-	-	-	2	3	25	75	100
	V	Gender Studies		Gender Studies	1	1	-	-	-	1	3	25	75	100
		Extension activity		Extension activity	-	-	-	-	-	1	-	-	-	-
<b>TOTAL</b>					<b>30</b>	<b>15</b>	<b>4</b>	<b>11</b>	<b>-</b>	<b>25</b>	-	-	-	<b>800</b>
<b>GRAND TOTAL</b>					<b>180</b>	<b>106</b>	<b>33</b>	<b>41</b>	<b>-</b>	<b>141</b>	-	-	-	<b>4500</b>
Extra Credit				MOOC/ SWAYAM/ NPTEL (At least One Per Year)	-	-	-	-	-	2	-	-	-	-
				Value Added Courses (At least One Per Year)	-	-	-	-	-	2	-	-	-	-

L-Lecture

T-Tutorial

P-Practical

S-Seminar

### Credit Distribution for B.Sc., Nutrition and dietetics

S.No	Part	Subject	No. of Courses	Total Credits
1.	I	Language	4	12
2.	II	English	4	12
3.	III	Core Course –Theory	8	38
4.		Core Practical	6	24
5.		Core Course-Project	1	5
6.		Allied Course	4	08
7.		Allied Course Practical	2	4
8.		Elective Course	4	12
9.		IV	Non-Major Elective	2
10.	Foundation Course – FC		1	02
11.	Skill Enhancement Course		5	10
12.	Internship/ Industrial visit/ Field visit		1	02
13.	Environmental Studies		1	02
14.	Value Education		1	02
15.	Professional competency skill		1	02
16.	V	Gender Studies	1	01
17.		Extension Activity	1	01
<b>Total</b>			<b>47</b>	<b>141</b>

**Note:**

	CIA	ESE
1 Theory	25	75
2 Practical	25	75
3 Separate passing minimum is prescribed for Internal and External marks		

**FOR THEORY**

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

**FOR PRACTICAL**

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

**NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT**

Semester	Part	Course	Course Code	Title of the Paper
I	IV	NME-I	U23NMEND11	Basics of Nutrition
II		NME-II	U23NMEND22	Women's Health and Wellness

**EXTRA CREDIT COURSE -VALUE ADDED COURSE OFFERED BY THE DEPARTMENT**

Semester	Course	Course Code	Title of The Paper
I	VAC-I	U23NDVA1	Fitness Nutrition
II	VAC-II	U23NDVA2	Convenience Foods

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**SUNDARAKKOTTAI, MANNARGUDI -614016.**

*(For the candidate admitted in the academic year 2023-2024)*

**DEPARTMENT OF NUTRITION AND DIETETICS**

**B.Sc., NUTRITION AND DIETETICS**

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**Semester: I –CC-I: Food Science**

**Ins. Hrs./Week: 5**

**Course Credit : 5**

**Course Code:U23ND101**

**UNIT- I: Introduction to Food Science and Cooking Methods (15 Hours)**

Food Science: Definition, functional classification, Food groups (Four, Five, Seven and Eleven), Food pyramid.

Nutrient content of foods and Cooking Methods - Classification of foods according to nutrient content. Study of the different cooking methods- dry heat, moist and combination methods, solar cooking, microwave cooking - merits and demerits, dishes prepared by these methods.

**UNIT- II: Cereals, Millets, Pulses, Legumes and Nuts (15 Hours)**

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- Gelatinisation and factors affecting gelatinisation, gel formation, retrogradation and syneresis; Effect of dry heat; Role of cereals in cookery.

Pulses and legumes - Types, nutritive value, methods of cooking, effect of soaking and germination, judicious combination of cereals and pulses- complementary effect, soya beans, fava beans and kesari dhal-methods to inactivate /remove toxins; storage. Role of pulses in cookery

Nuts - types, composition, market forms, roasting, steaming of nuts, nuts butters; uses in sweets, baking, and confectionery; Storage.

**UNIT- III: Milk and Milk products, Egg, Meat, Poultry and Fish (15 Hours)**

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, Fruits and Spices (15 Hours)**

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 Reactions- Types and preventive measures.

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

**UNIT-V: Fats and Oils, Sugars, and Beverages (15 Hours)**

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.

Sugars: Types and market forms of sugars; stages of sugar cookery, crystallization, factors affecting crystallization, uses in confectionery. Role of sugar in cookery.

Beverages- Classification- fruit based beverages; milk-based beverages nutritive value and uses, alcoholic beverages, coffee, tea and cocoa, malted beverages. Sources, manufacture, processing, and service; methods of preparation of coffee and tea.

**Total Lecture Hours -75**

**COURSE OUTCOME:**

The students will be able to

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. 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.

**TEXT BOOK(S)**

1. Avantina Sharma. 2017. Textbook of Food Science and Technology. CBS Publishers and Distributors, New Delhi.
2. Shakuntala Manay N. 2001. Foods, Facts and Principles. New Age International Pvt Ltd Publishers, New Delhi.
3. Srilakshmi B. 2015. Food Science. New Age International Publishers, New Delhi.
4. Swaminathan M. 1992. Hand Book of Food Science and Experimental Foods. BAPPCO, Bangalore.
5. Usha Chandrasekhar. 2002. Food Science and Application in Indian Cookery. Phoenix Publishing House, Pvt. Ltd, New Delhi.

## **REFERENCE BOOK(S)**

1. Brow A.2000. Understanding Food. Thomson Learning Publications, New Delhi.
2. Mehas KY and Rodgers SL.2000. Food Science and You, McMillan McGraw Company, New York.
3. Potter N.Hotchkiss, J H. 1998. Food Science.5<sup>th</sup> edition, CBS Publications and Distributors, Daryaganji, New Delhi.
4. Sunetra Roday.2012.Food Science and Nutrition. Oxford University Press, New Delhi.
5. Vickie A, Vaclavik, Elizabeth Wand Christian.2014. Essentials of Food Science Springer Science and Business Media, New York.

