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BE BOUNDLESS

# **BENGALURU CITY UNIVERSITY**

**CHOICE BASED CREDIT SYSTEM**

**(Semester Scheme with Multiple Entry and Exit Options for  
Under Graduate Course)**

**Syllabus for Home Science  
(I & II Semester)**

**2021-22 onwards**

Proceedings of the BOS in Home Science (UG & PG) for Bengaluru City University held on  
30<sup>th</sup> September, 2021

A meeting of the BOS in Home Science (UG & PG) for Bengaluru City University held on 30<sup>th</sup> September, 2021 between 10:30 am to 5:00 pm in Smt. V.H.D Central Institute of Home Science, Seshadri Road, Bengaluru – 560 001.

The following members were present for the meeting:

**Name and Designation**

**1. Dr Usha Devi. C**

Chairperson BOS in Home Science (UG, PG & PhD)  
Bengaluru City University (BCU)  
HOD, Dept. of Food and Nutrition & Research Centre,  
Smt. V.H.D Central Institute of Home Science,  
Seshadri Road, Bengaluru – 560 001.

*Usha Devi*  
30/9/21

**2. Dr. Vijayalaxmi A.H.M.,**

Member  
Principal & Associate Professor,  
Department of Human Development and Research Centre,  
Smt. V.H.D Central Institute of Home Science,  
Seshadri Road, Bengaluru – 560 001

*Vijayalaxmi*  
30/09/2021

**3. Dr. Madhumathy S.,**

Member  
HOD & Associate Professor,  
Department of Early Childhood Education and Administration,  
Smt. V.H.D Central Institute of Home Science,  
Seshadri Road, Bengaluru – 560 001

*Madhumathy*

**4. Dr. Asha Jyothi U. H.,**

Member  
HOD & Associate Professor,  
Department of Resource Management,  
Smt. V.H.D Central Institute of Home Science,  
Seshadri Road, Bengaluru – 560 001

*Asha Jyothi*

**5. Dr. Grace Premila Victor.,**

Member  
Associate Professor,  
Bishop Cotton Women's College,  
Field Marshal Kariyappa Road,  
Bengaluru – 560 025

*Grace Premila*

## Name and Designation

6. **Dr. Marie Kavitha Jayakaran.,**  
Member  
Associate Professor,  
Bishop Cotton Women's College,  
Field Marshal Kariyappa Road,  
Bengaluru - 560 025
7. **Dr. Shantha Maria B. V.,**  
Member  
Associate Professor,  
Home Science,  
Mount Carmel College, Autonomous,  
No. 58, Palace Road,  
Bengaluru - 560 052
8. **Dr. Sangeeta Pandey.,**  
Member  
Associate Professor,  
Nutrition and Dietetics,  
Mount Carmel College, Autonomous,  
No. 58, Palace Road,  
Bengaluru - 560 052

*M. Kavitha Jayakaran*

*Shantha Maria B. V.*

*Sangeeta Pandey*

## Members Absent

1. **Dr. Komala M**  
Member  
Professor,  
Department of Human Development,  
University of Mysore,  
Manasa Gangothri, Mysuru - 570 006

The meeting began with Dr Usha Devi C., Chairperson BOS in Home Science, welcoming the members to the meeting and appraising the members of the agenda scheduled for the meeting. She also informed the members that at present three colleges listed below are offering BA/BSc Home Science as one optional and BSc NDCZ courses at UG level and PG in Nutrition and Dietetics in one college.

- a) Bishop Cotton Women's Christian College - BA/BSc Home Science as one optional and NDCZ course; and PG in Nutrition and Dietetics
- b) Faith British Academy - BSc NDCZ course
- c) S B A N M College, Yelahanka - BSc CND

✓ The Board reviewed the NEP syllabus and made the necessary minor changes in the matrix and blown up syllabus of first and second semester and approved the same for the academic year 2021-2022 for all the courses.

2. Approval of the Ph.D Research guide ship of Dr Sujata Gupta, Department of Human Development, Mount Carmel College, Autonomous, Bengaluru.
3. The Board included panel of examiners from Smt. V H D Central Institute of Home Science to the Panel of Examiners sent by Bengaluru City University and recommended the same to BCU (Annexure-I) and an additional list of panel from other colleges.
4. The Board also constitutes the BOE (UG/PG) for approval by the BCU (Annexure-II).

The meeting ended with the Chairperson thanking the members for attending the meeting.

*Vijayalaxmi*  
30/09/2021  
Dr. Vijayalaxmi A.H.M.

*S. Madhumathy*  
Dr. Madhumathy S.

*Ashjoti*  
Dr. Asha Jyothi U. H.

*Grace Premila*  
Dr. Grace Premila Victor.

*Marie Kavitha*  
Dr. Marie Kavitha Jayakaran

*Shantha Maria B.V*  
Dr. Shantha Maria B. V.

Dr. Sangeeta Pandey.

*Sangeeta*

*Usha Devi C*

Dr. Usha Devi C,  
Chairperson, Ph.D., FISCA  
BOS in Home Science (UG&PG)  
Bangalore City University (BCU)  
Central College Campus, Bangalore - 01

# **BENGALURU CITY UNIVERSITY**

**CURRICULUM FRAMEWORK FOR FOUR-YEAR  
UNDER GRADUATE PROGRAM (HONOURS)  
AND MASTERS**

[ FIRST TWO SEMESTERS ]

**IN  
HOME SCIENCE  
2021**

## CONTENTS

<b>Sl. No.</b>	<b>Programmes</b>	<b>Page No.</b>
<b>3.</b>	<b>BA/B.Sc. Home Science</b>	<b>1-27</b>
<b>5.</b>	<b>B.Sc. Nutrition and Dietetics</b>	<b>28-56</b>
<b>6.</b>	<b>B.Sc. Clinical Nutrition</b>	<b>57-98</b>

**Structure of B.A/ B.Sc Home Science as one**

**Discipline Major**

**(Model II A)**

## PREAMBLE

Home Science is both science and social science-art related multi-disciplinary field of study. The Learning Outcomes-based Curriculum Framework (LOCF) for B.Sc/B.A (Home Science) degree programme has been designed to integrate the application of sciences and humanities to create a cadre of home scientists to improve the quality of life of individuals, family, community and nation.

Home science program is predominantly practical oriented and therefore helps to develop and polish various skills to empower the cadre required towards innovation, incubation and entrepreneurship along with professional and employable skills. Hands on experience with Project work/internship/fieldwork would help and build capacities for conducting primary research among the students. The curriculum has been structured to prepare the undergraduates to achieve skills to move forward with the development of the society/community/nation and entrepreneurship. The Curriculum incorporates multidimensional fundamental, core and applied aspects of various disciplines with Graduate Attributes (GAs) such as disciplinary knowledge, laboratory/field driven practical's, the art of writing & communication, self-learning, critical thinking, analytical & problem solving abilities, use of ICT, application of knowledge, lifelong learning, research-related skills, team spirit, multicultural competencies, leadership qualities, global vision, professional commitment and sensitizing with Sustainable Development Goals (SDGs) of United Nations. It also aims to build future ready professionals who would be socially responsible global citizens contributing to the overall development of the country. The model curriculum presented has a multidisciplinary approach keeping the New National Education Policy 2020

## **Model Curriculum**

**Name of the Degree Program: BA/B.Sc. Honours**

**Discipline Core:HomeScienceTotal Credits for the Program: 176**

**Starting year of implementation:2021-22**

**Program Outcomes:**

**By the end of the program the students will be able to:**

**(Refer to literature on outcome-based education (OBE) for details on Program Outcomes)**

1. Deliver quality tertiary education through learning while doing.
2. Reflect universal and domain-specific values in HomeScience.
3. Involve, communicate, and engage keystakeholders.
4. Preach and practice change as a continuum.
5. Develop the ability to address the complexities and interface among of self, societal and national priorities.
6. Generate multi-skilled leaders with a holistic perspective that cuts across disciplines.
7. Instill both generic and subject-specific skills to succeed in the employment market.
8. Foster a genre of responsible students with a passion for lifelong learning and entrepreneurship.
9. Develop sensitivity, resourcefulness and competence to render service to families, communities, and the nation at large.
10. Promote research, innovation and design (product) development favoring all the disciplines in HomeScience.
11. Enhance digital literacy and apply them to engage in real time problem solving and ideation related to all fields of HomeScience.
12. Appreciate and benefit from the symbiotic relationship among the five core disciplines of Home Science – Resource Management, Food Science and Nutrition, Textiles and Clothing, Human Development and Family Studies and Extension and Communication

**Assessment:**

**Weightage for assessments (in percentage)**

<b>Type of Course</b>	<b>Formative Assessment / IA</b>	<b>Summative Assessment</b>
<b>Theory</b>	<b>60</b>	<b>40</b>
<b>Practical</b>	<b>25</b>	<b>25</b>
<b>Projects</b>	<b>-</b>	<b>-</b>
<b>Experiential Learning (Internships etc.)</b>	<b>-</b>	<b>-</b>

## Contents of Courses for Ba/B.Sc. Home Science as Major Subject

### Model II A

Semester	Course No.	Course Category	Theory/Practical	Credits	Paper Title	Marks	
						S.A	I.A
1.	HSCT1.1	DSC A 1	Theory	4	Principles of Food and Nutrition	60	40
	HSCP1.1		Practical	2	Principles of Food and Nutrition	25	25
	HSCT1.2	OE- 1	Theory	3	Food Preservation	60	40
2.	HSCT2.1	DSC A2	Theory	4	Fundamentals of Human Development	60	40
	HSCP2.1		Practical	2	Fundamentals of Human Development	25	25
	HSCT2.2	OE- 2	Theory	3	Teaching Materials For Early Childhood Education	60	40
<b>Exit Option with Certificate in Home Science (48 Credits)</b>							
3.	HSCT3.1	DSC A 3	Theory	4	Early Childhood Care and Education	60	40
	HSCP3.1		Practical	2	Early Childhood Care and Education	25	25
	HSCT3.2	OE- 3	Theory	3	Income Generating Skills	60	40
4.	HSCT4.1	DSC A 4	Theory	4	Introduction to Textiles	60	40
	HSCP4.1		Practical	2	Introduction to Textiles	25	25
	HSCT4.2	OE- 4	Theory	3	FashionDesigning	60	40
<b>Exit Option with Diploma in Home Science (96 Credits)</b>							
5	HSCT5.1	DSC A 5	Theory	3	Resource Management and Consumer Economics	60	40
	HSCP5.1		Practical	2	Resource Management and Consumer Economics	25	25
	HSCT5.2	DSC A 6	Theory	3	Communication and Extension Education	60	40

	HSCP5.2		Practical	2	Communication and Extension Education	25	25
	HSCT5.3	VOC- 1	Theory	3	Special Education	60	40
6	HSCT6.1	DSC A 7	Theory	3	Human Development and Family Dynamics	60	40
	HSCP6.1		Practical	2	Human Development and Family Dynamics	25	25
	HSCT6.2		Theory	3	Interior Decoration	60	40
	HSCP6.2		Practical	2	Interior Decoration	25	25
	HSCT6.3		Theory	3	Designing Interior Spaces	60	40
<b>Exit Option with Bachelor of Science Degree in Home Science (136 Credits)</b>							
7.	HSCT7.1	DSC A 9	Theory	3	Traditional Textiles and Costumes of India	60	40
	HSCP7.1		Practical	2	Traditional Textiles and Costumes of India	25	25
	HSCT7.2	DSC A10	Theory	3	Children with Developmental Challenges	60	40
	HSCP7.2		Practical	2	Children with Developmental Challenges	25	25
	HSCT7.3	DSC A 11	Theory	3	Nutritional Management in Health and Disease	60	40
	HSCP7.3		Practical	2	Nutritional Management in Health and Disease	25	25
	HSCT7.4	DSE 1	Theory	3	Ergonomics in Design	60	40
	HSCT7.5	DSE 2	Theory	3	Public Health Nutrition	60	40
	HSCT7.6		Theory	3	Research Methodology	60	40
HSCT8.1	DSC A12	Theory	3	Clothing and Fashion Illustration	60	40	
HSCP8.1		Practical	2	Clothing and Fashion Illustration	25	25	
HSCT8.2	DSC A 13	Theory	3	Entrepreneurship Development	60	40	

8.	HSCP8.2		Practical	2	Entrepreneurship Development	25	25
	HSCT8.3	DSC A 14	Theory	3	Guidance and Counselling	60	40
	HSCP8.3		Practical	2	Guidance and Counselling	25	25
	HSCT8.4	DSE 3	Theory	3	Food Service Management	60	40
	HSCT8.5		Theory	6	Research Project OR	60	40
					Any two of the following electives / Internship (A) Food Preservation and Safety (B) Energy Conservation (C) Extension Management (D) Gerontology		
<b>Award of Bachelor of Science Degree Honours Degree in Home Science (176credits)</b>							

\*In lieu of the research Project, two additional elective papers/ Internship may be offered.

## Curriculum Structure for the Undergraduate Degree Program Ba/B.Sc.

### Home Science

**Total Credits for the Program: 176 Credits**

**Starting year of implementation: 2021-22**

**Name of the Degree Program: BA/BSc Degree/Honors**

**Discipline/Subject: Home Science as one Discipline A**

**Program Articulation Matrix:**

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately.

