

## As Per NEP 2020

# UNIVERSITY OF MUMBAI



### Title of the programme

- |                                                                                |   |                |
|--------------------------------------------------------------------------------|---|----------------|
| <b>A-</b> P.G. Diploma in Home Science – Foods, Nutrition and Dietetics        | } | <b>2023-24</b> |
| <b>B-</b> M.Sc. (Home Science – Foods, Nutrition and Dietetics)<br>(Two Years) |   |                |
| <b>C-</b> M.Sc. (Home Science – Foods, Nutrition and Dietetics)<br>(One Year)  |   | <b>2027-28</b> |

### Syllabus for Semester- I

Ref: GR dated 16th May, 2023 for Credit Structure of PG

# Preamble

## 1) Introduction

The emphasis on health and wellness, and the role of nutrition in health maintenance, disease prevention and disease management increased through the 1960s and the 1970s. With the understanding that there was a need for guidance of the community with respect to nutrition and lifestyle, the College of Home Science Nirmala Niketan started the Department of Foods and Nutrition in the year 1972, which was amended to Foods, Nutrition and Dietetics later. In the 50 years of its existence, we have had more than 500 students graduate from this programme and they have had opportunities to be professionally employed, finding success in diverse fields of foods, nutrition and dietetics. The department has produced many alumnae who have been and are in many leadership positions as heads of dietetics departments, research centers, NGOs and sports agencies and as lead nutritionists in food companies. Many of our alumnae are highly successful entrepreneurs in the food industry, wellness and dietetics, digital dietetics and nutrition education.

The Programme of the M.Sc. in Foods, Nutrition and Dietetics is a distinctive one as it involves aspects from three interconnected disciplines of Foods, Nutrition and Dietetics. Whilst this course has its unique niche, it confers the advantage of the graduate being able to branch out professionally in local, national and global settings, into any of the following: the food industry, dietetics practice in preventive as well as clinical settings, community and public health nutrition, as a researcher and academician. and in various entrepreneurial opportunities.

The M.Sc. Programme in Foods, Nutrition and Dietetics provides a detailed input into creating a strong knowledge and skill base of both theoretical and practical components across the diverse areas of the subject, making it one of the most sought after and prestigious programmes affiliated to the University of Mumbai. The coursework includes advanced concepts of physiology, nutritional biochemistry, and nutrition across the lifecycle, food science, processing and quality control, clinical nutrition and dietetics, public health nutrition, sports nutrition, entrepreneurship in the area of Foods, Nutrition and Dietetics and emphasizes on the values and methods of safeguarding the nutritional status of the community in a holistic way.

Mandatory course, elective courses, and their corresponding practical along with internships (On the Job training) form an integral part of the syllabus. Great attention has been paid to ensure that through the mandatory courses, the student placed in the food industry, clinical nutrition, public health nutrition and sports nutrition will adequately possess the required knowledge and skills to enable them to effectively contribute in professional and community settings.

The elective courses have been designed in order to provide students with opportunities to obtain insights and skill development in newer areas of food production, diet management and community education using latest research and trends with emphasis on multidisciplinary aspects and the use of technology and innovative ideas.

Focus has been given to areas of innovation, entrepreneurship and sustainability in health. Through this course the student will get multiple opportunities to create and innovate with regards to food product development, dietary and lifestyle consultations and nutrition education which they can continue ahead into their professional career. In the current times of evolution of thought with respect to sustainable practices, this syllabus ensures that the UN Sustainable Development Goals (SDGs)

related to health are featured to gear the students thinking towards it. The syllabus also incorporates national nutrition policies into its subjects thus being aligned to the national goals for health.

The strong emphasis of research methods, descriptive and advanced statistics and research project strengthens the course with provision of research knowledge and applications. Research is a core component in current evidence based dietetics practice, used for food product development in the food industry and in understanding the incidence of diseases and effects of nutrition initiatives in the public health sector. Thus, the extensive inputs into research methods and statistics will facilitate the postgraduate to conduct research projects across diverse streams in the specialization of Foods, Nutrition and Dietetics.