## **E-RESOURCES**

1. <https://study.com/academy/lesson/what-is-food-science-definition-research.html>
2. <https://www.nia.nih.gov/health/important-nutrients-know-proteins-carbohydrates-and-fats>
3. <http://courseware.cutm.ac.in/wp-content/uploads/2020/06/Malting-of-Cereals.pdf>
4. <https://microbenotes.com/milk-pasteurization-methods-steps-significance/>
5. <https://www.selfstudys.com/uploads/pdf/p17ZIMFciqH7WbRet7Qw.pdf>
6. <https://ia801408.us.archive.org/20/items/textbookoffoodsc0000khad/textbookoffoodsc0000khad.pdf>
7. <https://egyankosh.ac.in/handle/123456789/32947>
8. <https://unacademy.com/content/kerala-psc/study-material/basic-food-science/>

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**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE  
(AUTONOMOUS)**



**SUNDARAKKOTTAI, MANNARGUDI -614016.**

*(For the candidate admitted in the academic year 2023-2024)*

**DEPARTMENT OF NUTRITION AND DIETETICS**

**B.Sc., NUTRITION AND DIETETICS**

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**Semester: I –CP-I: Food Science**

**Ins. Hrs./Week: 4**

**Course Credit : 4**

**Course Code:U23ND102P**

**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. Study the effect of temperature, time of heating, concentration, addition of sugar and acid on gelatinization of starch.
5. Prepare recipes using the following processes-Gelatinization, gluten formation and gel formation.
6. Demonstrate the best method of cooking rice.
7. Demonstrate the effect of soaking, hard water, sodium bicarbonate and papaya on cooking quality of pulses.
8. Prepare recipes using whole gram, dhal, pulse flours, sprouted pulses and cereal pulse combination.
9. Prepare recipes using milk and its products.
10. Demonstrate the formation of ferrous sulphide in boiling egg and its preventive measures.
11. Demonstrate the effect of addition of acid, fat, salt, water and sugar on the texture of omelettes.
12. Prepare recipes where egg acts as – thickening agent, binding agent, emulsifying agent and enriching agent.
13. Demonstrate the effects of different amounts of water added to vegetables during cooking on flavor and appearance.
14. Prepare the following using fruits and vegetables- salads, soups and curries.
15. Prepare recipes using shallow fat and deep fat frying methods.
16. Preparation of any one beverage under the following types- refreshing, nourishing, stimulating, soothing and appetizing.



## **COURSE OUTCOME:**

The students will be able to

1. Identify appropriate methods for weighing dry and wet food ingredients and for cooking different foods.
2. Select suitable methods for cooking cereals, pulses, vegetables, meat, fish and Poultry.
3. Apply the principles of cookery, cooking techniques and suitable ingredients in preparing dishes.
4. Explain the reasons behind the changes that occur during food preparation.
5. Justify the best preparation and cooking methods for acceptability and retention of nutrients in different dishes

## **TEXT BOOK(S)**

1. Avantina Sharma. 2017. Textbook of Food Science and Technology. CBS Publishers and Distributors, New Delhi.
2. Shakuntala Manay N. 2001. Foods, Facts and Principles. New Age International Pvt Ltd Publishers, New Delhi.
3. Srilakshmi B. 2015. Food Science. New Age International Publishers, New Delhi.
4. Swaminathan M. 1992. Hand Book of Food Science and Experimental Foods. BAPPCO, Bangalore.

## **REFERENCE BOOK(S)**

1. Martland, R.E. and Welsby, D.A. (1980) Basic Cookery, Fundamental Recipes and Variations. William Heinemann Ltd., London.
2. Krishna Arora (2008) Theory of cookery, Frank Brothers & Co.,
3. Negi J (2013) Fundamentals of Culinary Art, S.Chand and Co.
4. Peckham, G .C .and Freeland- Graves, J.H. (1987) Foundation of food preparation. 4<sup>th</sup> Edition. Macmillan Publishing co, New York
5. Penfield MP and Ada Marie C (2012), Experimental Food Science, Academic Press, San Diego

## **E-RESOURCES**

1. [https://www.ihmnotes.in/assets/Docs/Books/Theory\\_of\\_Cookery.pdf](https://www.ihmnotes.in/assets/Docs/Books/Theory_of_Cookery.pdf)
2. <http://staffnew.uny.ac.id/upload/132318572/pendidikan/buku-esp.pdf>
3. <https://www.youtube.com/watch?v=PwYYf90vly0>
4. <https://food.unl.edu/article/how-prevent-cut-fruit-turning-brown>

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**Semester: I AC-I: Food Chemistry**

**Ins. Hrs./Week:3**

**Course Credit :2**

**Course Code:U23AND101**

**UNIT- I: Introduction to Food Chemistry and Water (10 Hours)**

Definition and history of food chemistry. Role of food chemist in food industry; Physico-chemical properties of foods ,Physical properties of water and ice; types of water, Water Activity in Foods and stability, packaging, sorption phenomenon, temperature dependence, Determination of Moisture Content in Foods. True Solutions, Dispersions, Sols, Gels, Foams, Colloids and Emulsions.

**UNIT- II: Chemistry of Starch and Sugars (9 Hours)**

Structure of important polysaccharides (starch, glycogen, cellulose, pectin, hemicellulose, gums) Modified celluloses and starches. Components of Starch, Swelling of Starch Granules, Gel Formation, Retrogradation, Syneresis,. Effect of Sugar, Acid, Alkali, Fat and Surface-Active Agents on Starch. Stages of Sugar Cookery, Crystallization and factors affecting it. Chemistry of Milk Sugar, Non-Enzymatic Browning.

**UNIT- III: Chemistry of Proteins (8 Hours)**

Nature of Food Proteins (Plant and Animal) Properties of Protein- Electrophoresis, Sedimentation, Amphoterism and Denaturation, Solubility, Viscosity, Binding, Gelatin, Texturization, Emulsification and Foaming.

**UNIT- IV: Chemistry of Fats and Oils (10 Hours)**

Classification and Characteristics of lipids. Physical properties-melting point, softening point, specific gravity, refractive index, smoke, flash and fire point, turbidity point. Chemical properties- reichertmeissel value, polenske value, Iodine value, peroxide value, saponification value. Effect of frying on fats, Changes in fats and oils- rancidity, lipolysis, flavor reversion. Technology of edible fats and oils- Refining, Plasticity, Hydrogenation and Interesterification. Shortening Power of Fats, Changes in Fats and Oils during Heating, Factors affecting fat absorption in foods.