Sem.	Title /Name of the course	Program outcomes that the course addresses (not more than 3 per course)	Pre-requisite course(s)	Pedagogy	Assessment
1	DSC A 1 Principles of Food and Nutrition	PO –4 PO -5 PO –7	12+/Equivalent Pass	<ul style="list-style-type: none"> <li>• Demonstration</li> <li>• lecture</li> </ul>	Formative and Summative Assessment
	OE- 1 Food Preservation	PO-3 PO-8 PO-9	12+/Equivalent Pass	<ul style="list-style-type: none"> <li>• Demonstration</li> <li>• lecture</li> </ul>	Formative and Summative Assessment
2	DSCA2 Fundamentals of Human Development	PO –4 PO –6 PO –8	12+/Equivalent Pass	<ul style="list-style-type: none"> <li>• Lecture</li> <li>• FieldVisit</li> </ul>	Formative and Summative Assessment
	OE-2 TeachingMaterials for Early Childhood Education	PO-1 PO-3 PO-8	12+/Equivalent Pass	<ul style="list-style-type: none"> <li>• Demonstration</li> <li>• lecture</li> </ul>	Formative and Summative Assessment

## Syllabus for B.Sc. Home Science as Major Subject & B.Sc. (Hons)

### B.SC. HOME SCIENCE SEMESTER 1

Course Title: <b>PRINCIPLES OF FOOD AND NUTRITION (DSC A1)</b>	
Total Contact Hours: 60Hrs	Course Credits: 4
Formative Assessment Marks: 40 marks	Duration of ESA / Exam: 3 Hrs
Model Syllabus Authors:	Summative Assessment Marks: 60 marks

**Course Pre-requisite(s):** Standard 12 and its equivalence with minimum 35%

**Course Outcomes: (COs)**

At the end of the course the student should be able to:

1. Understand the role and functions of nutrients, their requirements and the effect of deficiency and excess.
2. Understand the concept of an adequate diet and the importance of meal planning for all age group

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

Course Outcomes (COs) / Program Outcomes(POs)	1	2	3	4	5	6	7	8	9	10	11	12
Understand the role and functions of nutrients, their requirements and the effect of deficiency and excess	X		X						X			
Understand the concept of an adequate diet and the importance of meal planning for all age group			X	X							X	

**B.SC. HOME SCIENCE**  
**SEMESTER 1**

**Title of the Course: PRINCIPLES OF FOOD AND NUTRITION**

<b>Course : DSC A1</b>	
<b>Number of Theory Credits</b>	<b>Number of lecturehours/semester</b>
<b>4</b>	<b>60</b>

<b>CONTENT</b>	<b>60 Hrs.</b>
<b>Unit-1 Introduction to Nutrition</b>	<b>12 Hrs</b>
<b>Chapter No. 1:</b> Definition of nutrition, Malnutrition and Health, Functions of food, Food groups -Types of food pyramids	<b>6 Hrs</b>
<b>Chapter No. 2:</b> Balanced diet - Meal planning – steps in meal planning	<b>6 Hrs</b>
<b>Unit – 2 Nutrients</b>	<b>18 Hrs</b>
<b>Chapter No. 3:</b> Nutrients Macro and Micro nutrients- classification, Sources, functions and deficiency. A) Carbohydrates, B) Proteins C) Fats D) Minerals – Calcium, Iron, Iodine. E) Vitamins – Fat soluble vitamins – A, D, E & K Water soluble vitamins – vitamin C Thiamine, Riboflavin, Niacin	<b>15 Hrs</b>
<b>Chapter No. 4:</b> A) Water – Functions, sources and water balance B) Fibre – Functions and sources, C) Energy – factors affecting BMR	<b>3 Hrs</b>
<b>Unit – 3 Methods of Cooking</b>	<b>15 Hrs</b>
<b>Chapter No. 5.</b> Methods of cooking- Advantages and disadvantages a) Water – Boiling, steaming, pressure cooking b) Oil/Fat – Shallow frying,	

deep frying c) Air – Baking	4 hrs
<b>Chapter No. 6.</b> Nutrition through lifecycle Nutritional requirement, dietary guidelines: Adulthood, Pregnancy, Lactation, Infancy -Complementary feeding, Pre-school, Adolescence, Old age.	11hrs
<b>Unit – 4 Food Preservation</b>	<b>15 Hrs</b>
<b>Chapter No. 7 -</b> Food Preservation- Objectives and principles-Methods: dehydration, temperature regulation ,using preservatives like salt and sugar	8 hrs
<b>Chapter No. 8 -</b> Food Handling and storage - freezing thermal and non-thermal methods, Canning	7hrs
<b>Unit – 4 Food Preservation</b>	<b>15 Hrs</b>
<b>Chapter No. 7 -</b> Food Preservation- Objectives and principles-Methods: dehydration, temperature regulation ,using preservatives like salt and sugar	8 hrs
<b>Chapter No. 8 -</b> Food Handling and storage - freezing thermal and non-thermal methods, Canning	7hrs

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

**Practical Course:2Credits**

**30Hrs**

**List of Experiments to be conducted**

**Unit 1:** a) Weights and Measures

b) Food pyramids

**Unit 2:** Methods of cooking

a) Boiling, steaming

b) Pressure cooking, shallow and deep fatFrying

c) Dry heat -baking

**Unit 3:** Identification of nutrient rich foods and preparation of any three nutrient rich foods

**Unit 4:** Food preservation – salt, sugar and dehydration.

**REFERENCES**

1. Srilakshmi B, (2007), Dietetics. New Age International publishers. NewDelhi
2. Srilakshmi B, (2002), Nutrition Science. New Age International publishers. NewDelhi
3. Swaminathan M. (2002), Advanced text book on food and Nutrition. Volume I.Bappco.
4. Gopalan.C.,RamaSastry B.V., and S.C.Balasubramanian (2009), Nutritive value of Indian Foods.NIN.ICMR.Hyderabad.
5. Mudambi S R and Rajagopal M V, (2008), Fundamentals of Foods, Nutrition & diet therapy by New Age International Publishers, NewDelhi

**Date**

**CourseCoordinator**

**Subject CommitteeChairperson**

**Ba/ B.Sc. HOME SCIENCE**  
**SEMESTER 1**

Course Title: <b>FOOD PRESERVATION (OE1)</b>	
Total Contact Hours: 45 Hrs	Course Credits: 3
Formative Assessment Marks: 40 marks	Duration of ESA/Exam: 3 hrs
Model Syllabus Authors:	Summative Assessment Marks: 60 marks

**Course Pre-requisite(s):** Standard 12 and its equivalence with minimum 35%

**Course Outcomes (COs):**

At the end of the course the student should be able to:

1. Know the principles of preservation behind the methods of preservation
2. Understand the stages of sugar cookery, quality of pectin and acidity in the development of preserved food products
3. Acquire skills to formulate food based products
4. Explore the principles of preservation in fruits and vegetables based products
5. Skills to prepare cereals and pulse based preserved products and develop new products with retention of quality course

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
Know the principles of preservation behind the methods of preservation			X		X							
Understand the stages of sugar cookery, quality of pectin and acidity in the development of preserved food products				X	X							
Acquire skills to formulate food based products							X	X				

Explore the principles of preservation in fruits and vegetables based products							<b>x</b>		<b>x</b>			
Skills to prepare cereals and pulse based preserved products and develop new products with retention of qualitycourse					<b>x</b>		<b>x</b>					

**Ba/ B.Sc. HOME SCIENCE  
SEMESTER 1**

**Title of the Course: FOOD PRESERVATION**

<b>Course: OE 1</b>	
<b>Number of Theory Credits</b>	<b>Number of lecturehours/semester</b>
<b>3</b>	<b>45</b>

<b>CONTENT</b>	<b>45 Hrs</b>
<b>Unit-I Concept of Food Preservation</b>	<b>10 Hrs</b>
<b>Chapter No.1-</b> Importance of Food Preservation, Types of Food spoilage by Microorganisms and by Enzymes, Basic Principles of Food Preservation  Food preservatives- Use of Salt, Acid, Sugar, natural food preservatives and artificial preservatives	<b>5 Hrs</b>
<b>Chapter No. 2-</b> Starting a food preserving unit, Product Promotion strategies and marketing skills	<b>5 Hrs</b>
<b>Unit-II Preparation of dehydrated products</b>	<b>20 Hrs</b>
<b>Chapter No.3</b> Methods of drying & dehydration , different types of driers , freeze drying- lyophilization , packing & storage	<b>5 Hrs</b>
<b>Chapter No. 4-</b> Drying methods for the selected products -Rice, Sago, Wheat, Maida, Rice flakes, black gram dhal, green gram dhal, Horse gram dhal Roots and Tubers.  Preparation of salted, dehydrated, preserves (Traditional Indian varieties of chips, Papads, Khakharas etc and Masala Powders, onion, garlic, ginger	<b>7 Hrs</b>

<p>powder etc)</p> <p><b>Chapter No. 5-</b> Hands on experience :Drying of vegetables- peas, potato, carrot, French beans, Reconstitution of dried vegetables, Drying &amp; preparation of powders- garlic, ginger, spices mix etc</p>	<b>8 Hrs</b>
<b>Unit -III Preservation by Using Sugar, Chemicals, Salts and Fermentation</b>	<b>15 Hrs</b>
<p><b>Chapter No. 7 -</b> Role of Pectin in Preserved foods, Stages in Sugar Cookery, Sugar Concentrates – Principles of Gel Formation.</p> <p>Hands on Experience: Preparation of Jam, Jelly, Marmalades, Sauce and Squash, Preserves, Candied, Glazed, Crystallized Fruits, Toffee, Evaluation of pH, Acidity and pectin quality, Preparation and Preservation of Fruit Juices,RTS</p> <p>Visit to Fruits and Vegetable processing industry</p>	<b>8 Hrs</b>
<p><b>Chapter No. 8 -</b> Pickling – Principles Involved and Types of Pickles, Chemical Preservatives – Definition, Role of Preservation, Permitted Preservatives, FSSAI guidelines, Foods fermented by Yeasts and Bacteria, Wine and Cheese Making</p>	<b>3 Hrs</b>
<p><b>Chapter No. 9 -</b> Hands on experience: Pickle making, Visit to Commercial Pickle Manufacturing/ Food Industry / Wine industry</p>	<b>4 Hrs</b>

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>3 Total</b>	<b>60 marks + 40 marks = 100 marks</b>

### **Reference:**

1. Maney S (2008). Foods, Facts and Principles, 3 rd Edition Published by Wiley Eastern, New Delhi.  
Usha Chandrasekhar (2002) Food Science and Application in Indian Cookery, Phoenix Publishing House P. Ltd., NewDelhi.
2. Raina U, Kashyap S, Narula V, Thomas S Suvira, VirS, Chopra S (2010) Basic Food Preparation: A Complete Manual, 4th Edition, Orient Black Swan Ltd,Mumbai
3. Srivastava R.P. (2012),Fruit and vegetable preservation – Principles and Practices, International Book Distributing Co., (IBDC), NewDelhi.
4. Maria Parloa (2009), canned fruit, preserves and jellies: Household methods of preparation, US Department of Agriculture, Washington.5
5. Shafiur, Rahman, M. (2007), Handbook of Food Preservation, 2 nd edition, CRC press, NewDelhi

**Date**

**CourseCoordinator**

**Subject CommitteeChairperson**

**Ba/B. Sc. HOME SCIENCE**  
**SEMESTER 2**

Course Title: <b>Fundamentals of Human Development (DSC A2)</b>	
Total Contact Hours: 60 Hrs.	Course Credits: 4
Formative Assessment Marks: 40 marks	Duration of ESA / Exam: 3 hrs.
Model Syllabus Authors:	Summative Assessment Marks: 60 marks

**Course Pre-requisite(s): Standard 12 and its equivalence with minimum 35% Course**

**Outcomes (COs):**

At the end of the course the student should be able to:

1. Explain the need and the importance of studying human growth and development across lifespan.
2. Identify the biological and environmental factors affecting human development.
3. Describe the characteristics, needs and developmental tasks of different stages in the human lifecycle
4. Discuss the special features characteristic of each stage and its impact on the next stage
5. Explain the broad theoretical perspectives of different researchers.