The M.Sc. in Foods, Nutrition and Dietetics will deliver a holistic education that is in line with the goals of the National Education Policy 2020. The theory and practical learnings will help the students establish a niche career for themselves. They will be moulded to be a contributor to the health and wellness of individuals, communities and the nation and thereby participate in the creation of sustainable health.

## **2) Aims and Objectives**

- a. To help students create a strong understanding of fundamental and advanced concepts in the field of Foods, Nutrition and Dietetics
- b. To enable students with knowledge, skills and research competencies for professional application into the areas of food science and processing, clinical nutrition and dietetics, sports nutrition and public health nutrition
- c. To empower the students with analytical reasoning skills, research competencies; awareness of, open-mindedness to, and ability to use recent technologies; creativity for contribution to individuals' and the community's health, and an entrepreneurial bend of thought and action.
- d. To create competent professionals who work with acknowledgement of the dynamism and evolution in the field and are capable of keeping up with the emerging trends and practices in the field and have a vision to contribute to National and Global Development.

### 3) Programme Outcomes

The programme encompasses a comprehensive range of skills and knowledge, enabling graduates to excel in the multifaceted field of Foods, Nutrition and Dietetics. On successful completion of the programme, student will be able to be a competent and valuable member of the fraternity as outlined below:

<b>Programme Outcome (PO)</b>	<b>Definition</b>	<b>Graduate Attribute</b>
	To be able to...	
PO1	Demonstrate an in-depth knowledge and understanding of core fundamentals of concepts of Biochemistry, Nutrition, Food Science and Processing, Clinical Dietetics and Public Health Nutrition with the integration of all allied subjects required to professionally practice in the area of Foods, Nutrition and Dietetics competently.	Disciplinary Knowledge
PO2	Effectively develop nutritious and sustainability based food products, communicate therapeutic diets, counsel patients effectively and to explain complex nutritional concepts in simple and understandable terms both orally and in writing to fellow professionals as well as the community	Communication Skills
PO3	Design efficient methods of food analysis and food products, nutritional diagnosis and evaluate the modes of nutritional therapies as well as programmes to better community health.	Critical Thinking
PO4	Creatively construct Dietary, Nutritional and Lifestyle strategies to preserve health, manage diseases, address nutrition related health issues in the community, to support the industry as a knowledge partner in formulation of healthy food products and to engage in entrepreneurial initiatives to solve individual and community health problems	Problem Solving Innovation Entrepreneurship
PO5	Competently evaluate traditional as well as recent Nutrition practices in relation to evidence based nutrition and draw applicable conclusions, using a scientific and an open mind with the vision of bettering food and nutrition practice	Analytical and Scientific Reasoning
PO6	Proficiently explore the cause and effect relationships of food, nutrition and lifestyles on health and to construct and follow through a research problem using research techniques and statistical analysis, thus drawing up adequate conclusions for applications of research in the food industry, community and clinical set ups as employee or entrepreneur	Research related skills
PO7	Successfully work in teams, cooperate and derive meaningful beneficial conclusions for food consumers' requirements as well as patients' and community health through interdisciplinary and collaborative efforts in clinical, community, research, industry and organisations.	Cooperation/ Team work
PO8	Translate research, recent innovations and personal and professional experiences into applications to benefit food industry, clinical management of disease, community health; and entrepreneurial ventures with self-awareness and introspection	Reflective Thinking
PO9	Use technology for foods, nutrition and dietetic communications, consumer information, hospital administration, diet planning, nutrition education as well as be aware of using digitation for	Information/digital literacy

	entrepreneurial ventures.	
PO10	Work independently, identify appropriate resources for a project and manage a project to completion.	Self-Directed Learning
PO11	Be adept with regard to national and global multi-cultural aspects of foods and nutrition, thus being able to deliver food products and nutrition and lifestyle strategies for health in harmony with the existing cultural practices of the individual and the community.	Multicultural competence
PO12	Practice principles of food preservation, processing, dietetics and community health in the most sustainable and effective manner, placing consumer, patient, community and fraternity well-being at the center of operations and to refrain from unethical behaviour at workplace, the community and research.	Moral and Ethical awareness and reasoning
PO13	Take on leadership positions formulating and sharing an inspiring vision and the eagerness to bring productive and sustainable positive results for the professional group, the community and the foods, nutrition and dietetics fraternity using organisational, entrepreneurial and managerial skills	Leadership readiness/qualities
PO14	Continue lifelong learning and be updated with cutting edge knowledge and practices in the field and the understanding that ongoing learning has to be the personal and professional way of life; thus, being continuously involved in evolving, up scaling, reinventing and reskilling to the requirements of the times.	Lifelong learning