**UNIT- V: Enzymes and Flavours (8 Hours)**

Enzymes- Introduction, classification General characteristics, Enzymes in food processing, Industrial Uses of Enzymes, Immobilized enzymes.

Flavors- Definition and basic tastes, Chemical structure and taste, Description of food flavors and Flavor enhancers.

**Total Lecture Hours -45**

## **COURSE OUTCOME:**

The students will be able to

1. Know the basics of food chemistry, underlying properties and reactions of water.
2. Gain sufficient knowledge of starch and sugars to control reactions in foods and also know the major chemical reactions that limit shelf life of foods using sugars.
3. Apprehend the chemistry of protein, their functional properties in food.
4. Select the appropriate fats to be used in cooking and their storage and functional uses.
5. Have an enhanced knowledge on the role of enzymes and flavours in food processing.

## **TEXT BOOK(S)**

1. Chandrasekhar U. 2002. Food Science and applications in Indian Cookery. Phoenix Publishing House, New Delhi.
2. Chopra HK and Panesar PS. 2015. Food Chemistry. Narosa Publishing House (P) Ltd, New Delhi.
3. Iqbal, Syed Aftab. 2011. Advanced Food Chemistry. Discovery Publishing House, New Delhi.
4. Shakuntala Manay, Shadaksharaswamy M. 2000. Foods, Facts and Principles, 2<sup>nd</sup> Edition New Age International Pvt Ltd Publishers.
5. Srilakshmi B. 2016. Food Science. New Age International Publishers, New Delhi.
6. Swaminathan M. 2005. Food Science. Chemistry and Experimental Foods, Bappco Publishers, Bangalore.
7. Yadav, Seema. 2006. Food Chemistry. Anmol Publications (P) Ltd, New Delhi.

## **REFERENCE BOOK(S)**

1. Chopra H.K., Panesar P.S. 2010. Food Chemistry Narosa Publishing House, New Delhi.
2. John Wiley and Sons, New York, McGraw Hill Education (India), Pvt. Ltd, New Delhi.
3. Meyer LH. 2004. Food Chemistry. 4th edition, CBS Publishers and Distributors.
4. Paul PC and Palmer HH. 2000. Food Theory and Applications. Revised Edition,
5. Satarkar, Archana. 2008. Food Science and Nutrition ABD Publishers, Jaipur.
6. Shubhangini A, Joshi, 2010. Nutrition and Dietetics with Indian case studies

## **E-RESOURCES**

1. <https://ipa-pasca.unpak.ac.id/pdf/Food%20Chemistry%20by%20Fennema%203rd%20Ed.pdf>
2. [https://www.researchgate.net/publication/227009769\\_Starch\\_Structure\\_Properties\\_Chemistry\\_and\\_Enzymology](https://www.researchgate.net/publication/227009769_Starch_Structure_Properties_Chemistry_and_Enzymology)
3. [http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp\\_content/food\\_technology/food\\_chemistry/17.functional\\_and\\_nutritional\\_properties\\_of\\_proteins/et/41\\_et\\_m17.pdf](http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/food_technology/food_chemistry/17.functional_and_nutritional_properties_of_proteins/et/41_et_m17.pdf)
4. <https://ugemoocs.inflibnet.ac.in/assets/uploads/1/127/4409/et/14%20Script200302070703031919.pdf>
5. <https://byjus.com/biology/applications-of-enzymes/>

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**Semester: I AP-I: Food Chemistry**

**Ins. Hrs./Week:2**

**Course Credit :-**

**Course Code:U23AND102P**

**1. Chemistry of Starch and Sugars**

- Gelatinization of Starch, Microscopic Examination of uncooked and gelatinized starch.
- Retrogradation and Syneresis, Gluten Formation,
- Stages of Sugar Cookery, Preparation of Fondant, Fudge, and Toffee, Scum formation in milk.

**2. Chemistry of Proteins**

- Gluten Formation.
- Effect of Soaking, germination and fermentation of Pulses, Coagulation of egg white and egg yolk .
- Boiled Egg, Poached Egg, Omlettes, Custards, Cake and Mayonnaise.
- Coagulation and precipitation of milk proteins.
- Changes observed in Cooking Meat, Fish and Poultry, Testing the Tenderness of meat.

**3. Chemistry of Fats and Oils**

- Smoking Temperature of Different Fats, Factors Affecting Absorption of Fats.

**4. Chemistry of Pectic Substances and Plant Pigments.**

- Effect of acids, alkali and heat on water soluble and fat-soluble pigments.
- Enzymatic Browning and Methods of prevention.

**TEXT BOOK(S)**

1. Shakuntala Manay, Shadaksharaswamy M. 2000. Foods, Facts and Principles, 2<sup>nd</sup> Edition New Age International Pvt Ltd Publishers.
2. Srilakshmi B. 2016. Food Science. New Age International Publishers, New Delhi.
3. Swaminathan M. 2005. Food Science. Chemistry and Experimental Foods, Bappco Publishers, Bangalore.
4. Yadav, Seema. 2006. Food Chemistry. Anmol Publications (P)Ltd, New Delhi.

**REFERENCE BOOK(S):**

1. Brow A. 2000. Understanding The Food. Thomson Learning Publications, Wadsworth.
2. Mehas KY. Rodgers SL. 2000. Food Science. McMillan McGraw Company, New York.
3. Parker R. 2000. Introduction to food Science. Delmer, Thomson Learning Co, Delma.