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
Explain the need for and importance of studying human growth and development across life span.		X		X	X						X	

Identify the biological and environmental factors affecting human development.								X	X		X	
Describe the characteristics, needs and developmental tasks of different stages in the human life cycle								X		X		X
Discuss the special features characteristic of each stage and its impact on the next stage			X	X								
Explain the broad theoretical perspectives of different researchers.			X	X					X			

**Ba/B.Sc. HOME SCEINCE**  
**SEMESTER 2**

**Title of the Course: FUNDAMENTALS OF HUMAN DEVELOPMENT**

<b>Course : DSC A2</b>	
<b>Number of Theory Credits</b>	<b>Number of lecturehours/semester</b>
<b>4</b>	<b>60</b>

<b>CONTENT</b>	<b>60 Hrs</b>
<b>Unit – 1 Introduction</b>	<b>20 Hrs</b>
<b>Chapter No. 1</b> Human Development – Definition, needs, and Scope; Domains of Development:	<b>3 Hrs</b>
<b>Chapter No. 2</b> Concept and principles of Growth and development; Factors influencing growth and development.	<b>5 Hrs</b>
<b>ChapterNo. 3</b> Methods of studying Human development, Prenatal development	<b>3 Hrs</b>
<b>Chapter No. 4</b> Fertilization, Pregnancy–Signs, Symptoms, Complications, Discomforts; Stages of Prenatal Development	<b>5 Hrs</b>
<b>Chapter No. 5</b> Child Birth - Process and types, Birth complications	<b>4 Hrs</b>
<b>Unit – 2 Infancy and Early childhood Years</b>	<b>20 Hrs</b>
<b>Chapter No. 6.</b> Infancy - Definition, Significance, Developmental Tasks, and developmental milestones; Physical growth, reflexes and perceptual	

abilities, Immunization Schedule;	
<b>Chapter No. 7.</b> Early Childhood Years- Definition, Developmental tasks; physical, motor, intellectual, language, emotional, social developmental milestones. importance of preschool education and Significance of play for all-round development	<b>8 Hrs</b>
<b>Chapter No. 8.</b> Piaget's cognitive Theory and Erik Erickson's Personality Theory.	<b>4 Hrs</b>
<b>Unit – 3 Middle Childhood Years</b>	<b>20 Hrs</b>
<b>Chapter No. 9</b> The Middle Childhood Years - Definition, Developmental tasks. Highlights of Physical, Social, Emotional, Intellectual development. Significance of school and functions; Importance of extra-curricular activities, Peers - Importance and Influence, Interestdevelopment	<b>12 Hrs</b>
<b>Chapter No. 10</b> Role of Parents and Disciplinary Techniques; Role of siblings, peers and others in the development; Behaviorproblems	<b>8 Hrs</b>

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>3 Total</b>	<b>60 marks + 40 marks = 100 marks</b>

**Practical:2Credits**

**60Hrs**

**List of Experiments to be conducted**

1. Prepare an album on the stages of prenatal development.
2. Organize a lecture/workshop for parents on importance of the nutrition/ Needs of preschool children.
3. Develop an activity to foster cognitive development in school children

<b>Formative Assessment</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment /Project	5+5
<b>Total</b>	60 marks + 40 marks = 100 marks

**REFERENCES**

1. Berk, L.E. (2005). Child development (5th ed.). New Delhi: PrenticeHall.
2. Bhangaokar, R., & Kapadia, S. (in press). Human Development Research in India: A historical overview. In G. Misra (Ed.), Hundred years of Psychology in India. New Delhi: Springer.
3. Feldman, R., & Babu, N. (2009). Discovering the life span. New Delhi: Pearson
4. Kakar, S. (1998). The inner world. Psychoanalytic study of childhood and society in India. Delhi: Oxford University Press.
5. Kapadia, S. (2011). Psychology and human development in India. Country paper. International Society for the Study of Behavioural Development Bulletin Number 2, Serial No. 60, pp.37-42.
6. Keenan, T., Evans, S., & Crowley, K. (2016). An introduction to Child development. Sage.
7. Lightfoot, C., Cole, M., & Cole, S. (2012). The development of children

8. (7<sup>th</sup>ed.).NewYork: WorthPublishers.
9. Santrock, J. (2017). A topical approach to life span development (9th ed.). NewNY.:  
Mcgraw-Hill HigherEducation.
10. Singh, A. (2015). Foundations of Human Development: A life span approach.  
ND:Orient BlackSwan.
11. Walsh, B.A., Deflorio, L., Burnham, M.M., & Weiser, D.A. (2017). Introduction to  
Human Development and Family Studies. NY:Routledge
12. Baradha.G 'Basics of Human Development' Saradalaya Press, Sri  
Avinashilingam Education Trust Institutions, Coimbatore2008.
13. Hurlock.B.Elizabeth 'Developmental Psychology – A Life Span Approach' Tata  
McGraw Hill Publications, New Delhi Latest Edition.3.
14. Suriakanthi. A. (2015) 'Child Development' Kavitha Publications, Gandhigram,  
TamilNadu.

**Date**

**CourseCo-ordinator**

**Subject CommitteeChairperson**

**Ba/B.Sc. HOME SCIENCE**  
**SEMESTER 2**

<b>Course Title: TEACHING MATERIALS FOR EARLY CHILDHOOD EDUCATION (OE 2)</b>	
<b>Total Contact Hours: 45 Hrs</b>	<b>Course Credits: 3</b>
<b>Formative Assessment Marks: 60marks</b>	<b>Duration of ESA/Exam: 3 Hrs</b>
<b>Model Syllabus Authors:</b>	<b>Summative Assessment Marks: 40marks</b>

**Course Pre-requisite(s):** Standard 12 and its equivalence with minimum 35%

**Course Outcomes (COs):**

At the end of the course the student should be able to:

1. Understand the importance of teaching learning materials.
2. Understand the different teaching methods & materials for early years
3. Understand the different teaching methods & materials developmentally challenged children

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

<b>Course Outcomes (COs) / Program Outcomes (POs)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
Understand the importance of teaching learning materials		X		x			x					
Understand the different teaching methods & materials for early years			x				x		x			
Understand the different teaching methods & materials developmentally challenged children			x				x		x			

**B.Sc. HOME SCIENCE  
SEMESTER 2**

**Title of the Course: TEACHING MATERIALS FOR EARLY CHILDHOOD EDUCATION**

<b>Course: OE 2</b>	
<b>Number of Theory Credits</b>	<b>Number of lecturehours/semester</b>
<b>3</b>	<b>45</b>

<b>CONTENT</b>	<b>45 Hrs</b>
<p><b>Chapter No. 1-</b> Objectives of Teaching-Learning Materials, Orientation on different methods and materials used for teaching young children and studying the techniques of different methods.</p> <ul style="list-style-type: none"> <li>• The oral communication methods: (stories, songs, Music, description, explanation, etc.) and conversational methods (conversation, heuristic conversation, questioning on a special subject,etc.).</li> <li>• Exploratory learning methods: direct exploration of objects and phenomena (systematic and independent observation, small experiments, etc.) and indirect exploration (demonstration through pictures, films,etc.).</li> <li>• Methods based on the pupils' direct voluntary action (exercises, practical work, etc.) and simulated action (didactic games, learning through drama,etc.).</li> <li>• Use of natural materials (plants, shells, seeds, insects, rocks, sand, etc.)</li> <li>• Intuitive materials (cast and clay models, Puppets, blocks, puzzles, mazes, etc)</li> <li>• Figurative aids (pictures, photographs, atlas books, maps, albums, table games,etc.)</li> </ul>	<b>15 Hrs</b>

<ul style="list-style-type: none"> <li>Printed teaching aids (children's books, workbooks, etc.). Printed teaching aids</li> </ul> Digital material (audio & videos)	
<b>Unit-II – Development of Materials for Early years</b>	<b>13 Hrs</b>
<b>Chapter No. 2-</b> Design and development of developmentally appropriate play materials to foster all round development in children using indigenous materials, Developing stories, songs with music and rhythm appropriate for infancy through early childhood	<b>8 Hrs</b>
<b>Chapter No. 3 -</b> Creative Activities - importance, Types and values promoted, method of giving instructions. Process of scripting for puppet plays and creative drama.	<b>5 Hrs</b>
a) Painting – free hand, finger, thread, wax resist & spray	
b) Printing -block, leaf, stencil, thumb	
c) Pasting – collage, paper mosaic, sand	
d) Miscellaneous-etching, marbling, dough modelling	
<b>Unit –III- Development of Materials for developmentally challenged children</b>	<b>12 Hrs</b>
<b>Chapter No. 4-</b> Creating teaching learning materials for developmentally challenged children ( Blind, Dumb & deaf, Learning disabilities, Speech disorders, Mentally retarded, Gifted children, Slow learners)	<b>8 Hrs</b>
<b>Chapter No. 5 -</b> Designing & developing digital play materials like videos, audio aids or audio- Visual aids	<b>4 Hrs</b>

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>3 Total</b>	<b>60 marks + 40 marks = 100 marks</b>

**Reference:**

1. Contractor, M., 1984, Creative drama and puppetry in education, National book trust of India, Delhi
2. Devadas P. Rajammal and N. Jaya (1996), "A Textbook on child development", Mac Millan India Ltd. New Delhi.
3. Nasim Siddiqi, Suman Bhatia and Suptika Biswas (2007) Early Childhood Care and Education –Book IV, DOABA HOUSE, New Delhi.
4. Sen Gupta, M. (2009). Early Childhood Care and Education. New Delhi: PHI Learning Pvt. Ltd.
5. Soni, R., 2015, Theme based early childhood care and education programme- A Resource Book, NCERT

**Date Course Co-ordinator Subject Committee Chairperson**

**Structure of  
B.Sc. (Hons.) with  
Nutrition and Dietetics as a  
Major / Minor Subject & M.Sc.  
Nutrition and Dietetics  
(Model II A)**

## Preamble

The subject wise expert committee to draft model curriculum contents in Nutrition & Dietetics constituted by the Department of Higher Education, Government of Karnataka, Bangalore vide GO No. ED 260 UNE 2019 (PART-1) DATED 13.08.2021 is pleased to submit its partial report on the syllabus for the First Year (First & Second Semesters) B.Sc.(Basic/Honors) Nutrition and Dietetics and detailed Course Structure for B.Sc.(Honors) Nutrition and Dietetics and M.Sc.(OneYear) Nutrition and Dietetics.

The committee discussed various models suggested by the Karnataka State Higher Education Council in its joint meetings with the Chairpersons of Board of Studies of all state universities in Karnataka and resolved to adopt Model IIA (Model Program Structure for the Bachelor of Arts (Basic/Hons.)/ Bachelor of Science (Basic/Hons.) for the subjects with practical with Nutrition and Dietetics as Major/Minor.

The B.Sc (Honors) programme in Nutrition and Dietetics intends to create competent professionals with in-depth understanding of various aspects offered under this programme. The programme offers a broad range of courses spanning across areas of community nutrition, food science, dietetics, and nutrition counseling. The four-year programme aims at conceptual understanding of the key elements of nutrition and dietetics. Students would be trained in areas such as nutritional assessment, diet planning, food product development, health communication, clinical nutrition, nutrition education and behavior modification. The programme would also introduce students to research methodology and statistics which would be pivotal in developing

reasoning, logic, problem solving and scientific temper. The students would be further exposed to continuous hands-on training through regular practical and internship experience. This would enable creative and critical thinking among the students. The comprehensive programme would enable students to keep themselves updated through internship, practical and projects.

The subject expert committee designed the Course Learning Outcome (CO) to help the learners to understand the main objectives of studying the courses by keeping in mind of the Programme outcomes (PO) of the graduate degree with honors in Nutrition and Dietetics or a graduate degree with Nutrition and Dietetics as a major subject.

As the field of Nutrition and Dietetics is vast, dynamic and an evolving area of specialization. This requires students to learn and be abreast with recent advances and evidence-based guidelines in the field of food and nutrition. Hence the subject expert committee suggests introduction of elective papers (for both Discipline electives and Open Electives) along with Discipline Core Courses. The BoS in Nutrition and Dietetics of universities may include additional electives based on the expertise of their staff and needs of the students. Student can select elective paper as per her/his needs and interest. The skills and attributes acquired during the programme would open doors to job opportunities in areas of food science, nutrition, health promotion, and disease management, also paves way for research and higher education for interested students.

## Model Curriculum

Name of the Degree Program: M.Sc. Discipline

Core: Food Science and Nutrition Total Credits for  
the Program: 265

Starting year of implementation: 2021-22

Program Outcomes:

By the end of the program the students will be able to:

PO 1	<b>Disciplinary Knowledge:</b> Understand the role and importance of food and nutrition for the welfare of the community and acquire the skills in planning diet, health and diseases
PO 2	<b>Communication Skills:</b> Learn and apply evidence-based guidelines in the field of dietetics, nutrition counselling, nutrition research laboratory, community
PO 3	<b>Critical thinking:</b> Understand the structure and functions of the different organs systems in relation to nutrition
PO 4	<b>Interpersonal and Problem Solving:</b> Design solutions and novel food products to meet the specified nutrient needs with appropriate consideration for the public health and safety.
PO 5	<b>Critical thinking, Communication and problem solving:</b> Comprehend, communicate effectively, plan, design and implement programs in the field of nutrition and dietetics
PO 6	<b>Decision making, Analytical and Research skills:</b> Understand and demonstrate the knowledge of food science, food science and quality control in societal and environmental contexts

PO 7	<b>Moral and ethical awareness/reasoning and Research skills:</b> Apply ethical principles and commit to professional ethics and responsibilities in the field of nutrition, sports, food industry and health care sectors.
PO 8	<b>Interpersonal and Business skills:</b> Understand the applications of nutraceuticals and functional foods in the product development from conceptualization to evaluation of the quality of the food product
PO 9	<b>Analytical and Research skills:</b> Comprehend the knowledge and role of food additives in food industry in relation to its analytical techniques
PO 10	<b>Critical thinking, Analysis and Research skills:</b> Understand and apply the concept of nutrients and nutritional science in the evaluation of health and disease
PO 11	<b>Goal Setting and Problem-solving skills:</b> Enable students to pursue higher education and research

**Assessment:**

**Weightage for assessments (in percentage)**

Type of Course	Formative Assessment / IA	Summative Assessment
Theory	40	60
Practical	25	25
Projects	40	60
Experiential Learning (Internships etc.)	80	20