**4) Any other point (if any)**

5) **CREDIT STRUCTURE OF THE PROGRAMME (SEMESTER- I)**  
(Table as per Parishishta 1 with sign of HOD and Dean)

R\_\_\_\_\_

Post Graduate Programme in University:

A. PG Diploma in Home Science – Foods, Nutrition and Dietetics

B. M.Sc. (Home Science – Foods, Nutrition and Dietetics) (Two Years)

Parishishta – 1

Year (2 Yr PG)	Level	Sem. (2 Yr)	Major		RM	OJT / FP	R P	Cum . Cr.	Degree
			Mandatory*	Electives (Any one)					
I	6.0	Sem- I	<b>Course 1</b> A. Advances in Nutritional Biochemistry- I (Th) (2 Cr) B. Food Analysis and Microbiology (Pr) (2 Cr)	<b>Course 5</b> <b>Elective 1</b> A. Food Product Development (Th) (2 Cr) B. Food Product Development (Pr) (2 Cr) <b>OR</b>	<b>Course 6</b> Research Methods in Home Science (4 Cr)	-	-	22	<b>PG Diploma (after 3 Year Degree)</b>
			<b>Course 2</b> A. Human Physiology (Th) (2 Cr) B. Advances in Food Microbiology (Th) (2 Cr)	<b>Elective 2</b> A. Multidisciplinary Strategies for Health and Disease Management (Th) (2 Cr) B. Multidisciplinary Strategies for Health and Disease Management (Pr) (2 Cr)					
			<b>Course 3</b> A. Food Science and Quality Control (Th) (2 Cr) B. Food Science and Sensory Evaluation (Pr) (2 Cr)						
			<b>Course 4</b> Descriptive Statistics in Home Science (Th) (2 Cr)						
<b>Sem- I (For PG Diploma/M.Sc. Year 1)</b>			<b>14</b>	<b>4</b>	<b>4</b>	-	-	<b>22</b>	

Note: Curriculum will be enriched by extension work and educational trips for experiential learning with supplemental credits.

A MOOC course on SWAYAM/ NPTEL/COURSERA can be completed with supplemental credits.

## CREDIT STRUCTURE OF THE PROGRAMME (SEMESTER- II)

(Table as per Parishishta 1 with sign of HOD and Dean)

R \_\_\_\_\_

Post Graduate Programme in University:

A. PG Diploma in Home Science – Foods, Nutrition and Dietetics

B. M.Sc. (Home Science – Foods, Nutrition and Dietetics) (Two Years)

Parishishta – 1

Exit option: PG Diploma (44 Credits) after Three Year UG Degree									
Year (2 Yr PG)	Level	Sem. (2 Yr)	Major		R M	OJT / FP	RP	Cum. Cr.	Degree
			Mandatory*	Electives (Any one)					
<b>I</b>	<b>6.0</b>	<b>Sem- II</b>	<b>Course 1</b> A. Advances in Nutritional Biochemistry- II (Th) (2 Cr) B. Clinical Biochemistry and Nutritional Assessment (Pr) (2 Cr)	<b>Course 5</b> <b>Elective 1</b> A. Lactation Management and Complementary Feeding (Th) (2 Cr) B. Lactation Management and Complementary Feeding (Pr) (2 Cr)  <b>OR</b> <b>Elective 2</b> A. Nutrition Communication for Health Sustainability (Th) (2 Cr) B. Nutrition Communication for Health Sustainability (Pr) (2 Cr)	-	4 Cr	-	22	<b>PG Diploma (after 3 Year Degree)</b>
			<b>Course 2</b> Nutrition through the Life Cycle (Th) (4 Cr)						
			<b>Course 3</b> A. Nutritional Management in Chronic Degenerative Diseases (Th) (2 Cr) B. Diet Planning for Chronic Degenerative Diseases (Pr) (2 Cr)						
			<b>Course 4</b> Advanced Statistics in Home Science (2 Cr)						
<b>Sem– II ((For PG Diploma/M.Sc. Year 1)</b>			<b>14</b>	<b>4</b>	-	<b>4</b>	-	<b>22</b>	
<b>Cum. Cr. (For PG Diploma/M.Sc. Year 1)</b>			<b>28</b>	<b>8</b>	<b>4</b>	<b>4</b>	-	<b>44</b>	