**E-RESOURCES**

1. [http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp\\_content/food\\_technology/food\\_chemistry/17.functional\\_and\\_nutritional\\_properties\\_of\\_proteins/et/41\\_et\\_m17.pdf](http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/food_technology/food_chemistry/17.functional_and_nutritional_properties_of_proteins/et/41_et_m17.pdf)
2. <https://ugcmoocs.inflibnet.ac.in/assets/uploads/1/127/4409/et/14%20Script200302070703031919.pdf>
3. <https://byjus.com/biology/applications-of-enzymes/>

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**Semester: I Non Major Elective – I: Basics of Nutrition**

**Ins Hrs. /Week: 2**

**Course Credit: 2**

**Course Code: U23NMEND11**

**UNIT- I: Basic of Nutrition**

**(06 Hours)**

Basic of Nutrition - Definition of Nutrition, Importance of nutrition for health, Basic five food groups, portion size of foods and the functions of food, Food pyramid, Balanced Diet, Nutrients and their functions , Recommended dietary allowances , factors affecting recommended dietary allowances, malnutrition (under nutrition, and over nutrition).

**UNIT- II: Carbohydrates, Proteins and Lipids**

**(06 Hours)**

Carbohydrates- Classification, Sources, Requirements and Functions of carbohydrates in the body. Dietary fiber- Definition, soluble and insoluble fibers, sources of fiber, Role of fiber in human nutrition.

Proteins - Classification, Sources, Requirements and functions of protein. Protein deficiency- Protein Energy Malnutrition- Kwashiorkor and Marasmus – etiology, clinical features, treatment and prevention.

Lipids- Classification, Sources, Requirements and functions, Essential fatty acids- food sources functions and deficiency, dietary lipids and its relation to cardiovascular diseases.

**UNIT- III: Fat Soluble Vitamins and Water Soluble Vitamins**

**(06 Hours)**

Fat Soluble Vitamins - Functions, food sources, requirements, unit of measurements and hyper vitaminosis of vitamins A, D, E and K, Effect of deficiency.

Water Soluble Vitamins - Ascorbic acid and B complex vitamins- Thiamine, Riboflavin and Niacin- functions, food sources and requirements for different age groups. Importance of folic acid, Pyridoxine, Vitamin B12.

**UNIT-IV: Macro and Micro Minerals**

**(06 Hours)**

Macro Minerals- Calcium, Phosphorous, Magnesium, Potassium, & Sodium Distribution in the body; functions, effects of deficiency, food sources and Recommended dietary allowances.

Micro / Trace Minerals- Iron, Zinc, and Iodine Distribution in the body; functions, food sources and requirements for different age groups, effects of deficiency,.

**UNIT- V: Water**

**(06 Hours)**

Water- Sources, Functions, requirements. Distribution of water in the body, exchange of water in the body, Water balance, dehydration, water intoxication, Role of ADH in water balance.

**Total Lecture Hours- 30**

## **COURSE OUTCOME**

The students will be able to

1. Understand the importance of nutrients in relation to health.
2. Identify the major nutrients and their functions, interactions, and needs of the body.
3. Infer knowledge on micro nutrients and their functions.
4. Understand the importance of water balance and health.

## **TEXT BOOK(S)**

1. Gajalakshmi R. 2014. Nutrition Science. CBS Publishers and distributors Pvt Ltd, New Delhi.
2. Raheena Begum M. 2012. A Text Book of Foods Nutrition and Dietetics. Sterling publishers private Limited.
3. Ranjana Mahna & Seema PuriKumud Khanna, Sharda Gupta, Santosh Jain Passi, Rama
4. Seth.2016. Textbook of Nutrition and Dietetics. Elite Publishing House Pvt. Ltd, ISBN-10 : 8188901539; ISBN-13: 978-8188901531
5. Srilakshmi B.2017.Nutrition Science. Sixth edition. New Age International Publishers ISBN- 10 : 9386418886; ISBN-13 : 978-9386418883,
6. Swaminathan M. 1993. Principles of Nutrition and Dietetics. Bappco 88, Mysore Road, Bangalore-560 018.

## **REFERENCE BOOK(S)**

1. Bogert J.G.V. Briggs, D.H. 1985. Calloway Nutrition and physical fitness 11th edition W.B. Saunders Co., Philadelphia, London, Toronto.
2. Guthrie H.A. – Introductory Nutrition C.V. Mosby Co. St. Louis.
3. Maurice E, Shils, James A. Olson, Moshe Shike “Modern Nutrition in health and disease” (1994) eighth edition, Vol. I & II Lea &Febiger Philadelphia, A waverly Company.
4. Wardlaw G.M. Insel, P.H. – Perspectives in Nutrition (1990) Times Mirror / Mosby College Publishing Co. St. Louis, Toronto, Boston.
5. William S.R. 1985. Nutrition and Diet Therapy. 5th edition, Mosbey Co. St. Louis.

## **E - RESOURCES**

1. <https://youtu.be/HxeqJWJ5U>
2. [https://youtu.be/WecTpcuha\\_4](https://youtu.be/WecTpcuha_4)
3. <http://www.kgmu.org/download/virtualclass/biochemistry/Fat%20Soluble%20Vitamins.pdf>
4. <https://www.megazyme.com/focus-areas/dietary-fiber-portal/what-is-dietary-fiber>
5. <https://www.ncbi.nlm.nih.gov/books/NBK218759/>
6. <https://www.aao.org/eye-health/diseases/vitamin-deficiency>
7. <https://www.medicalnewstoday.com/articles/248>

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**DEPARTMENT OF NUTRITION AND DIETETICS**

**B.Sc., NUTRITION AND DIETETICS**

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**Semester: I- Foundation Course- Introduction to Nutrition and Dietetics**

**Ins. Hrs. /Week: 2**

**Course Credit: 2**

**Course Code: U23FCND11**

**UNIT- I: Introduction to Nutrition and Dietetics (6 Hours)**

Nutrition ,Nutrients ,Malnutrition, Nutritional Status, Balanced Diet, Healthy Eating Pyramid, Dietetics, Nutritional Deficiency, Nutrition Screening, Nutritional Assessment, Macronutrients, Micronutrients and Food Groups.

**UNIT- II: Goals of Nutrition and Dietetics (6 Hours)**

Vision, Mission, Values Goals, Program Goals, Objectives and Mission of the Dietetic Internship.