## Content of Courses for B.Sc. Degree/Honours in Nutrition and Dietetics

### Model II A

Semester	Course Code.	Category of course	Theory/ Practical	Credits	Paper Titles	Marks	
						S.A	I.A
I	NDT1.1	DSC	Theory	4	Fundamentals of nutrition	60	40
	NDP1.1	DSC	Practical	2	Fundamentals of nutrition	25	25
	NDT1.2	OE	Theory	3	Fundamentals of food and health / Healthy lifestyle and nutrition	60	40
II	NDT2.1	DSC	Theory	4	Principles of Food Science and Preservation	60	40
	NDP2.1	DSC	Practical	2	Principles of Food Science and Preservation	25	25
	NDT2.2	OE	Theory	3	Food safety and Hygiene/ Food Adulteration	60	40
<b>Exit Option with Certificate in Nutrition and Dietetics (52 Credits)</b>							
III	NDT3.1	DSC	Theory	4	Nutrition through life span	60	40
	NDP3.1	DSC	Practical	2	Nutrition through life span	25	25
	NDT3.2	OE	Theory	3	Nutritional Assessment/ Traditional Foods and Health	60	40
IV	NDT4.1	DSC	Theory	4	Human Physiology	60	40
	NDP4.1	DSC	Practical	2	Human Physiology	25	25
	NDT4.2	OE	Theory	3	Nutrition in weight management/ Diet in life style disorder	60	40
<b>Exit Option with Diploma in Nutrition and Dietetics (100 Credits)</b>							
V	NDT5.1	DSC	Theory	3	Clinical Nutrition & Dietetics –1	60	40
	NDP5.1	DSC	Practical	2	Clinical Nutrition & Dietetics –1	25	25

	NDT5.2	DSC	Theory	3	Intermediary metabolism	60	40
	NDP5.2	DSC	Practical	2	Intermediary metabolism	25	25
	NDT5.3	VOC	Theory	2	Food Product Development & Sensory analysis	60	40
	NDP5.3	VOC	Practical	1	Food Service Management	25	25
	NDT5.4	Minor	Theory	3	Nutrition Psychology and Diet Adherence	60	40
	NDP5.4	Minor	Practical	2	Nutrition Psychology and Diet Adherence	25	25
<b>VI</b>	NDT6.1	DSC	Theory	3	Clinical Nutrition & Dietetics –II	60	40
	NDP6.1	DSC	Practical	2	Clinical Nutrition & Dietetics –II	25	25
	NDT6.2	DSC	Theory	3	Community Nutrition & Public Health	60	40
	NDP6.2	DSC	Practical	2	Community Nutrition & Public Health	25	25
	NDP6.3	VOC	Practical	3	Food Analysis	25	25
	NDT6.4			2	Internship	25	25
	NDT6.5	Minor	Theory	3	Assessment of Nutritional Status	60	40
	NDP6.5	Minor	Practical	2	Assessment of Nutritional Status	25	25
<b>Exit Option with Bachelor in Science Degree in Nutrition and Dietetics (144 Credits)</b>							
	NDP5.3	VOC	Practical	1	Food Service Management	25	25
	NDT5.4	Minor	Theory	3	Nutrition Psychology and Diet Adherence	60	40
	NDP5.4	Minor	Practical	2	Nutrition Psychology and Diet Adherence	25	25

<b>VI</b>	NDT6.1	DSC	Theory	3	Clinical Nutrition & Dietetics –II	60	40
	NDP6.1	DSC	Practical	2	Clinical Nutrition & Dietetics –II	25	25
	NDT6.2	DSC	Theory	3	Community Nutrition & Public Health	60	40
	NDP6.2	DSC	Practical	2	Community Nutrition & Public Health	25	25
	NDP6.3	VOC	Practical	3	Food Analysis	25	25
	NDT6.4			2	Internship	25	25
	NDT6.5	Minor	Theory	3	Assessment of Nutritional Status	60	40
	NDP6.5	Minor	Practical	2	Assessment of Nutritional Status	25	25
<b>Exit Option with Bachelor in Science Degree in Nutrition and Dietetics (144 Credits)</b>							
<b>VII</b>	NDT7.1	DSC	Theory	3	Advanced Nutrition –I	60	40
	NDP7.1	DSC	Practical	2	Advanced Nutrition –I	25	25
	NDT7.2	DSC	Theory	3	Advanced Food Science	60	40
	NDP7.2	DSC	Practical	2	Advanced Food Science	25	25
	NDT7.3	DSC	Theory	3	Food Microbiology, Sanitation & Hygiene	60	40
	NDT7.4	DSE	Theory	3	Statistics for Nutrition Research / food and Drug interaction	60	40
	NDT7.5	DSE	Theory	3	Food Processing & Preservation / Functional food quality	60	40
	NDT7.6	DSE	Theory	3	Research Methodology	60	40
<b>VIII</b>	NDT8.1	DSC	Theory	3	Advances in Medical Nutrition Therapy	70	40
	NDP8.1	DSC	Practical	2	Advances in Medical Nutrition Therapy	25	25

	NDT8.2	DSC	Theory	3	Advanced Nutrition-II	60	40
	NDT8.3	DSC	Theory	3	Exercise physiology and nutrition	60	40
	NDT8.4	DSE	Theory	3	Nutrition counselling / Nutrition care process	60	40
	NDT8.5		Research Project/	6	Research Project	140	60
<b>Exit Option with Bachelor in Science Honours in Nutrition and Dietetics (185 Credits)</b>							
<b>IX</b>	NDT9.1	DSC	Theory	3	Nutraceuticals and Functional Foods	60	40
	NDP9.1	DSC	Practical	2	Nutraceuticals and Functional Foods	25	25
	NDT9.2	DSC	Theory	3	Nutrition in critical care	60	40
	NDP9.2	DSC	Practical	2	Nutrition in critical care	25	25
	NDT9.3	DSC	Theory	3	Food safety & quality assurance	60	40
	NDT9.4	DSE	Theory	3	Nutrition in emergencies / Food sanitation & hygiene	60	40
	NDT9.5	VOC	Theory	3	Maternal & child nutrition / Precision nutrition and Nutrigenomics	60	40
	NDT9.6	DSE	Theory	3	Food Additives/ Nutritional Biochemistry	60	40
<b>X</b>	NDT10.1	DSC	Theory	3	Sports Nutrition	60	40
	NDT10.1	DSC	Practical	2	Sports Nutrition	25	25
	NDT10.2	DSC	Theory	3	Program Planning and Nutrition	60	40
	NDT10.3	DSC	Theory	3	Nutrition Education in Community	60	40
	NDT10.4	DSE	Theory	3	Geriatric Nutrition / Pediatric Nutrition	60	40
	NDT10.5		Dissertation	6	Dissertation/ Research project	140	60

**Award with Master in Science in Nutrition and Dietetics (265 Credits)**

\*In lieu of the research Project, two additional elective papers/ Internship may be offered

Abbreviation ND – Nutrition and Dietetics; DSC – Discipline Core; DSE –Discipline Specific Elective; T – Theory/ P – Practical; VOC-Vocational; OE- Open Elective; E-Elective ; MIN -minor

## CURRICULUM STRUCTURE FOR UNDERGRADUATE DEGREE PROGRAM

**Name of the Degree Program: B.Sc. (Honors)**

**Discipline / Subject: Nutrition and Dietetics**

**Starting Year of Implementation: 2021-22**

### PROGRAM ARTICULATION MATRIX

Semester	Course No	Program outcomes that the course addresses	Pre Requisite Course (s)	Pedagogy	Assessment
I	DSC 1 Fundamentals of nutrition	PO1 PO2	PUC/12 <sup>th</sup> Science students	<ul style="list-style-type: none"> <li>➤ MOOC</li> <li>➤ Seminar</li> <li>➤ Assignments</li> <li>➤ Group</li> <li>➤ Discussion</li> <li>➤ Case Studies</li> <li>➤ Lecture</li> <li>➤ ICT</li> <li>➤ Content Review</li> <li>➤ Audio -VideoMaterials</li> <li>➤ Demonstration</li> <li>➤ Field Visits</li> <li>➤ Hands OnTraining</li> <li>➤ Observation</li> <li>➤ On The FieldTraining</li> <li>➤ Review</li> <li>➤ Research</li> <li>➤ Article</li> <li>➤ Presentations</li> <li>➤ Nutrition Education Tools And Module Development</li> </ul>	Formative and Summative Assessment
	OE 1 Fundamentals of food and health / Health lifestyle and nutrition	PO1 PO2	PUC/12 <sup>th</sup> Science students		Formative and Summative Assessment
II	DSC- 2 Principles of Food Science and Preservation	PO1 PO4 PO6	PUC/12 <sup>th</sup> Science students		Formative and Summative Assessment
	OE- 1 Food safety and Hygiene/ Food Adulteration	PO1 PO4 PO6	PUC/12 <sup>th</sup> Science students		Formative and Summative Assessment

## Syllabus for B.Sc. with Nutrition and Dietetics as Major Subject & B.Sc. (Hons) Nutrition and Dietetics

### B.Sc NUTRITION AND DIETETICS SEMESTER 1

**Title of the Course: FUNDAMENTALS OF NUTRITION**

Course Title: Fundamentals of Nutrition (DSC 1)	
Total Contact Hours: 45 Hours	Course Credits:3
Formative Assessment Marks: 40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC Science students

**Course Outcomes (COs):**

1. Gain knowledge in basic terminology, aspects of nutrition & functions of food in healthy lifesustenance
2. Understand function of nutrients, dietary sources, consequences of deficiency and excess
3. Understand the food composition and concept of energy balance
4. Equip with knowledge and understanding on importance of water

**Course Articulation Matrix:**

Course Outcomes (COs) / Program Outcomes(POs)	1	2	3	4	5	6	7	8	9	10	11	12
Gain knowledge in basic terminology, aspects of nutrition & functions of food in healthy life sustenance	X											
Understand function of nutrients, dietary sources, consequences of deficiency and excess	X									X		
Understand the food composition and concept of energy balance	X											

Equip with knowledge and understanding on importance of water	X													
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## B.Sc NUTRITION AND DIETETICS SEMESTER 1

Title of the Course: FUNDAMENTALS OF NUTRITION

<b>Course: DSC- 1</b>	
<b>Number of Theory Credits</b>	<b>Number of lectureHours/semester</b>
<b>3</b>	<b>45</b>

<b>Content</b>	<b>45 Hrs</b>
<b>Unit – 1 Introduction to Nutrition</b>	<b>14 hours</b>
Understanding concept of nutrition, nutrients, nutritional status, malnutrition Functions of food, food groups, concept of balanced diet Methods of cooking and preservation of Nutrients Water: Functions, sources and water balance	
<b>Unit - 2 Macronutrients</b>	<b>14 hours</b>
Classification, Sources, Functions and Deficiency of Carbohydrates, Dietary Fibre Proteins and fats	
<b>Unit - 3 Energy Metabolism</b>	<b>14 hours</b>
Significance, components, factors influencing body composition, energy metabolism, BMR Measurement methods – Direct and Indirect Energy expenditure in activities, the use of doubly labeled water Influence of energy excess & deficit on body composition – obesity and under nutrition. Current methodology, Recommendations	

<b>Unit – 4 Micro Nutrients - Sources, Functions and Deficiency</b>	<b>14 hours</b>
Minerals: Calcium, Phosphorous, Iron, Iodine, Zinc Fat soluble vitamins (Vitamin A, D, E, K) Water soluble vitamins (B complex vitamins: Thiamine, Riboflavin, Niacin, Folic acid and Vitamin C)	

<b>Formative Assessment</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
CIA	15+ 15
Presentation / Assignment	10
<b>Total</b>	<b>30</b>

**Practical:2Credits**

**60Hrs**

**List of Experiments to be conducted**

1. Weights and measures
2. Methods of cooking
  - a. Water – boiling, steaming, pressure cooking
  - b. Oil- Shallow frying, deep frying
3. Identification of nutrient rich food
4. Planning and preparation of macro nutrient rich recipes
  - a. Energy
  - b. Protein
5. Planning and preparation of micro nutrient recipes
  - a. Iron
  - b. Vitamin A

## REFERENCES

1. Raheena Begum., (2009), A Text book of Food, Nutrition & Dietetics, Sterling Publications, New Delhi.
2. Mudambi S R and Rajagopal M V., (2008), Fundamentals of Food, Nutrition and Diet Therapy by New Age International Publishers, New Delhi
3. Srilakshmi. B., (2009), Human Nutrition, New Age International Publishers

**Date**

**Course Co-ordinator**

**Subject Committee Chairperson**

## B.Sc NUTRITION AND DIETETICS SEMESTER 1

**Title of the Course: FUNDAMENTALS OF FOOD & HEALTH -OE**

Course Title: FUNDAMENTALS OF FOOD AND HEALTH (OE-1)	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

### Course Outcomes (COs):

1. Gain knowledge on key nutrients and their implications on health
2. Familiarize with the concept of health and issues of public health concern
3. Understand the effect of novel and processed foods on general health and wellbeing

### Course Articulation Matrix:

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
Gain knowledge on key nutrients and their implications on health	X											
Understand the effect of novel and processed foods on general health and well being	X											

## B.Sc NUTRITION AND DIETETICS SEMESTER 1

Title of the Course: FUNDAMENTALS OF FOOD & HEALTH

<b>Course: OE-1</b>	
<b>Number of Theory Credits</b>	<b>Number of lectureHours/semester</b>
<b>3</b>	<b>45</b>