Note: Curriculum will be enriched by extension work and educational trips for experiential learning with supplemental credits.

A MOOC course on SWAYAM/ NPTEL/COURSERA can be completed with supplemental credits.

Students need to complete a mandatory summer internship/project (4 weeks) during the summer vacation with supplemental credits.

**CREDIT STRUCTURE OF THE PROGRAMME (SEMESTER- III)**

(Table as per Parishishta 1 with sign of HOD and Dean)

R \_\_\_\_\_

Post Graduate Programme in University:

**B. M.Sc. (Home Science – Foods, Nutrition and Dietetics) (Two Years)**

**C. M.Sc. (Home Science – Foods, Nutrition and Dietetics) (One Year)**

Parishishta – 1

Exit option: PG Diploma (44 Credits) after Three Year UG Degree									
Year (2 Yr PG)	Level	Sem. (2 Yr)	Major		RM	OJT / FP	RP	Cum. Cr.	Degree
			Mandatory*	Electives (Any one)					
<b>II</b>	<b>6.5</b>	<b>Sem-III</b>	<b>Course 1</b> Advances in Human Nutrition- I (Th) (4 Cr)	<b>Course 5</b> <b>Elective 1</b> A. Innovation and Entrepreneurship in Foods, Nutrition and Dietetics (Th) (2 Cr) B. Innovation and Entrepreneurship in Foods, Nutrition and Dietetics (Pr) (2 Cr) <p align="center"><b>OR</b></p> <b>Elective 2</b> A. Current and Emerging Digital Technologies in Foods, Nutrition and Dietetics (Th) (2 Cr) B. Current and Emerging Digital Technologies in Foods, Nutrition and Dietetics (Pr) (2 Cr)	-	-	<b>Course 6</b> Research Project (4 Cr)	22	<b>PG Degree (after 3 Year UG)</b>
			<b>Course 2</b> A. Advances in Clinical Nutrition- I (Th) (2 Cr) B. Medical Nutrition Therapy- I (Pr) (2 Cr)						
			<b>Course 3</b> A. Public Health Nutrition and Epidemiology (Th) (2 Cr) B. Nutritional Assessment and Education (Pr) (2 Cr)						
			<b>Course 4</b> Sports and Fitness Management (Th) (2 Cr)						
<b>Sem– III (For M.Sc. Degree)</b>			<b>14</b>	<b>4</b>	-	-	<b>4</b>	<b>22</b>	

Note: Curriculum will be enriched by extension work and educational trips for experiential learning with supplemental credits.

A MOOC course on SWAYAM/ NPTEL/COURSERA can be completed with supplemental credits.