**UNIT- III: Jobs/Careers in Nutrition and Dietetics (6 Hours)**

Clinical Dietician/Nutritionist, Sports Nutritionist/Dietician, Community Dietician/Nutritionist, Pediatric Dietician/Nutritionist, Management Dietician/Nutritionist, Registered Dietitian (RD) Dietician/Nutritionist. Recruiters in the career of Nutrition and Dietetics

**UNIT- IV: Standards in Nutrition and Dietetics Profession (6 Hours)**

Standards of professional performance, Important standards for Registered Dietitian, Nutritionists RDNs, Ethics in nutrition and dietetics practice- Fundamental principal, Role and Responsibilities of Dietician, Nutritionist Responsibilities to the Public, Responsibilities to Clients, Responsibilities to the Profession.

**UNIT-V: Future Scope of Nutrition and Dietetics (6 Hours)**

Holistic Nutritionist, Clinical Dietetics/Nutrition, Sports Nutritionist, Health Coach, Public Health Nutrition, Nutrition Education and Research, Business and Industry, Private Practice/Consulting, Nutritionist in school/clubs/restaurants/hotels,. Medical Nutrition Therapy, Clinical dietitian, Business and Industry, International Food Organization.

**Total Lecture Hours- 30**

**COURSE OUTCOME:**

The students will be able to

1. Understand the fundamental knowledge in the core areas of Nutrition and Dietetics
2. Describe the goals of Nutrition and Dietetics
3. Infer knowledge on the professionals in different fields related to Nutrition and Dietetics and understand the role of Dietician
4. Gain knowledge on fundamental, principal, role and responsibilities of Nutrition and Dietetics Profession
5. Understand the future scope of Nutrition and Dietetics

**TEXT BOOK(S)**

1. Antia, F.B. 2010, Clinical Nutrition and Dietetics, Oxford University Press, London. Bangalore-560 018.
2. Dr. Sheila John, 2004, Nutrition and Dietetics, Government of Tamil Nadu Publication, First Edition
3. Indian Dietetic Association. 2018, Clinical Dietetic Manual, 2<sup>nd</sup> edition, Elite Publishing House, New Delhi. ISBN- 10 : 9386418886; ISBN-13 : 978-9386418883,
4. Shubhangini A Joshi,2021, Nutrition and Dietetics , 5th Edition,MC Grew Hill Publication.
5. Sri Lakshmi. B., 2019, Dietetics, 8<sup>th</sup> Edition, New Age International Pub. Co, Chennai.
6. Srilakshmi B.2017.Nutrition Science. sixth edition. New Age International Publishers
7. Swaminathan M. 1993. Principles of Nutrition and Dietetics. Bappco 88, Mysore Road

**REFERENCE BOOK(S)**

1. Gajalakshmi R. 2014. Nutrition Science. CBS Publishers and distributors Pvt Ltd, New Delhi.
2. Wardlaw G.M. Insel, P.H. – Perspectives in Nutrition (1990) Times Mirror / Mosby College Publishing Co. St. Louis, Toronto, Boston.
3. William S.R. 1985. Nutrition and Diet Therapy. 5th edition, Mosbey Co. St. Louis.

**E - RESOURCES**

1. <https://www.pace.edu/college-health-professions/departments/nutrition-and-dietetics/welcome-chair/mission-goals>
2. <https://www.shiksha.com/hospitality-travel/dietetics-chp>
3. <https://www.eatrightpro.org/practice/code-of-ethics/code-of-ethics-for-the-nutrition-and-dietetics-profession/code-of-ethics-practitioner-handout>
4. <https://www.youtube.com/watch?v=AwK98CoNK3U>
5. <https://www.unsw.edu.au/study/undergraduate/bachelor-of-nutrition-master-of-dietetics-and-food-innovation>



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**B.Sc., NUTRITION AND DIETETICS**



**Semester: II –CC-II: HUMAN PHYSIOLOGY**

**Ins.Hrs./Week:5**

**Course Credit: 5**

**Course Code: U23ND203**

**UNIT: I- Blood and Circulatory System (20 Hours)**

Blood and Circulatory System-Blood: Composition, functions, Red Blood cells (RBCs) – Structure functions, Erythropoiesis, Haemoglobin, White Blood cells (WBCs) Structure, classification- granulocytes, lymphocytes, monocytes, and functions.

Blood Platelets: Structure, functions; Reticulo endothelial system; Blood groups –Rh factor. Blood coagulation, Spleen –Structure and functions, Lymph – Lymphatic system- Components and functions.

Heart and Circulation – Structure of heart and circulation. Structure of blood vessels, Properties of cardiac muscle, Cardiac cycle-Cardiac rhythm, Cardiac output, Origin and conduction of heart beat; Measurement of arterial blood pressure; Regulation of Heart's action.

**UNIT- II: Digestive System (15 Hours)**

Digestive System-General Anatomy of the digestive system. Digestion in the Mouth, Stomach and Intestines; structure of Villi: Movements of the Gastro intestinal tract; Role of Liver, Gall bladder and Pancreas – Structure and Functions.

**UNIT-III : Respiratory and Excretory System (10 Hours)**

Respiratory System –Anatomy and physiology of Respiratory organ, Mechanism of respiration, Subdivisions of Lung air; Control of respiration; chemistry of Respiration; Artificial Respiration.

Excretory system –Structure and functions of kidney and nephron, Formation of urine; Micturition.

**UNIT-IV Endocrine and Reproductive System (15 Hours)**

Endocrine System – Role of hormones and functions of thyroid gland, pituitary gland, parathyroid gland, adrenal gland; Islets of langerhans of pancreas.

Reproductive System – General anatomy – Female and male reproductive system. Testis – Spermatogenesis, male sex hormones, ovaries – oogenesis, Female sex hormones, menstrual cycle. Phases and endocrine control. Fertilization, development of embryo, pregnancy and parturition. Mammary glands – Structure and process of lactation.

## **UNIT-V Nervous System and Sense Organs**

**(15 Hours)**

Nervous System – Anatomy and physiology of Brain. Spinal cord and Neuron, Conduction of nerve impulse.

Sense Organs:

Eye - Structure, functions, Physiology of vision, dark and light adaptation, accommodation of the eye, visual fields, Abnormalities – presbyopia, cataract, Astigmatism, Blindness.

Ear - Structure and Physiology of hearing.

Skin – Structure and functions, Regulations of body temperature.