<b>Content</b>	<b>45 Hours</b>
<b>Unit-1</b> Overview of Food &Macronutrients	<b>12 hours</b>
Overview of Food & Nutrients, Food choice and factors influencing food choice Classification of nutrients – macronutrients and micronutrients. Energy, Carbohydrates, Protein and Fats Classification, Functions and Sources Impact of macronutrients on health – Deficiency and Excess	
<b>Unit - 2</b> Micronutrients & Water	<b>11 hours</b>
Micronutrients - Classification, Functions and Sources Impact of micronutrients on health – Deficiency and Excess Water – Role, Body fluids and electrolytes	
<b>Unit – 3</b> Components of health	<b>11 hours</b>

Health – Definition, Components, Factors influencing health, Dietary guidelines Issues of public concern Malnutrition, Anemia, Vitamin A deficiency, Obesity, Diabetes and Hypertension	
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<b>Unit - 4</b> Foods for health and well being	<b>11 hours</b>
Functional foods – Probiotics, prebiotics and phytochemicals Health supplements, processed foods, organic foods Nutrition label – understanding and importance	
<b>Unit - 4</b> Foods for health and well being	<b>11 hours</b>
Functional foods – Probiotics, prebiotics and phytochemicals Health supplements, processed foods, organic foods Nutrition label – understanding and importance	

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

## References

1. Antia F.P., Philip Abraham, Clinical Dietetics and Nutrition, Oxford University Press; 4<sup>th</sup> edition.
2. Kathleen Mahan L., Sylvania Escott-Stump, Krause's food, nutrition and diet therapy (11<sup>th</sup> edition). Saunders company, London.
3. Passmore R. and Davidson S. (1986) Human nutrition and Dietetics. Liming stone publishers.
4. Robinson C.H. Careme, Chenometh W.L., Garmick A.E. (1986) 16<sup>th</sup> edition Normal Therapeutic nutrient. Publish by Mc Millan Company NewYork.
5. Shil's M.E., Alfon J.A., Shike M (1994), Modern nutrition in health and diseases eighth edition.
6. William S.R., Nutrition and Diet Therapy fourth edition C.V. Mos Company.

**Date**

**Course Co-ordinator**

**Subject Committee Chairperson**

## B.Sc. NUTRITION AND DIETETICS SEMESTER 2

**Title of the Course: PRINCIPLES OF FOOD SCIENCE & PRESERVATION**

Course Title: <b>Principles of Food Science &amp; Preservation (DSC- 2)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:40	Duration of ESA/Exam: 3 hrs
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s): 12 std / PUC SCIENCE**

### **Course Outcomes (COs):**

1. Apply basic nutrition knowledge in making foods choices and obtaining an adequatediet
2. Learn to distinguish and relate the characteristics and properties offoods
3. Apply the knowledge gained on characteristics and properties of foods during cooking
4. Develop appropriate food preparation and processing methods to ensurequality standards

**Course Articulation Matrix:**

<b>Course Outcomes (COs) / Program Outcomes(POs)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
Learn to distinguish and relate the characteristics and properties of foods	X					X						
Apply the knowledge gained on characteristics and properties of foods during cooking.				X								
Develop appropriate food preparation and processing methods to ensure quality standards				X		X						

## B.Sc NUTRITION AND DIETETICS SEMESTER 2

**Title of the Course: Principles of Food Science & Preservation**

<b>Course: DSC- 2</b>	
<b>Number of Theory Credits</b>	<b>Number of lectureHours/semester</b>
<b>3</b>	<b>45</b>

<b>CONTENT</b>	<b>56 Hours</b>
<b>Unit – 1</b>	<b>14 hours</b>
<p>Introduction to Food Science</p> <p>Properties of food (a) Colloids, sols, gels, foam- (b) Emulsion formation- (c) Bound and free water -(d) pH Value, osmosis and osmotic pressure- (e) Boiling, melting and freezing points Sensory Evaluation- Subjective and objective.</p> <p>Cereals &amp; Millets-Production, importance &amp; composition- Cereal Products. Wheat, rice maize, ragi and sorghum. Malting and cooking of cereals, non-enzymatic reactions, Leavening agents. Fermented products, Milling of wheat, Parboiling of Rice,</p> <p>Pulses- composition, toxic constituents and cooking of pulses, variety and processing</p>	

<b>Unit – 2</b>	<b>14 hours</b>
<p>Fruits and vegetables – Production composition, pigments, flavors and variety- changes during cooking-enzymatic browning, non-enzymatic browning.</p> <p>Milk and milk products- composition, storage- Processing of milk- Coagulation- Milk products available in India.</p> <p>Egg- structure, composition, storage, grade, quality, selection, Role of egg in food preparation, coagulation.</p>	16hrs
<b>Unit – 3</b>	<b>14 hours</b>
<p>Sugar, Jaggery and honey - Composition, different forms of sugar, storage- Behaviors of syrups at different temperatures- Crystallization and caramelization</p> <p>Oil and Fats- Composition, types, storage, plasticity, Hydrogenation and processing .Changes during heating- Fats as shortening agents, smoking point, Rancidity, specific fat (Lard, Butter, Margarine)</p> <p>Meat, Fish poultry-structure, composition, storage, Post mortem changes in meat, Curing of meat, Tenderization, Aging of meat, selection, Meat cookery.</p>	
<b>Unit – 4</b>	<b>14 hours</b>
<p>Methods of cooking, nutrient loss during cooking</p> <p>Concepts of food safety and standards</p> <p>Food Preservation, food spoilage, method of preservation by low temperature, high temperature, dehydration, food irradiation</p>	

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

**Practical:2Credits**

**60Hrs**

**List of Experiments to be conducted**

1. Weights & measures, standardization of common foodpreparation.
2. Sensoryevaluation
3. Starch cookery I-microscopic observation of different starches gel formationand gelatinization.
4. Starch cookery II- Rice and Wheat preparation, factors influencingdoughdevelopment and gluten formation.Leavened products, milk cookery-casein formation, curdsetting.
5. Fermented products and pulsecookery.
6. Vegetable cookery- Effect on pigments and enzymatic browning in fruits and vegetables
7. Egg cookery and fat and oil cookery.
8. Sugar and Jaggery- Syrup formation, crystallization andcaramelization.

9. Leavened products, milk cookery-casein formation, curdsetting.
10. Fermented products and pulsecookery.
11. Vegetable cookery- Effect on pigments and enzymatic browning in fruits and vegetables
12. Egg cookery and fat and oil cookery.
13. Sugar and Jaggery- Syrup formation, crystallization andcaramelization.

<b>Formative Assessment</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
CIA	15+15
Presentation / Assignment	10
<b>Total</b>	<b>40</b>

### References

1. Arora K., Gupta K.V.,Theory ofcooking
2. Bennen Marion. Introductoryfoods
3. Lavies. (1998) Food commodities. Heinemann Ltd,London
4. Lowe Bella Experimentalcookery
5. Norman N Potter, Joseph H Hotchkiss (1999) Food scienceTechnology
6. Peckham. Foundation of foodpreparation
7. Srilakshmi. Food Science. New Age International Publishers, NewDelhi.

Sari Edelstein, 2014, Food Science-An ecological approach, Jones & Bartlett Learning,MA

**Date**

**CourseCo-ordinator**

**Subject CommitteeChairperson**

## B.Sc NUTRITION AND DIETETICS SEMESTER 2

Course Title: <b>FOOD SAFETY AND HYGIENE (OE- 2)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

### Course Outcomes (COs):

1. Gain knowledge on food safety and their implications on health
2. Familiarize with the concept of food safety issues on public health
3. Understand the standards, laws and regulations regarding food safety

### Course Articulation Matrix:

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12
Gain knowledge on food safety and their implications on health	X											
Familiarize with the concept of food safety issues on public health	X					X						
Understand the standards, laws and regulations regarding food safety						X						

## B.Sc NUTRITION AND DIETETICS SEMESTER 2

Title of the Course: FUNDAMENTALS OF FOOD SAFETY AND HYGIENE (OE-2)

Number of Theory Credits	Number of lecture hours/semester
3	45

Content	45 Hours
<b>Unit-1 Introduction to Food Safety</b>	<b>11 hours</b>
Concept and meaning of Food Safety, food adulteration, food hazards Food laws and regulations – National (FSSAI) and international (FAO) food laws, Governingbodies Exposure, estimation, toxicological requirements and risk analysis Safety aspects of water and beverages Safety assessment of food contaminants and pesticide residues	
<b>Unit – 2 Food Safety: Principles of prevention</b>	<b>11 hours</b>
Reduce microbial contamination and control growth Eliminate source of contaminants Sanitation: principle and purposes	
<b>Unit – 3 Food Protection</b>	<b>11 hours</b>

Food protection by: Thermal transfer methods, Chemical methods, Biocontrol methods and biotechnology, Irradiation methods Foodborne Illness Risk Factors Food worker Education and training	
<b>Unit - 4 Food Hygiene</b>	<b>12 hours</b>
Food hygiene law and the importance of food safety. Food Safety Hazards. Temperature control, food deliveries, refrigeration, low and high-risk foods,	

use by dates and best before dates, and stock rotation (FIFO). Cross-Contamination Hand hygiene, further hygiene considerations, protective clothing, reporting illness and first aid.	
use by dates and best before dates, and stock rotation (FIFO). Cross-Contamination Hand hygiene, further hygiene considerations, protective clothing, reporting illness and first aid.	

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

## References

1. Food Safety-Theory and Practice:Paul L. Knechtges, Jones & BartlettLearning,2012
2. Food Hygiene and Sanitation With case studies, Sunetra Roday, 2<sup>nd</sup> Edition, Tata McGraw Hill Education PvtLtd.,2011
3. Kirk, R.S and Sawyer , R.: Pearson's composition and analysis of foods, Longman Scientific and technical. 9<sup>th</sup> Edition, England.1991
4. Bryan,F.L: Hazardous Analysis Critical Control Point Evaluation. A guide to identifying Hazards and assessing risks associated with food preparation and storage. WHO,Geneva.1992
5. Bureau of Indian Standards: Specifications and Standardmethods.

**Date**

**CourseCo-ordinator**

**Subject CommitteeChairperson**

**Structure of B.Sc  
Honours in  
Clinical Nutrition and Dietetics and  
M.Sc. in  
Clinical Nutrition and Dietetics  
(Model I C)**

## Model Curriculum

**Name of the Degree Program: B.Sc. Honours and M.Sc.**

**Discipline Core: Clinical Nutrition and Dietetics**

**Total Credits for the Program: 224 Starting**

**year of implementation: 2021-22 Program**

**Outcomes:**

**By the end of the program the students will be able to: -**

<b>PO</b>	<b>Program Outcomes</b>
PO1	Understand the basic concepts of food science and nutrition and role of food and nutrients in growth, development, disease prevention and management.
PO2	Explain functions of macro and micronutrients, deficiencies, disorders and identify foods rich in specific nutrients.
PO3	Understand the complex processes of human physiology, metabolism, and human biochemistry with reference to energy and nutrition requirements.
PO4	Competent to implement food safety regulations and create awareness about sanitation, safety, hygiene for individuals, families, and communities.
PO5	Understand food and nutrition security and create awareness to public and communities.
PO6	Evaluate and assess the nutrient requirements of infants, children, and adults.
PO7	Critically analyze nutritional status of different age groups, and design diet plan as per the nutritional requirements.
PO8	Understand the importance of nutrition in lifestyle disorders and derive plan accordingly.

PO9	Apply technical skills, knowledge of nutrition, and decision-making skills, assessing capabilities in evaluating the nutritional status of individuals and communities and their response to nutrition intervention
PO10	Provide nutrition awareness and counseling to individuals, groups, and communities.

PO11	Competence in the skills of Nutritional assessment, Diet planning and Food service management in health-care systems, communities, and institutions
PO12	Shall be able to understand the principles of fitness and nutrition, during various stages of life cycle such as childhood, adolescence and old age and assess and evaluate their dietary and exercise habits.
PO13	Data collection and interpretation in nutrition surveys and critical analysis to resolve complex societal problems
PO14	Maintain ethical, legal, and professional practice standards during nutritional counselling or consultancy and to take leadership roles in fields of health, food research laboratories, dietetics, special nutritional needs, and nutritional counseling.
PO15	Practice and implement state of art nutrition care or consultancy in health food industry, critical care nutrition segments, clinical setups, nutraceutical industry, sports and fitness centers, therapeutic nutrition product manufacturing set ups, geriatric care units, meal/food distribution centers, women and child development organizations, Food auditing set ups, Food testing labs and Foodcorporations.
PO11	Competence in the skills of Nutritional assessment, Diet planning and Food service management in health-care systems, communities, and institutions
PO12	Shall be able to understand the principles of fitness and nutrition, during various stages of life cycle such as childhood, adolescence and old age and assess and evaluate their dietary and exercise habits.
PO13	Data collection and interpretation in nutrition surveys and critical analysis to resolve complex societal problems

PO14	Maintain ethical, legal, and professional practice standards during nutritional counselling or consultancy and to take leadership roles in fields of health, food research laboratories, dietetics, special nutritional needs, and nutritional counseling.
PO15	Practice and implement state of art nutrition care or consultancy in health food industry, critical care nutrition segments, clinical setups, nutraceutical industry, sports and fitness centers, therapeutic nutrition product manufacturing set ups, geriatric care units, meal/food distribution centers, women and child development organizations, Food auditing set ups, Food testing labs and Foodcorporations.