**CREDIT STRUCTURE OF THE PROGRAMME (SEMESTER- IV)**  
(Table as per Parishishta 1 with sign of HOD and Dean)

R \_\_\_\_\_

**Post Graduate Programme in University:**

**B. M.Sc. (Home Science – Foods, Nutrition and Dietetics) (Two Years)**

**C. M.Sc. (Home Science – Foods, Nutrition and Dietetics) (One Year)**

**Parishishta – 1**

Year (2 Yr PG)	Level	Sem. (2 Yr)	Major		RM	OJT / FP	RP	Cum. Cr.	Degree
			Mandatory*	Electives (Any one)					
II	6.5	Sem- IV	<b>Course 1</b> Advances in Human Nutrition- II (4 Cr)	<b>Course 4</b> <b>Elective 1</b> A. Food Psychology and Nutritional Counseling (Th) (2 Cr) B. Food Psychology and Nutritional Counseling (Pr) (2 Cr) <b>OR</b> <b>Elective 2</b> A. Novel and Emerging Strategies in Disease Management (Th) (2 Cr) B. Novel and Emerging Strategies in Disease Management (Pr) (2 Cr)	-	-	<b>Course 5</b> Research Project (6 Cr)	22	<b>PG Degree (after 3 Year UG)</b>
			<b>Course 2</b> A. Advances in Clinical Nutrition- II (Th) (2 Cr) B. Medical Nutrition Therapy – 2 (Pr) (2 Cr)						
			<b>Course 3</b> Food Preservation, Processing and Quality Assurance (Th) (4 Cr)						
<b>Sem– IV (For 1 year PG Degree)</b>			<b>12</b>	<b>4</b>	-	-	<b>6</b>	<b>22</b>	
<b>Cum. Cr. (For 1 year PG Degree)</b>			<b>26</b>	<b>8</b>	-	-	<b>10</b>	<b>44</b>	

Note: Curriculum will be enriched by extension work and educational trips for experiential learning with supplemental credits.

A MOOC course on SWAYAM/ NPTEL/COURSERA can be completed with supplemental credits. Students can do a summer internship/project (4 weeks) during the summer vacation with supplemental credits (Optional).

<b>Year &amp; Level</b>	<b>Mandatory</b>	<b>Elective</b>	<b>RM</b>	<b>OJT/FP</b>	<b>RP</b>	<b>Cum. Cr.</b>	<b>Degree</b>
<b>Cum. Cr. for 1 Yr PG Degree</b>	<b>26</b>	<b>8</b>	<b>--</b>	<b>--</b>	<b>10</b>	<b>44</b>	
<b>Cum. Cr. for 2 Yr PG Degree</b>	<b>54</b>	<b>16</b>	<b>4</b>	<b>4</b>	<b>10</b>	<b>88</b>	

Note: The number of courses can vary for totaling 14 Credits for Major Mandatory Courses in a semester as illustrated.

**Sign of Head of the Institute**

**Sign of Dean**

Name of the Head of the Institute  
**Dr. Anuradha J. Bakshi**  
(I/C Principal)

Name of the Dean

Name of Department  
**Foods, Nutrition and Dietetics**

Name of the Faculty

**Syllabus: M.Sc. (Home Science – Foods, Nutrition & Dietetics)**

**Semester- I**

**Level 6.0**

**Cumulative Credits= 22**

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**Mandatory Course (Credits 14)**

**Code:** : **Course 1 Credits 4 C1**      A. Advances in Nutritional Biochemistry- I (Th) (2 Cr)  
B. Food Analysis and Microbiology (Pr) (2 Cr)

**Code:** : **Course 2 Credits 4 C2**      A. Applied Physiology (Th) (2 Cr)  
B. Advances in Food Microbiology (Th) (2 Cr)

**Code:** : **Course 3 Credits 4 C3**      A. Food Science and Quality Control (Th) (2 Cr)  
B. Food Science and Sensory Evaluation (Pr) (2 Cr)

**Code:** : **Course 4 Credits 2**      Descriptive Statistics in Home Science (Th) (2 Cr)

**Electives: Course 5 (Credits 4)**

**Code:** : **Elective 1 – A. Food Product Development (Th) (2 Cr)**  
B. Food Product Development (Pr) (2 Cr)

**OR**

**Code:** : **Elective 2 – A. Multidisciplinary Strategies for Health and Disease Management (Th) (2 Cr)**  
B. Multidisciplinary Strategies for Health and Disease Management (Pr) (2 Cr)

**Research Methods (Credits 4)**

**Code:** : **Course 6 Credits 4**      Research Methods in Home Science (Th) (4 Cr)

## **Syllabus:**

**P.G. Diploma in Home Science – Foods, Nutrition & Dietetics**

**M.Sc. (Home Science – Foods, Nutrition & Dietetics)**

**(Semester I)**

# Semester I

# **Semester I: Mandatory Courses**

**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Mandatory Course)**

<b>Course Code</b>	<b>Title of the Course</b>	<b>Th/Pr</b>	<b>Credits</b>
<b>Course 1- A</b>	<b>Advances in Nutritional Biochemistry- I</b>	<b>Theory</b>	<b>2</b>