**Total Lecture Hours- 75**

### **COURSE OUTCOMES**

The students will be able to

1. Know the role and importance of circulatory system and its regulation in body function
2. Gain knowledge on mechanism of digestive system, respiratory and excretory function and their role in body regulation.
3. Understand the importance of endocrine system and its role in biological process.
4. Comprehend the reproductive system.
5. Gain knowledge about nervous system and sense organs.

### **TEXT BOOK(S)**

1. Beck, W.S. (1971) Human Design. Harcourt Brace Jovanovich Inc., New York.
2. Best, C. H. and Taylor, N. B. (1980) Living Body. 4th ed. BIP, Bombay.
3. Creager, J. G. (1992) Human Anatomy and Physiology. 2nd ed. WMC Brown Publishers, England.
4. Guyton, A.C. (1979) Physiology of the Human Body. 5th ed. Saunders College of Publishing, Philadelphia

### **REFERENCE BOOK(S)**

1. Subramaniam, S. and Madhavan Kutty, K. (1971) The Text Book of Physiology. Orient Longman Ltd., Madras.
2. Tortora G. J. and Anagnostakos N.P. (1984) Principles of Anatomy and Physiology, 4th edition, Harper and Row Publishers, New York.
3. Waugh A and Grant A. (2012) Ross and Wilson Anatomy and Physiology in Health and Illness. 11th ed. Churchill and Livingstone, Elsevier
4. Wilson, K. J. W. (1987) Anatomy and Physiology in Health and Illness. 6th ed. ELBS, Churchill Livingstone, London.

### **E - RESOURCES**

1. <https://youtu.be/uFf0zxQ3rBU>
2. <http://epgp.inflibnet.ac.in/Home/Download>.
3. <https://courses.lumenlearning.com/suny-ap2/chapter/organs-and-structures-of-the-respiratory-system/>
4. <https://dhingcollegeonline.co.in/attendance/classnotes/files/1606233006.pdf>
5. <https://my.clevelandclinic.org/health/articles/10978-skin>

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**DEPARTMENT OF NUTRITION AND DIETETICS**

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**Semester: II –CP-II: HUMAN PHYSIOLOGY**

**Ins.Hrs./Week:4**

**Course Credit: 4**

**Course Code: U23ND204P**

**CONTENT:**

**PRACTICAL:**

1. Histology of Tissues – Columnar, cubical, ciliated, squamous, stratified squamous.
2. Microscopic structure of organs – lungs, artery, vein, stomach, ovary, testis, uterus, pancreas.
3. Histology of muscles – Cardiac, striated, non – striated
4. Estimation of Haemoglobin, Bleeding time, Clotting time
5. Measurement of Blood pressure – before and after exercise
6. Determination of Respiratory rate and Pulse rate – before and after exercise.
7. Determination of Blood group.
8. Determination of Rh factor.
9. Enumeration of Red blood cells – Demonstration.
10. Enumeration of White blood cells – Demonstration.
11. Differential Leukocyte count – Demonstration
12. Visit to a Clinical laboratory.

**COURSE OUTCOMES**

The students will be able to

1. Identify cells present in the body
2. Describe cellular arrangement in tissues and organs
3. Articulate the methods to be adapted for the measurement of various blood Parameters
4. Explain cellular arrangement in tissues and organs
5. Appraise number of cells present in blood.

**TEXT BOOK(S)**

1. Dr.Mrunal K.Shirsat.Dr.Jayesh Dwivedi.2002.A Practical Book on Human Anatomy And Physiology I. Everest Publishing House.Pune.
2. Guyton and Hal.2000. Textbook of Medical Physiology. Saunders, United States of America
3. Pal GK, and Parvati Pal.2016.Textbook of Practical Physiology. Universities Press(India)Private Limited,
4. Sembulingam, 2016. Essentials of Medical Physiology. Health Sciences Publisher, New Delhi.
5. Subramanyam, Sarada . 2018. Textbook of Human Physiology. S.Chand and company Ltd, New Delhi.

## **REFERENCE BOOK(S)**

1. Best and Taylor.1992. The Physiological Basis for Medical Practice, Saunders Company.Canada.
2. Dr.Goyal R, Dr.Natvar M,Patel M.2018.Practical Anatomy and Physiology.B.S.Shah Prakashan.Gujarat.
3. Sri Nageswari K.Rajeev Sharma.2018.Practical Workbook of Human Physiology .Jaypee- The Health Sciences Publisher. Mumbai.
4. Waugh Anne Ross. 2003. Anatomyand Physiology in Health and Illness, Churchill Livingstone, New York.
5. Wilson, Ross. 2014. Anatomy and Physiology in Health and Illness, Reed Elsevier India Private Limited, New Delhi.

## **E - RESOURCES**

1. <http://nbtc.naco.gov.in/assets/resources/training/5.pdf>
2. [https://www.researchgate.net/publication/331326775\\_Bleeding\\_Time\\_BT\\_Clotting\\_Time\\_CT\\_Platelet\\_Count\\_and\\_Mean\\_Platelet\\_Volume\\_MPV\\_in\\_Type\\_2\\_Diabetes\\_Mellitus-A\\_case\\_control\\_study](https://www.researchgate.net/publication/331326775_Bleeding_Time_BT_Clotting_Time_CT_Platelet_Count_and_Mean_Platelet_Volume_MPV_in_Type_2_Diabetes_Mellitus-A_case_control_study)
3. <http://nbtc.naco.gov.in/assets/resources/training/5.pdf>
4. <https://youtu.be/4PaEd6FAZn4>
5. [https://youtu.be/x\\_AihJIPF30](https://youtu.be/x_AihJIPF30)

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**Semester: II AP-I: Food Chemistry**

**Ins. Hrs./Week:2**

**Course Credit : 2**

**Course Code:U23AND102P**

**1. Chemistry of Starch and Sugars**

- Gelatinization of Starch, Microscopic Examination of uncooked and gelatinized Starch.
- Retrogradation and Syneresis, Gluten Formation,
- Stages of Sugar Cookery, Preparation of Fondant, Fudge, and Toffee, Scum formation in milk.