**Assessment:**

**Weightage for assessments (in percentage)**

<b>Type of Course</b>	<b>Formative Assessment / IA</b>	<b>Summative Assessment</b>
<b>Theory</b>	<b>40</b>	<b>60</b>
<b>Practical</b>	<b>25</b>	<b>25</b>
<b>Projects</b>	<b>40</b>	<b>60</b>
<b>Experiential Learning (Internships etc.)</b>	<b>80</b>	<b>20</b>

## Contents of Courses for B.Sc. Clinical Nutrition and Dietetics as Major Subject

### Model I C

Semester	Course code.	Course Category	Theory/Practical	Credits	Paper Title	Marks	
						S. A	I.A
1.	CNDT 1.1	DSC- 1	Theory	3	Fundamentals of Nutrition	60	40
	CNDP 1.1		Practical	2	Fundamentals of Nutrition	25	25
	CNDT 1.2	DSC- 2	Theory	3	Essentials of Macronutrients	60	40
	CNDP 1.2		Practical	2	Essentials of Macronutrients	35	15
	CNDT 1.3	DSC- 3	Theory	3	Food Sanitation and Hygiene	60	40
	CNDT 1.4	OE - 1	Theory	3	Fundamentals of Food and Health/Health lifestyle and Nutrition	60	40
2.	CNDT 2.1	DSC - 4	Theory	3	Human Physiology	60	40
	CNDP 2.1		Practical	2	Human Physiology	25	25
	CNDT 2.2	DSC- 5	Theory	3	Essentials of Micronutrients	60	40
	CNDP 2.2		Practical	2	Essentials of Micronutrients	25	25
	CNDT 2.3	DSC- 6	Theory	3	Food Safety and Security	60	40
	CNDT 2.4	OE- 2	Theory	3	Food safety and Hygiene /Food Adulteration	60	40
<b>Exit option with Certificate</b>							
	CNDP 3.1		Practical	2	Life Cycle Nutrition	25	25
	CNDT 3.2	DSC- 8	Theory	3	Dietetics I	60	40
	CNDT 3.2		Practical	2	Dietetics I	25	25

	CNDT 3.3	DSC- 9	Theory	3	Nutritional Biochemistry	60	40
	CNDT 3.4	OE- 3	Theory	3	Nutritional Assessment/Traditional Foods in Health	60	40
4.	CNDT 4.1	DSC- 10	Theory	3	Dietetics II	60	40
	CNDP 4.1		Practical	2	Dietetics II	25	25
	CNDT 4.2	DSC- 11	Theory	3	Community Nutrition	60	40
	CNDP 4.2		Practical	2	Community Nutrition	25	25
	CNDT 4.3	DSC- 12	Theory	3	Nutrition in Physical Fitness	60	40
	CNDT 4.4	OE- 4	Theory	3	Nutrition in Weight Management / Diet in Lifestyle Disorders	60	40
<b>Exit Option with Diploma</b>							
5	CNDT 5.1	DSC- 13	Theory	3	Dietetics III	60	40
	CNDP 5.1		Practical	2	Dietetics III	25	25
	CNDT 5.2	DSC- 14	Theory	3	Food Science	60	40
	CNDP 5.2		Practical	2	Food Science	25	25
	CNDT 5.3	DSC- 15	Theory	3	Functional Foods	60	40
	CNDT 5.5	DSE- 1	Theory	3	Food Microbiology	60	40
	CNDT 5.4	VOC - 1	Theory	3	Food Entrepreneurship	60	40
6.	CNDT 6.1	DSC- 16	Theory	3	Dietetics IV	60	40
	CNDP 6.1		Practical	2	Dietetics IV	25	25
	CNDT 6.2	DSC- 17	Theory	3	Institutional Food Service Management	60	40
	CNDP 6.2		Practical	2	Institutional Food Service Management	25	25
	CNDT 6.3	DSC- 18	Theory	3	Nutrition Education and Counselling	60	40

	CNDT 6.4	DSE- 2	Theory	3	Diabetes Management	60	40
	CNDT 6.5	VOC - 2	Theory	3	Clinical Case Studies	60	40
<b>Exit Option with Bachelor of Science in Clinical Nutrition and Dietetics</b>							
7.	CNDT 7.1	DSC- 19	Theory	3	Human Nutrition I	60	40
	CNDP 7.1		Practical	2	Human Nutrition I	25	25
	CNDT 7.2	DSC- 20	Theory	3	Medical Nutrition Therapy I	60	40
	CNDP 7.2		Practical	2	Medical Nutrition Therapy I	25	25
	CNDT 7.3		Internship	3	Internship	60	40
	CNDT 7.4	DSE- 3	Theory	3	Foods in Indian Tradition	60	40
	CNDT 7.5	VOC - 3	Theory	3	Nutritional Communication	60	40
	CNDT 7.6		Theory	3	Research Methodology	60	40
8.	CNDT 8.1	DSC- 21	Theory	3	Human Nutrition- II	60	40
	CNDT 8.2	DSC- 22	Theory	3	Nutrition in Critical Care	60	40
	CNDT 8.3	DSE- 4	Theory	3	Food Additives and Adulterants	60	40
	CNDT 8.4	VOC- 4	Theory	3	Therapeutic Food Product Development	60	40
	CNDT 8.5		Research Project/ Theory – 2	6	Research Project	140	60
					Advanced Dietetics	60	40
					Advanced Food Science	60	40
<b>Award of Bachelor of Science Honours in Clinical Nutrition and Dietetics</b>							
9.	CNDT 9.1	DSC- 23	Theory	3	Medical Nutrition Therapy II	60	40
	CNDP 9.1		Practical	2	Medical Nutrition Therapy II	60	40
	CNDT 9.2	DSC- 24	Theory	3	Public Health Nutrition	60	40

	CNDP 9.2		Practical	2	Public Health Nutrition	25	25
	CNDT 9.3	Field Study	Field study	2	Field Study	25	25
	CNDT 9.4	DSE- 5	Theory	3	Nutritional Psychology	60	40
	CNDT 9.5	VOC - 5	Vocational	3	Nutrition for Women	60	40
	CNDT 9.6		Theory	3	Nutraceuticals and Dietary Supplements	60	40
10.	CNDT 10.1	DSC -25	Theory	4	Sports Nutrition	60	40
	CNDT 10.2	DSC- 26	Theory	3	Nutrition in major Emergencies	60	40
	CNDT 10.3	DSE- 6	Theory	3	Paediatric and Geriatric Nutrition	60	40
	CNDP 10.4	VOC- 6	Practical	2	Nutritional Management in Lifestyle Disorders	25	25
	CND 10.5	Dissertation /Research Project	Dissertation/Research Project	6	Dissertation/Research Project	140	60

**Award of Master of Science in Clinical Nutrition and Dietetics**

# Curriculum Structure for the Undergraduate Degree Program

## B.Sc. Clinical Nutrition and Dietetics

**Total Credits for the Program:** 265 credits

**Starting year of implementation:** 2021-2022

**Name of the Degree Program:** B. Sc Degree / Honours and M.Sc

**Discipline/Subject:** Clinical Nutrition and Dietetics

### Program Articulation Matrix:

This matrix lists only the core courses. Core courses are essential to earn the degree in that discipline/subject. They include courses such as theory, laboratory, project, internships etc. Elective courses may be listed separately.

Sem.	Title /Name of thecourse	Program outcomes that the course addresses (not more than 3per course)	Pre-requisite course(s)	Pedagogy	Assessment
1	Fundamentals of Nutrition	PO1	PUC / 10+2 with Chemistry or Biology as one optional	<ul style="list-style-type: none"> <li>• SeminarPresentation</li> <li>• Quiz</li> </ul>	Formative and Summative Assessment
	Essentials of Macronutrients	PO1, PO2	PUC / 10+2 with Chemistry or Biology as one optional	<ul style="list-style-type: none"> <li>• Seminarpresentation</li> <li>• Planninginnovative recipes, Low-cost innovativerecipes</li> </ul>	Formative and Summative Assessment
	Food Sanitation, Hygiene	PO4	PUC / 10+2 with Chemistry or Biology as one optional	<ul style="list-style-type: none"> <li>• Field study incommunity</li> <li>• Visits</li> <li>• Awarenessprograms</li> </ul>	Formative and Summative Assessment
	Human Physiology	PO3	PUC / 10+2 with Chemistry or Biology as one optional	<ul style="list-style-type: none"> <li>• Seminar and Poster presentation</li> <li>• Modelmaking</li> </ul>	Formative and Summative Assessment

2	Essentials of Micronutrients	PO2	PUC / 10+2 with Chemistry or Biology as one optional	<ul style="list-style-type: none"> <li>• Seminar presentation, Quiz</li> <li>• Low-cost innovative recipes</li> </ul>	Formative and Summative Assessment
	Food Safety and Security	PO4, PO5	PUC / 10+2 with Chemistry or Biology as one optional	<ul style="list-style-type: none"> <li>• Visits to fair price shops</li> <li>• Visits to institutes, Debate</li> <li>• Awareness programs</li> </ul>	Formative and Summative Assessment

SYLLABUS FOR B.SC. (HONOURS) IN CLINICAL NUTRITION AND DIETETICS

**B.SC. CLINICAL NUTRITION AND DIETETICS SEMESTER 1**

<b>Course Title: FUNDAMENTALS OF NUTRITION (DSE1)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks: 40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

Course Pre-requisite(s): PUC/ 10+2 (with chemistry or biology as one optional) Course

Outcomes (COs): At the end of the course the student should be able to:

1. To understand the guidelines of diet requirements
2. To learn about different methods and principle of cooking
3. To understand the role of macro nutrients in human nutrition
4. To understand their physiological functions, requirements, and sources of macronutrients
5. To acquire knowledge on food sanitation and hygiene
6. To understand food laws and food regulations

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes (POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
To understand food laws and food regulations	✓														
To understand the guidelines of diet requirements	✓														
To learn about different methods and principle of cooking	✓														
To understand the role of macro nutrients in human nutrition	✓	✓													
To understand their physiological functions, requirements, and sources of macro nutrients	✓	✓													
To acquire knowledge on food sanitation and hygiene				✓											

Course Title: FUNDAMENTALS OF NUTRITION

<b>Course : DSC 1</b>	
<b>Number of Theory Credits</b>	<b>Number of lecture hours/semester</b>
<b>3</b>	<b>45</b>

<b>CONTENT</b>	<b>45 Hrs</b>
<b>Unit-1INTRODUCTION</b>	<b>14 Hrs</b>
<p><b>Understanding terminologies:</b>                      Food, nutrition, health, nutrients, nutritional status, malnutrition-under nutrition over nutrition and optimum nutrition, diet, diet therapy, therapeutic nutrition, kilocalorie, joule, diet diversity, body mass index, daily values, nutrient density. Methods of determining human nutrient need</p> <p><b>Food and nutrient requirements:</b>                      Guidelines and Recommendations, development of National Nutritional Requirements, translation of nutritional requirements into Dietary Guidelines. food group system, functions of food Physiological, Psychological and Social factors affecting food intake and food habits, Recommended Dietary allowance (RDA), General Principles of Deriving RDA, Use of Recommended Dietary Allowances (RDAs), Limitations of RDAs, Balanced diet, use of Food exchange list. Food pyramid, my plate, basic of menu planning for family.</p>	

<b>Unit – 2 ENERGY</b>	<b>14 Hrs</b>
<p>Definition, units of energy, energy value of food. Components of energy requirement, factors affecting energy requirements, methods of measuring energy expenditure. RMR, Physical Activity Level (PAL), BMR, factors affecting B.M.R, determination of BMR by calculation (Harris Benedict). Energy needs of the body (reference man and reference woman), Energy requirement during work, thermic effect of food, SDA.</p> <p>Human body composition – Methods of assessment (direct and indirect), Changes in body composition during life cycle. Factors affecting body composition: body weight and physical activity</p>	
<b>Unit – 3 FOOD PREPARATION AND HEALTH</b>	<b>14 Hrs</b>
<p>Selection of foods, preliminary preparation of food, principles of cooking, methods of cooking - Boiling, Steaming, Pressure cooking, Microwave oven, Frying (shallow, deep fat), Smoking point of oil, Combination method, methods of cooking: advantages and disadvantages. Effect of cooking on nutritive value, methods of enhancing nutritive value</p> <p>Nutrition and Health- Inter-relationship between food, nutrition, and health. Food choices – nutrients and nourishment, cognitive and environmental influences. Nutrient and food guides for health promotion. Balanced diet- definitions and its importance</p>	

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15

Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

**Practical –2Credits**

**60hours**

1. Identification of foods under foodgroups.
2. Study of My plate and FoodPyramid
3. Weights and measures of common food (Raw and cookedweight)
4. Cooking methods – Planning and Preparing of recipesby
  - a. Boiling,
  - b. Steaming,
  - c. Pressure cooking,
  - d. Microwave cooking
  - e. Frying (shallow, deep fat), Smoking point ofoil
  - f. Combinationmethod
5. Identifying food composition table and Usage food exchangelist
6. Calculation of energy requirement and energy expenditure for an adultman
7. Calculation of energy requirement and energy expenditure for an adult awoman