**Course Objectives:**

1. To enable students to understand cell structure, nutrient metabolism, fuel and energy utilization by cells and the de-novo synthesis of various molecules of significance in human nutrition.
2. To help students elucidate biochemical pathways with reference to the role of various nutrients as substrates, enzymes, coenzymes and cofactors.
3. To assist the students to develop an understanding of the regulations and modulation of various biochemical pathways in health and diseases with special reference to inborn errors of metabolism.

**Course Outcomes (CO)**

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

<b>CO No.</b>	<b>Course Outcomes</b>
CO1	Understand the fundamental concepts of metabolism and metabolic pathways.
CO2	Comprehend and summarize the interconnection, regulation and significance of various biochemical reactions in maintaining an adequate nutritional status and health.
CO3	Apply the information on various metabolic pathways and the enzymes in understanding normal metabolism and to relate any alterations in diagnosis of diseases.
CO4	Compare the nutrient metabolism in health and disease both genetic and chronic degenerative diseases.
CO5	Construct various aspects of cellular functions and transport in maintenance of life processes.
CO6	Interpret the role of various nutrients in terms of type and quantity obtained through diet in influencing the cellular metabolism that would have an impact on tissues, organ, organ system and the organism.

<b>Unit No.</b>	<b>Course Content</b>	<b>No. of Hours</b>
<b>I.</b>	<b>A. Cell biochemistry:</b> i. Cell membrane and cellular communication: Cellular transport- Principles of mechanisms of passive, facilitated diffusion and active transport. Na- K ATPase, GLUT proteins and SGLT. ii. Cell signaling- General principles. Signaling via G- proteins embedded cell surface receptors. iii. Gap junctions in extracellular communication  <b>B. Carbohydrate biochemistry:</b> i. Detailed classification of carbohydrates: Monosaccharides, oligosaccharides, polysaccharides, sugar alcohols, glycosides.	<b>15</b>

	<ul style="list-style-type: none"> <li>ii. Carbohydrate metabolism: Overview of EMP Pathway, TCA cycle, glycogen metabolism and gluconeogenesis, HMP shunt, galactose metabolism.</li> <li>iii. Phosphorylation reactions (ATP synthesis), energy rich compounds, overview of ETC.</li> <li>iv. Metabolism of carbohydrate in fed, fasting and starvation states and carbohydrate metabolism in hyperglycemia and hypoglycemia (Complications of Diabetes Mellitus- Sorbitol formation, ketogenesis).</li> <li>v. Inborn errors of carbohydrate metabolism</li> </ul>	
<b>II.</b>	<p><b>A. Protein biochemistry:</b></p> <ul style="list-style-type: none"> <li>i. Essential and non-essential amino acids, chemical structure of amino acids, formation of specialized products from amino acids and their functions- Glutathione, creatine &amp; creatinine, biogenic amines (dopamine, norepinephrine, tyramine, serotonin, GABA, histamine).</li> <li>ii. Four levels of protein structure and functions of Insulin, Haemoglobin, Carboxypeptidase, Keratin)</li> <li>iii. Overview of amino acid metabolism: Transamination, deamination, ammonia formation, detoxification and Urea cycle, decarboxylation</li> <li>iv. Metabolism of aromatic amino acids, BCAA, methionine and trans-methylation reactions. Inborn errors of amino acid metabolism</li> <li>v. Reactions of one carbon metabolism.</li> </ul> <p><b>B. Enzymes chemistry:</b></p> <ul style="list-style-type: none"> <li>i. Enzyme classification, structure, factors affecting enzyme activity and enzyme inhibition. Units to measure enzyme activity, significance of Km.</li> <li>ii. Clinical Enzymology and use of ELISA &amp; RIA- Enzymes of clinical significance in diagnosis- LDH, ALT, AST, CK/CPK, GGT, Alkaline phosphatase, amylase, etc.</li> <li>iii. Overview of enzymes in digestion of carbohydrate, protein and fats.</li> </ul>	<b>15</b>
	<b>Total hours</b>	<b>30</b>