**2. Chemistry of Proteins**

- Gluten Formation.
- Effect of Soaking, germination and fermentation of Pulses Coagulation of egg white and egg yolk .
- Boiled Egg, Poached Egg, Omlettes, Custards, Cake and Mayonnaise.
- Coagulation and precipitation of milk proteins.
- Changes observed in Cooking Meat, Fish and Poultry, Testing the Tenderness of meat.

**3. Chemistry of Fats and Oils**

- Smoking temperature of different fats, factors affecting absorption of fats.

**4. Chemistry of Pectic Substances and Plant Pigments.**

- Effect of acids, alkali and heat on water soluble and fat-soluble pigments.
- Enzymatic Browning and Methods of prevention.

**TEXT BOOK(S)**

1. Shakuntala Manay, Shadaksharaswamy M. 2000. Foods, Facts and Principles, 2<sup>nd</sup> Edition New Age International Pvt Ltd Publishers.
2. Srilakshmi B. 2016. Food Science. New Age International Publishers, New Delhi.
3. Swaminathan M. 2005. Food Science. Chemistry and Experimental Foods, Bappco Publishers, Bangalore.
4. Yadav, Seema. 2006. Food Chemistry. Anmol Publications (P)Ltd, New Delhi.

**REFERENCE BOOK(S)**

1. Brow A. 2000. Understanding Food. Thomson Learning Publications, Wadsworth.
2. Mehas KY. Rodgers SL. 2000. Food Science. McMillan McGraw Company, New York.
3. Parker R. 2000. Introduction to food Science. Delmer, Thomson Learning Co, Delma.

**E-RESOURCES**

1. [http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp\\_content/food\\_technology/food\\_chemistry/17.functional\\_and\\_nutritional\\_properties\\_of\\_proteins/et/41\\_et\\_m17.pdf](http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/food_technology/food_chemistry/17.functional_and_nutritional_properties_of_proteins/et/41_et_m17.pdf)
2. <https://ugcmoocs.inflibnet.ac.in/assets/uploads/1/127/4409/et/14%20Script200302070703031919.pdf>
3. <https://byjus.com/biology/applications-of-enzymes/>

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**Semester: II –AC-II: Food Microbiology**

**Ins.Hrs./Week:3**

**Course Credit: 2**

**Course Code: U23AND203**

**UNIT- I: Introduction to Microbiology (10 Hours)**

Definition and types of Microscope: Micro Organisms – Bacteria- General characteristics, bacteria morphology, cell structure, motility, nutrition, reproduction and respiration. Viruses: General characteristics of viruses, Structure. Bacteriophage-multiplication. Yeasts: General characteristics of yeasts, Nutrition, Reproduction, Economic importance of yeasts. Molds: General characteristics and Economic importance of molds.

**UNIT- II: Microbial spoilage and contamination of common food (8 Hours)**

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.

**UNIT- III: Beneficial uses of microorganisms in food and health (8 Hours)**

Microorganisms used in fermented products - Alcoholic drinks, Dairy products, Bread, Vinegar, Pickled foods. Single-cell protein Food Bio preservatives of microbial origin. Intestinal Bacteria and Probiotics.

**UNIT-IV: Food poisoning and Food borne disease (9 Hours)**

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.

**UNIT-V: Microorganisms found in water, soil, air and sewage (10 Hours)**

List of microorganisms and diseases caused; Test for sanitary quality of water, Purification of Water  
Control of Microorganisms in food -Control of Access of Microorganisms: sanitation, sterilization and disinfection Control by Heat (Thermal Processing), Low Temperature, Reduced Water Activity and Drying, Low pH and Organic Acids, Modified Atmosphere, Reducing O-R Potential) Antimicrobial Preservatives and Bacteriophages Irradiation, Novel Processing Technologies, Combination of Methods (Hurdle Concept)

**Total Lecture Hours -45**

## **COURSE OUTCOME:**

The students will be able to

1. Understand the knowledge on history and scope of microbiology and deep insight in the application of microscopy
2. Acquaint with the basic concept of microbes, their taxonomy, differentiation and factors influencing their growth and survival.
3. Acquire knowledge of microbes and their importance, application in day to day life with special reference to food.
4. Explain the effects of fermentation in food production and also how it influences the microbial quality and status of the food product.
5. Identify the characteristics of food borne, water borne and air borne microbial diseases.

## **TEXT BOOK(S)**

1. Adams MR. 2014. Food Microbiology. New Age International Publishers, New Delhi.
2. Arumugam N, Mani A, Selvaraj AM and Narayanan LM. 2014. Microbiology. Saraspublication, Nagercoil.
3. Pelczar Jr. Michael J. 2014. Microbiology. McGraw Hill Education (India), Private Ltd, Publication, New York.
4. Vijaya Ramesh, K. 2007. Food Microbiology. MJP Publishers, Chennai.
5. William C. Frazier. 2014. Food Microbiology. Tata McGraw Hills Publishing Company Limited, New York.

## **REFERENCE BOOK(S)**

1. Adams Tamine, 2005. Probiotic Dairy Products. Blackwell Publishing, USA.
2. Ananthanarayan and Paniker. (2017). Text book of Microbiology, Tenth Edition, Orient Longman Limited, Hyderabad.
3. Bohra and Parihar. 2012. Food Microbiology. Student edition.
4. Gerald McDonell. (2020). Block's Disinfection, Sterilization and Preservation. 6<sup>th</sup> edition. Lippincott Williams and Wilkins, Philadelphia.
5. James G. Cappuccino. Natalie Sherman. 2008. Microbiology – A Laboratory Manual. Pearson Education Publishers, USA.
6. James M. Jay. 2005. Modern Food Microbiology. Fourth Edition, CBS Publishers and Distributors, New Delhi.
7. Ramesh. V. (2007). Food Microbiology, MJP publishers, Chennai.
8. Sugandhar Babu RP. 2008. Food Microbiology. Adhyayan Publishers and Distributors, New Delhi.