<b>Formative Assessment</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
CIA	15 +15
Presentation / Assignment	10
<b>Total</b>	<b>40</b>

## REFERENCES

1. Mudambi S R and Rajagopal M V, (2008), Fundamentals of Foods, nutrition & Diet therapy by new age international publishers, NewDelhi
2. Srilakshmi B, (2002), nutrition science. New Age International publishers. New Delhi.
3. Shubhangaini A Joshi, (2010), Nutrition and Dietetics, with Indian case studies, Tata McGraw-Hill, NewDelhi
4. Bamji, M.S, Reddy, V. (1998), Textbook of Human Nutrition, Oxford & IBH Publishing Co, NewDelhi. Gibney M.J, Elia M Ljngquist. O (2005), Clinical Nutrition, Blackwell Science PublishingCo.
5. Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillan Pub. Co. NewYork.
6. Swaminathan, M. (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing CompanyLtd.
7. Guthrie, H.A & Picciano, M.F (1995), Morby Publishing Co, NewYork.
8. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, NewDelhi
9. Williams- Basic nutrition and Diet therapy, Elsevier 12thedition

**Date**

**CourseCo-Ordinator**

**Subject CommitteeChairperson**

## B.SC. CLINICAL NUTRITION AND DIETETICS SEMESTER 1

<b>Course Title: ESSENTIALS OF MACRO NUTRIENTS (DSC- 2)</b>	
Total Contact Hours: 45	Course Credits: 3+2
Formative Assessment Marks:40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC/ 10+2 (with chemistry or biology as one optional)

**Course Outcomes (COs):** At the end of the course the student should be able to:

1. Understand significance of Macro nutrients in the diet
2. Understand their physiological functions, requirements, and sources of macro nutrients

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

Course Outcomes (COs) / Program Outcomes(POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Understand significance of Macro nutrients in the diet	✓														
Understand their physiological functions, requirements, and sources of macro nutrients	✓														

## B.SC. CLINICAL NUTRITION AND DIETETICS

### SEMESTER 1

Title of the Course: ESSENTIALS OF MACRO NUTRIENTS

<b>Course: DSC 2</b>	
<b>Number of Theory Credits</b>	<b>Number of lectureHours/semester</b>
<b>3</b>	<b>45</b>

<b>CONTENT</b>	<b>45 Hrs</b>
<b>Unit-1 CARBOHYDRATES</b>	<b>15 Hrs</b>
<b>Chapter No.1: Carbohydrates:</b> Composition, classification, digestion, absorption and metabolism, Functions, Sources and Requirements, excess and deficiencies.	<b>8 Hrs</b>
<b>Chapter No.2:</b> Dietary fiber – definition, classification, sources, role of fiber in Nutrition. Resistant starch, fructo-oligosaccharides, other oligosaccharides: Chemical composition and physiological significance. Glycemic Index and glycemic load. Review of nutritional significance of carbohydrates and changing trends in dietary intake of different types of carbohydrates and their implications.	<b>7 Hrs</b>
<b>Unit – 2PROTEINS</b>	<b>15 Hrs</b>
<b>Chapter No.3: Proteins:</b> Composition, classification of proteins and amino-acids, functions, digestion, absorption and metabolism, Requirements and Sources, Effect of deficiency. Assessment of Protein quality. BV, PER, NPU and	

chemical score.	
<b>Unit-3 LIPIDS</b>	<b>15 Hrs</b>
<b>Chapter No.4: Lipids:</b> Classification, functions, digestion, absorption and metabolism, Sources and Requirements - SFA, MUFA, PUFA: functions and deficiency, Role of n-3 and n-6 fatty acids, Trans Fatty Acids, dietary guidelines (International and National) for visible and invisible fats in diets.	

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

**Practical –2Credits****60Hours**

1. Planning and preparation of energy denserecipes
2. Planning and preparation of low energyrecipes
3. Planning and Preparation of low Glycaemic index recepies. load

Calculation of Glycaemic index andGlycaemic

4. Planning and preparation of high & low fiberrecipes
5. Planning and preparation of protein denserecipes
6. Planning and preparation of low proteinrecipes
7. Planning and preparation of n-3 and n-6 richrecipes

<b>Formative Assessment</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Seminar presentation	10
Planning innovative recipes	15
Low-cost innovative recipes	15
<b>Total</b>	<b>40</b>

**References:**

1. Shubhangaini A Joshi, (2010), Nutrition and Dietetics, with Indian case studies, Tata McGraw-Hill, NewDelhi
2. Srilakshmi B. (2013) human Nutrition for B.Sc. Nursing students, New Age international publications, NewDelhi.
3. Mudambi S.R and Rajagopal M.V (2008) Fundamentals of foods, Nutrition and Diet therapy, 6<sup>th</sup> revised edition, new age international publications, NewDelhi
4. Swaminathan M S (2012) Fundamentals of food nutrition BappccoPublication
5. Longvah T Anathan R, Bhaskarachary K, and Venkaiah k (2017) Indian food composition table, NIN.ICMRHyderabad
6. Bamji, M.S, Reddy, V. (1998), Textbook of Human Nutrition, Oxford & IBH Publishing Co, NewDelhi.
7. Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science PublishingCo.
8. Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillan Pub. Co. NewYork.
9. Swaminathan, M. (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing CompanyLtd.
10. Guthrie, H.A & Picciano, M.F (1995), Morby Publishing Co, NewYork.
11. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, NewDelhi.

**Date:****CourseCo-Ordinator****Subject Committee Chairperson**

## B.SC. CLINICAL NUTRITION AND DIETETICS SEMESTER 1

<b>Course Title: FOOD SANITATION AND HYGYEINE (OE- 1)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC/ 10+2 (with chemistry or biology as one optional)

**Course Outcomes (COs):** At the end of the course the student should be able to:

1. Understand importance of foodhygiene
2. Understand the procedure for cleaning andsanitation

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

Course Outcomes (COs) / Program Outcomes(POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Understand importance of food hygiene	✓														
Understand the procedure for cleaning and sanitation	✓														

## B.SC. CLINICAL NUTRITION AND DIETETICS

### SEMESTER 1

Title of the Course: FOOD SANITATION & HYGIENE

Number of Theory Credits	Number of lecture hours/semester
3	42

CONTENT	45 Hrs
<b>Unit-1 INTRODUCTION</b>	<b>15 Hrs</b>
<b>Chapter No.1:</b> Terminologies – Sanitation, hygiene, food safety, food sanitation, contamination, food spoilage, danger zone. Significance of sanitation in food catering units, hospital kitchens, food handlers. FSSAI: Safe food handling and hygiene practices -guidelines.	<b>8 Hrs</b>
<b>Chapter No.2:</b> Introduction - Serving safe food, food borne illnesses, preventing food borne illnesses, key practices for ensuring food sanitation. Personal hygiene - importance, sanitary habits, and practices, use of protective clothing during food preparation in large establishments.	<b>7 Hrs</b>
<b>Unit-2 PURCHASE ANDHYGIENE</b>	<b>15 Hrs</b>
<b>Chapter No.3:</b> Purchasing and Storage - Choosing a supplier, Inspection Procedures, Receiving and Inspecting Specific Food, Storage - General Storage Guidelines, Types of Storage, storing specific food, storage techniques - dry	<b>7 Hrs</b>

<p>food storage, refrigerated storage, freezer storage.</p> <p><b>Chapter No.4:</b> Hygiene in Service - Hygiene procedures in food preparation, holding and display food for service, serving food safely, off-site services, hot holding of foods, Safe use of left - over food, hygiene in food service, protective display of food. Storage and disposal of waste – Classification of waste, methods of disposal.</p>	<p><b>8 Hrs</b></p>
<p><b>Unit – 3 CLEANING AND SANITATION</b></p>	<p><b>15 Hrs</b></p>
<p><b>Chapter No.4:</b> Cleaning and Sanitation - Sanitation Standards for Equipment, installing and maintaining kitchen equipment, Cleaning and Sanitizing - Cleaning vs. Sanitizing, machine dishwashing, manual dishwashing, sanitizing food contact surfaces, cleaning the Premises, storing utensils, tableware, and equipment, using cleaning agents, developing a cleaning Program. Pest control methods and its importance.</p>	<p><b>15 Hrs</b></p>

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

## References

1. De Vries. (1997) Food Safety and Toxicity, CRC, NewYork.
2. Lawley, R., Curtis L. and Davis, J. (2004) The Food Safety Hazard Guidebook, RSCpublishing.
3. Mario Stanga, Sanitation: Cleaning and Disinfection in the Food Industry, Wiley, 2010.
4. Marriott, Norman G. (1985). Principles of Food Sanitation, AVI, New YorkUSA.
5. Norman G. Marriott, Principles of sanitation, Van Nostrand Reinhold Company, New York.1985.
6. Roday. S. (1999) Food Hygiene and Sanitation, Tata McGraw-Hill Company Limited, NewDelhi.
7. Y. H. Hui, L. Bernard Bruinsma, J. Richard Gorham, Wai-Kit Nip, Phillip S. Tong, Phil Ventresca, Food plant sanitation, CRC Press,2002.
8. Y. H. Hui, Plant sanitation for food processing and food service, CRC Press,2014.

**Date**

**CourseCo-ordinator**

**Subject CommitteeChairperson**

**B.SC. CLINICAL NUTRITION AND DIETETICS**  
**SEMESTER 2**

<b>Course Title: HUMAN PHYSIOLOGY (DSC – 3)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC/ 10+2 (with chemistry or biology as one optional)

**Course Outcomes (COs):**

At the end of the course the student should be able to:

- 1 To gain elementary knowledge of functions of organ systems in the human body.
2. To learn about the physiological functions, sources, requirements, micronutrients and its deficiencies
3. To understand the concept of water balance and the function of electrolytes in human nutrition
4. To understand the major nutritional problems in populations
5. To study the different programs and interventions for improving nutritional status.

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

<b>Course Outcomes (COs) / Program Outcomes (POs)</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>
To gain elementary knowledge of functions of organ systems in the human body			✓												
To learn about the physiological functions, sources, requirements, micronutrients and its deficiencies		✓													
To understand the concept of water balance and the function of electrolytes in human nutrition		✓													
To understand the major nutritional problems in populations				✓	✓										
To study the different programs and interventions for improving nutritional status				✓	✓										

## B.SC. CLINICAL NUTRITION AND DIETETICS

### SEMESTER 2

Title of the Course: HUMAN PHYSIOLOGY

Number of Theory Credits	Number of lecture hours/semester
3	45

CONTENT	45 HRS
<p><b>UNIT 1- Basic Cells and Tissues</b></p> <p>Structure and Function of Cell, Physiological properties of protoplasm. Levels of cellular organization and function – cell organelles and tissues - Structure and functions of epithelial, connective, muscular and nervous tissue, organs and systems – Brief review, Cell membrane transport across cell, membrane and intercellular communication, cell multiplication</p> <p>Introduction of biological membranes to understand molecular transport, transport of large molecules, receptor mediated endocytosis, exocytosis. Molecular aspects of transport; Passive diffusion, facilitated diffusion, active transport. active transport - sodium potassium pump.</p>	15 Hrs

<p><b>Unit – 2 - Organ system</b></p> <p><b>Digestive System</b> - Digestive system: Review of structure (Physiology) and function - Secretory, Digestive and Absorptive functions. Functions of mouth pharynx, oesophagus, stomach, intestine and intestinal villi. Liver, pancreas and gall bladder and their dysfunction Digestive glands: salivary, gastric, liver, pancreas. Digestion of nutrients- Proteins,fats, carbohydrates.Hungerandthirstmechanism.Motilityandhormonesof</p>	<p>15 Hrs</p>
<p>GIT. Regulation of food intake – role of hunger and satiety centers, effect of nutrients.</p> <p><b>Circulatory System</b> - Blood: Properties, formation, composition and functions and homeostasis. Formation and function of plasma proteins, erythropoiesis. Blood groups &amp; histocompatibility. Composition &amp; functions of CSF and Lymph. Structure &amp; functions of heart, blood vessels- physiological aspects, ECG, Blood pressure.</p> <p><b>Respiratory system</b> - Outlined structure of respiratory system, Primary function of respiratory system, Mechanism of respiration, Transport of gases and artificial respiration. Role of lungs in the exchange of gases, Transport of oxygen and CO<sub>2</sub>. Cardiorespiratory changes during exercise and training</p> <p><b>Excretory System</b> - Structure and functions of nephron, glomerular filtration, tubular absorption and secretion. Urine formation - Role of kidney in maintaining pH of blood -Water,electrolyte and acid base balance –diuretics</p> <p><b>Nervous System:</b> Review of structure and function of neuron - conduction of nerve impulse, synapses, and role of neurotransmitters, Organization of central and Peripheral nervous system, Hypothalamus and its role in various body functions</p>	

<b>Unit – 3</b>	15 Hrs
<p><b>Skeletal &amp; Muscular System</b> - Ultra structure of skeletal muscle and bone, role of collagen and elastin in bone composition, growth and remodeling, factors affecting long bone growth. Muscular system: Muscle type, structure: Muscle proteins – contractile and non-contractile. Energetics of muscle contraction, Muscular dystrophies.</p> <p><b>Reproductive System and Endocrine System</b> -Male reproductive system – Structure and functions. Spermatogenesis. Female reproductive system – Structure and functions. Oogenesis. Menstrual cycle, Puberty, Menopause. Fertilization, Development of fertilized ovum (Brief account) Placenta and its functions – Parturition. Endocrinology- Functions of hormones of the pituitary,</p> <p><b>Immune System</b> - Organs and cells of Immune system, Primary and secondary Lymphoid organs. Immunity– Definition, Types, Innate immunity, Adaptive immunity, cell mediated and humoral immunity. Complement system. Antigens - Chemical nature of antigens, hapten, antigenicity, immunogenicity, epitope. Immunoglobulins -Isotypes, structures and functions IgG, IgM, IgE. Adjuvants. Monoclonal antibodies – definition and production. Major histocompatibility complex proteins (MHC): Definition. Types, physiological role. Vaccines- Definition, significance of vaccines. Hypersensitivity reactions- definition, types, and examples thyroid, parathyroid, adrenal, pancreas, and gonads. Steroid hormones their functions and mechanism of action.</p>	

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<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

**PRACTICAL:2Credits**

**60Hrs**

1. Microscopic study of tissues- Epithelial, connective, and muscular tissues
2. Smear preparation of human blood for RBC and WBC count
3. Estimation of hemoglobin by Sahli- Hellige (Calorimetric) hematin method
4. Determination of blood groups and Rh factor
5. Determination of bleeding time by Duke's method
6. Determination of Blood clotting time by Wright's method
7. Clinical examination of urine

a) Physical examination: volume colour, odour, appearance, pH.

b) Test for abnormal constituents of urine: Sugar, blood, albumin, Bile salts and ketone bodies.