**References:**

- Berg, J. M., Tynocrko, J. L. et al *Biochemistry* (6th ed.) New York W.H. Freeman and Co 2006.
- Brody Tom. *Nutritional Biochemistry* 2nd ed. New Delhi Elsevier/Reed Elsevier India Pvt. Ltd. 2004.
- Chatterjee M.N. Shinde and Rana *Textbook of Medical Biochemistry* 8th ed. New Delhi Jaypee Brothers Medical Publishers 2012.
- Devlin Thomas, M (ed.) *Textbook of Biochemistry with Clinical Correlation* New York, John Wiley and Sons Inc.1997.
- Montgomery, Rex and others *Biochemistry A case oriented Approach* St. Louis The C.V. Mosby Co. 1977.
- Murray, R.K. and others. *Harper's Biochemistry* 25th ed. Connecticut, Appleton and large Publications. London, Prentice Hall Int. Inc 1996.
- Lehninger, A.L.; Nelson D.L. and Cox. M.M., *Principles of Biochemistry* 3rd ed. New York. Worth Publishers McMullan Press, 2000.
- Puri Dinesh *Textbook of Biochemistry. A Clinically oriented Approach* New Delhi B.I. Churchill Livingstone Pvt. Ltd. 2002.



Rastogi, S. C. Biochemistry. 4<sup>th</sup> ed. New Age International Publishers, 2019.

Satyanarayan U. and Chakrapani U., *Biochemistry* 4<sup>th</sup> ed. Elsevier 2013.

Satyanarayan U. and Chakrapani U., *Essentials of Biochemistry* 3<sup>rd</sup> ed. Books and Allied (p) Ltd, 2019.

**Evaluation:**

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Class test/Quiz (MCQ)/ Open book test	10
Creating summary of biochemical pathways or reactions and highlighting the role of nutrients in it in the form of presentations/ Charts/2D or 3 D models) or creating activities to improve knowledge retention of nutritional implications of biochemistry for nutrition professionals.	10
Group discussion	5
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
<b>Total</b>	<b>25</b>

**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Mandatory Course)**

<b>Course Code</b>	<b>Title of the Course</b>	<b>Th/Pr</b>	<b>Credits</b>
<b>Course 1- B</b>	<b>Food Analysis and Microbiology</b>	<b>Practical</b>	<b>2</b>

**Course Objectives:**

1. To enable the students to understand the principles involved in various laboratory techniques and apply them in the analysis of food.
2. To equip the students with skills required for the extraction and determination of components in food.
3. To help students assess the microbiological quality of food.
4. To familiarize students with the working of equipment used in the laboratory.

**Course Outcomes (CO)**

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

<b>CO No.</b>	<b>Course Outcomes</b>
CO1	Describe the underlying principles involved in various analytical techniques used in the laboratory.
CO2	Understand the processes involved in extraction and estimation of food components as well the working mechanism of various laboratory equipment.
CO3	Apply the knowledge of principles of Food Science and Microbiology to select appropriate techniques of determination.
CO4	Analyse various food products and identify and quantify various components present in them.
CO5	Assess food samples and evaluate their nutritional quality and microbiological safety.
CO6	Develop nutritious food products and devise strategies to maintain food safety and quality.

<b>Unit No.</b>	<b>Course Content</b>	<b>No. of Hours</b>
<b>I.</b>	<b>A. Food Analysis:</b> i. Preparation of Buffers and pH measurement ii. Determination of the optimum pH of amylase isolated from sweet potato. iii. Estimation of Total Reducing Sugars in fruit juice by DNSA method iv. Estimation of Albumin in egg white using Biuret method v. Separation of Lipids by Thin Layer Chromatography vi. Estimation of Total Phenolics in tea by Folin Ciocalteu's method vii. Measurement of the Antioxidant Activity of foods by DPPH Method viii. Estimation of Lycopene content in tomatoes by spectrophotometry	<b>30</b>