## **E-RESOURCES**

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

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**Semester: II Non Major Elective-II: Women's Health and Wellness**  
**Ins. Hrs./Week:2      Course Credit :2      Course Code:U23NMEND22**

**Unit-I: Nutrition for Women (6 Hours)**

Dietary Guidelines for a healthy lifestyle, Current concepts pertaining to Balanced Diets, Nutrient requirements for young and older women with special focus on Protein, Iron, Vitamin D and Calcium, Factors affecting nutrient intake in women- Socioeconomic, Environmental conditions, Health conditions; Consequences of Eating disorders in young women.

**Unit-II: Physical Health (6 Hours)**

Significance of Body weight and Body composition parameters, Benefits of Aerobic, Flexibility and Strength training exercises- on General health, Bone health, and risks associated with NCD's.

**Unit-III: Reproductive Health (6 Hours)**

Menstrual Health, Pregnancy and Lactation, Pre- and Post-Menopausal concerns- preventive measures, sexually transmitted diseases- an overview

**Unit-IV: Mental Health (6 Hours)**

Common mental health problems - Trends and issues relating to women, Depression, Anxiety and coping with Stress, Strategies to improve mental health- learning new skills and hobbies, Relaxation techniques such as yoga and meditation.

**Unit-V: Social Health (6 Hours)**

Balancing home and career, strengthening relationships, enhancing communication skills and Personality Development, technological advancements and its impact, Dealing with domestic violence, and harassment issues.

**Total Lecture Hours -30**

**COURSE OUTCOME:**

The students will be able to

1. Define terms related to nutrition, physical, reproductive, mental and social health.
2. Discuss the need for right nutrition, exercises and skills needed for the overall well-being of women.
3. Explain the significance of maintaining physical, reproductive, mental and social health for the overall well-being of women.
4. Devise strategies to improve women's health in a holistic manner.
5. Recommend simple measures for a healthy lifestyle.



## **TEXT BOOK(S):**

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). *J Women's Health*; 21(5):481-489.
2. Mahan K and Sylvia E. Stump (2000) *Krause's Food Nutrition and Diet Therapy*, Saunders, USA.
3. Minkin M. J. and Wright C. V. (2003) *The Yale Guide to Women's Reproductive Health from menarche to menopause*. Yale University Press, London
- 4.Sizer F. S. and Whitney E. (2014) *Nutrition: Concepts & Controversies*. 13<sup>th</sup> Ed., Wadsworth, Cengage Learning, USA.

## **REFERENCE BOOK(S)**

1. Sperry L. (2016) *Mental Health and Mental Disorders*. ABC-Clio, California
2. Williams M.H., Anderson D.E., Rawson E.S. (2013) *Nutrition for Health, Fitness and Sport*. McGraw Hill, New York.
3. Wrzus C, Hänel M, Wagner J, Neyer FJ. (2013) Social network changes and life events across the life span: a meta-analysis. *Psychol Bull*;139(1):53-80.

## **E-RESOURCES**

1. [https://www.nhp.gov.in/social-health\\_pg](https://www.nhp.gov.in/social-health_pg)
2. <https://ncert.nic.in/textbook/pdf/jehp112.pdf>
3. <https://ncert.nic.in/textbook/pdf/iehp113.pdf>
4. <https://ncert.nic.in/textbook/pdf/lebo104.pdf>
5. <https://www.nih.gov/health-information/social-wellness-toolkit>
6. <https://www.cdc.gov/reproductivehealth/womensrh/index.htm>
7. <https://www.nimh.nih.gov/health/topics/caring-for-your-mental-health>
8. <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response>
9. <https://www.cdc.gov/mentalhealth/learn/index.htm>

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**Semester: II Skill Enhancement Course-I Human Development**

**Ins. Hrs./Week:2**

**Course Credit :2**

**Course Code: U23SEND21**

**Unit-I: Growth and development**

**(6 Hours)**

Meaning - growth and development, principles of governing growth and development, developmental task of different stages. Methods of study of human development.

**Unit-II: Infancy and Childhood**

**(6 Hours)**

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.

**Unit-III: Adolescence**

**(6 Hours)**

Adolescence –physical and psychological changes, emotional, moral and social development, Problems of adolescence.

Delinquency – causes, prevention, and rehabilitation.

Educational and vocational guidance, role of family and schools and colleges in guiding adolescence

**Unit-IV: Adulthood and Old Age**

**(6 Hours)**

Adulthood - Characteristics and developmental tasks, all aspects of development and vocational adjustments.

Old age - Characteristics of old age, physical changes, psychological changes. Place of the aged in Indian Society.

**Unit-V: Exceptional Children**

**(6 Hours)**

Introduction to Children with Special Needs and identification &Educational Rehabilitation

Gifted children    orthopedically challenged

Mentally retarded                                        Hearing impaired

Visually handicapped                                  Learning disability

**Total Lecture Hours -30**

**COURSE OUTCOME:**

The students will be able to

1. Describe the meaning and principles of Growth & Development
2. Explain the developmental aspects during infancy, early and late childhood.
3. Evaluate the developmental aspects during adolescence.
4. Identify the developmental tasks during adulthood and old age.
5. Introduction to Children with Special Needs and identification and Educational Rehabilitation

**TEXT BOOK(S):**

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.

**REFERENCE BOOK(S):**

1. Suriakanthi A., (1997). Child Development – An Introduction, Tamil Nadu: Kavitha Publishers.
2. Swaminathan, M (1998). The First Five Years: A Critical Perspective on Early Childhood Care and Education in India. New Delhi: Sage Publications.
3. Suriakanthi, A., (2009). Child Development. Kavitha publications, Tamil.

**E-RESOURCES**

1. [https://www.nhp.gov.in/social-health\\_pg](https://www.nhp.gov.in/social-health_pg)
2. <https://ncert.nic.in/textbook/pdf/jehp112.pdf>
3. <https://ncert.nic.in/textbook/pdf/iehp113.pdf>
4. <https://ncert.nic.in/textbook/pdf/lebo104.pdf>
5. <https://www.nih.gov/health-information/social-wellness-toolkit>
6. <https://www.cdc.gov/reproductivehealth/womensrh/index.htm>
7. <https://www.nimh.nih.gov/health/topics/caring-for-your-mental-health>
8. <https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response>
9. <https://www.cdc.gov/mentalhealth/learn/index.htm>