8. Pulse, B.P and respiratory rate at rest and after exercises

<b>Formative Assessment</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Seminar presentation	10
Planning innovative recipes	15

Low-cost innovative recipes	15
<b>Total</b>	<b>40</b>

## References

1. Human Physiology by CC. Chatterjee, 11th edition(1985)
2. Essentials of Medical physiology by K Sambulingam, 3rd edition,2005
3. The Cell, Copper, Geoffery, M., Oxford University Press,(2001)
4. Textbook of Biochemistry with Clinical correlations; Thomas Devlin [Ed.] (1997), Wiley –Liss.
5. Lehninger- Principles of Biochemistry; DL Nelson and MM Cox [Eds], 6th Edn. Macmillan Publications(2012).
6. Principles of Human Physiology; 4th Edn. Cindy L. Stanfield Pearson,(2010).
7. Principles of Biochemistry: Smith et al., [Ed.] (1986) McGrawHill.
8. Principles of Biochemistry: General Aspects, Smith et al., [Ed.] (1986) McGrawHill.
9. Human Biochemistry, Orten and Neuhans, 10th Edn. Mosbey International,(1983).
10. Review of Medical Physiology, Gannong, W.F.15th Edn., Maruzen Asial,(1991).
11. Human Physiology: The mechanisms of Body functions. A.J. Vander, et. Al., (1985) McGraw-Hill.
12. Molecular Cell Biology, Baltimore et. al. (1995) Scientific AmericanPublication.
13. Cellular Physiology of Nerve and Muscle. Gary G Mathew (1998) Balckwell Scientific Inc

**Date**

**CourseCo-ordinator**

**Subject Commit**

## B.SC. CLINICAL NUTRITION AND DIETETICS SEMESTER 2

<b>Course Title: ESSENTIALS OF MICRO NUTRIENTS (DSC – 4)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC/ 10+2 (with chemistry or biology as one optional)

### Course Outcomes (COs):

At the end of the course the student should be able to:

1. Understand the significance of micronutrients
2. Know the role of water and electrolytes in the body

### Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)

Course Outcomes (COs) / Program Outcomes(POs)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Understand the significance of micronutrients			✓												
Know the role of water and electrolytes in the body		✓													

## B.SC. CLINICAL NUTRITION AND DIETETICS

### SEMESTER 2

Title of the Course: ESSENTIALS OF MICRONUTRIENTS

Number of Theory Credits	Number of lecture hours/semester
3	45

CONTENT	45 Hrs
<b>Unit –1 - Vitamins</b>	<b>15 Hrs</b>
<p>– Definition and classification</p> <p>Fat soluble vitamins - Physiological functions, Sources, Requirements, Deficiency and Hypervitaminosis of Vitamin A, D, E and K</p> <p>Water Soluble vitamins – Physiological functions, Sources, Requirements and Deficiency of B Complex Vitamins- Thiamine, Riboflavin, Niacin, Pyridoxine, Folic Acid, Pantothenic Acid, Cyanocobalamin and VitaminC.</p> <p>Interaction with other nutrients and its effects.</p>	
<b>Unit – 2 - Minerals</b>	<b>15 Hrs</b>
<p>Definition, Classification, Distribution in the body, Functions, Sources and requirement and Effects of Deficiency of Calcium, Phosphorus, Magnesium, Sodium, Potassium, Manganese, Selenium, Iron, Zinc, Iodine, Molybdenum, Cobalt and Fluorine</p> <p>Trace Elements - Distribution in the body, Functions, Sources and requirement and Effects of Deficiency of Vanadium, Silicon, Boron, Nickel, Lithium, Lead, Cadmium, Sulphur.</p>	

<b>Unit – 3 – Water and Electrolytes</b>	<b>15 Hrs</b>
Water – Importance, distribution in the body, functions of water and sources, water intake and loss. Dehydration, edema.  Electrolytes - Types, sources, composition of body fluids, maintenance of fluid and electrolyte balance and imbalance	

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15
Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

**Practical:2Credits**

**60Hrs**

1. Planning and preparation of Vitamin A rich recipes
2. Planning and preparation of Vitamin C rich recipes
3. Planning and preparation of Vitamin B complex rich recipes
4. Planning and preparation of Calcium rich recipes
5. Planning and preparation of iron rich recipes
6. Planning and preparation of Folate rich recipes
7. Estimation of iron in food sources
8. Estimation of calcium in milk
9. Estimation of vitamin C in food sources
10. Estimation of vitamin A by calorimetric method
11. Estimation of total mineral content in a food sample using muffle furnace

<b>Formative Assessment</b>	
<b>Assessment Occasion/ type</b>	<b>Weightage in Marks</b>
Seminar presentation	15
Quiz, Assignment	15
Low-cost innovative recipes	10
<b>Total</b>	<b>40</b>

## REFERENCES

1. Shubhangaini A Joshi, (2010), Nutrition and Dietetics, with Indian case studies, Tata McGraw-Hill, NewDelhi
2. Srilakshmi B. (2013) human Nutrition for B.Sc. Nursing students, New Age international publications, NewDelhi.
3. Mudambi S.R and Rajagopal M.V (2008) Fundamentals of foods, Nutrition and Diet therapy, 6<sup>th</sup> revised edition, new age international publications, NewDelhi
4. Swaminathan MS (2012) Fundamentals of food nutrition BappccoPublication
5. Longvah T Anathan R, Bhaskarachary K, and Venkaiah k (2017) Indian food composition table, NIN.ICMRHyderabad
6. Bamji, M.S, Reddy, V. (1998), Textbook of Human Nutrition, Oxford & IBH Publishing Co, NewDelhi.
7. Gibney M.J, Elia M Ljingquist. O (2005), Clinical Nutrition, Blackwell Science PublishingCo.
8. Robinson C.H and Winely E.S, (1984). Basic Nutrition and Diet Therapy, Macmillan Pub. Co. NewYork.
9. Swaminathan, M. (2002) Food and Nutrition, Volume I, The Bangalore Printing and Publishing CompanyLtd.
10. Guthrie, H.A & Picciano, M.F (1995), Morby Publishing Co, NewYork.
11. Srilakshmi, B. (2005). Dietetics, New Age International Publishers, NewDelhi

**Date:**

**CourseCo-Ordinator**

**Subject-CommitteeChairperson**

**B.SC. CLINICAL NUTRITION AND DIETETICS**  
**SEMESTER 2**

<b>Course Title: FOOD SAFETY AND SECURITY (OE-2)</b>	
Total Contact Hours: 45	Course Credits: 3
Formative Assessment Marks:40	Duration of ESA/Exam: 3 hours
Model Syllabus Authors:	Summative Assessment Marks: 60

**Course Pre-requisite(s):** PUC/ 10+2 (with chemistry or biology as one optional)

**Course Outcomes (COs):**

At the end of the course the student should be able to:

1. Understand food laws, regulations and policies
2. Know about food safety and food adulteration

**Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs 1-12)**

<b>Course Outcomes (COs) / Program Outcomes(POs)</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Understand food laws, regulations and policies			✓												
Know about food safety and food adulteration		✓													

## B.SC. CLINICAL NUTRITION AND DIETETICS

### SEMESTER 2

Title of the Course: FOOD SAFETY AND SECURITY0E

Number of Theory Credits	Number of lecture hours/semester
3	45

CONTENT	45 Hrs
<p><b>Unit –1</b></p> <p>Food Safety - definition of food safety and food spoilage, factors affecting food safety and food spoilage: GMP, GAP, SSOP, GHP, food adulteration - definition, types adulteration in various foods- intentional, incidental, and metallic contaminants</p> <p>Food Laws and Regulations National Legislation - Essential Commodities Act, Standard of Weight and Measures Act, ISI, Mark of BIS, Agmark, BIS. GRAS and permissible limits for chemical preservatives and legal aspects for <math>\gamma</math> -irradiations. Recent concerns in food safety: New and Emerging Pathogens. Genetically modified foods / Transgenics / Organic foods. Newer approaches to food safety. PFA, FPO, Food Safety and Standards Bill 2005, International Laws and Agreements - FAO, WHO, Codex Alimentarius, WTO, JECFA, APEDA, ISO 22000 series, Hazard Analysis Critical Control Point (HACCP): principles of HACCP, applications of HACCP Current Food Safety Standards in India, Current Food Safety regulations 2001, Food Safety and Standards Authority of India, objectives of developing food safety standards, enforcement of structure and procedure, role of food analyst, safety analysis, action by designated officer and report of foodanalyst</p>	15 Hrs

<b>Unit - 2</b>	<b>15 Hrs</b>
<p>Food and Nutrition Security – Definition, Food production, access, distribution, availability, losses, consumption, Food distribution strategies and storage of food. Socio-cultural aspects and Dietary Patterns: Their implications for Nutrition and Health. Nutritional Status - Determinants of nutritional status of individual and populations, Nutrition and Non-nutritional indicators -Socio-cultural, Biologic, Environmental, Economic.</p> <p>Major Nutritional Problems – An overview etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: Macro and micronutrient deficiencies.</p>	
<b>Unit - 3</b>	<b>15 Hrs</b>
<p>National Food, Nutrition and Health Policies- Plan of action and programs, Approaches and Strategies for improving nutritional status and health, Programmatic options- their advantages and demerits. feasibility, political support, available resources (human, financial, infrastructural). Case studies of selected strategies and programs: their rationale and context. How to select interventions from a range of possible options: Health-based interventions, Food-based interventions including fortification and genetic improvement of foods, supplementary feeding, nutrition education for behavior change.</p> <p>Health economics and economics of malnutrition- Its impact on productivity and national development, Cost-Benefit, Cost effectiveness, Cost efficiency</p>	

<b>Formative Assessment = 100 marks</b>	
<b>Assessment Occasion / type</b>	<b>Weightage in Marks</b>
Test 1	15

Test 2	15
Assignment + Project	5 + 5
<b>Total</b>	<b>60 marks + 40 marks = 100 marks</b>

## References

1. Bamji, M.S., Rao, P.N., Reddy, V. (Eds) (1996): Textbook of Human Nutrition, Oxford and IBH Publishing Co. Pvt. Ltd., NewDelhi.
2. Gopalan, C. and Kaur, S. (Eds) (1989): Women and Nutrition in India, Nutrition Foundation ofIndia.
3. Gopalan, C. (Ed) (1987): Combating Undernutrition – Basic Issues and Practical Approaches, Nutrition Foundation ofIndia.
4. Achaya, K.T. (Ed) (1984): Interfaces between agriculture nutrition and food science, The United NationsUniversity.
5. National Family Health Survey I & II (1993, 2000): International Institute for Population Studies,Mumbai.
6. National Plan of Action on Nutrition (1995): Food & Nutrition Board, Dept. Of WCD, Govt. ofIndia.
7. National Nutrition Policy (1993): Dept. of WCD, Govt. ofIndia.
8. Nutrition Education for the Public (1997): FAO Food and Nutrition Paper, 62,FAO.
9. Allen, L. and Ahluwalia, N. (1997) Improving Iron Status Through Diet: The Application of Knowledge Correcting Dietary Iron Bioavailability in Human Populations. OMNI/USAID, Arlington, VA,USA
10. Nestel, P. (ed) (1995). Proceedings: Interventions for Child Survival. OMNI/USAID Arlington, VA,USA

11. Murray, C. and Lopez, A. (eds)(1996) Global Burden of Disease and Injury Harvard University Press, Cambridge, MA,USA.
12. Ross, J.; Horton, S. (1998) Economic Consequences of Iron Deficiency. The Micronutrient Initiative, Ottawa,Canada.
13. World Health Organization (1998) World Health Report: Life in the 21st century. Report of the Director General. WHO,Geneva,

**Date CourseCo-Ordinator Chairperson**