	ix. Determination of the chlorophyll content in leafy vegetables by spectrophotometry.	
<b>II.</b>	<p><b>B. Extraction and Isolation of food components:</b></p> <ul style="list-style-type: none"> <li>i. Starch from potato</li> <li>ii. Casein in milk using isoelectric precipitation</li> <li>iii. Cholesterol from egg yolk</li> <li>iv. Pectin from fruits</li> <li>v. Essential oils from spices, herbs and orange peels</li> </ul> <p><b>C. Microbial Testing of Food:</b></p> <ul style="list-style-type: none"> <li>i. Simple staining method and Differential staining (Gram Staining)</li> <li>ii. Fungal staining</li> <li>iii. Techniques of sterilization- Autoclaving, Hot air drying</li> <li>iv. Preparation of culture media</li> <li>v. Maintenance of microbial culture on agar slants</li> <li>vi. Isolation of microbes by plate streaking</li> <li>vii. Enumeration of Total Plate Counts, Yeast and Mold counts and Coliform counts using Pour plate method, Spread plate method</li> <li>viii. Testing of Water Quality- MPN method</li> <li>ix. Antimicrobial Testing of Food Extracts- Agar well method, disc diffusion method</li> </ul>	<b>30</b>
	<b>Total Hours</b>	<b>60</b>

**References:**

Official Methods of Analysis of AOAC International, 22nd Edition (2023).

Garg, N., Garg, K. L., Mukerji, K. G. (2010). Laboratory Manual of Food Microbiology. India: I.K. International Publishing House Pvt. Limited.

Gomori, G. (1955). [16] Preparation of buffers for use in enzyme studies.

Miller, G. L. (1959). Use of dinitrosalicylic acid reagent for determination of reducing sugar. *Analytical Chemistry*, 31, 426-428.

Pearson, D. (1970). Chemical Analysis of Foods, (6th Ed), London: T.A. Churchill.

Raghuramulu, N., Nair, K. M., & Kalyanasundaram, S. (2003). National Institute of Nutrition- A Manual of Laboratory Techniques.

Singleton, V. L., & Rossi, J. A. (1965). Colorimetry of total phenolics with phosphomolybdic-phosphotungstic acid reagents. *American Journal of Enology and Viticulture*, 16(3), 144-158.

**Evaluation:**

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Quiz (Objective type)	10
Group project or MOOCs (with course completion certificate and completed in the same semester)	10
Journal	5
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 Performing an experiment in food analysis	10
Question 2 Performing an experiment in food microbiology	10
Question 3 Viva	5
<b>Total</b>	<b>25</b>

**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Mandatory Course)**

Course Code	Title of the Course	Th/Pr	Credits
Course 2- A	Human Physiology	Theory	2

**Course Objectives:**

1. To help students strengthen their understanding of the fundamental concepts of physiological processes of the human body.
2. To facilitate comprehension of newer and applied concepts of human physiology.
3. To enable in students the skills of application of the principles of physiology in health and disease management.

**Course Outcomes (CO)**

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

CO No.	Course Outcomes
CO1	Outline the basic physiological processes of various systems.
CO2	Understand the various interactions between physiological processes in the body.
CO3	Apply the concepts of physiology to pathological conditions.
CO4	Analyse the aspects of disease development in abnormal physiology.
CO5	Design diagnostic criteria using the understanding of physiological processes.

Unit No.	Course Content	No. of Hours
<b>I.</b>	<b>A. Homeostasis and its importance</b> i. Advanced Concepts of Cell Physiology ii. Cell physiology and membrane transport -its effect in health and disease <b>B. The Nervous system</b> i. Structure and function of the nervous system ii. Nerve conduction, synaptic transmission and neurotransmitters iii. Advanced concepts in Neuronal communication and its significance iv. Neuro-regulation of body processes v. Effects of nervous system dysfunction on health and disease <b>C. The Endocrine system</b> i. Endocrine glands and their hormones ii. Incretins and gut hormones iii. Hormonal regulation of metabolism, growth, and stress responses iv. Imbalances leading to endocrine-related disorders <b>D. The Immune System</b> i. Components of the immune system and their functions ii. Immune responses in health and disease iii. Role of Inflammation in Health and Disease	<b>15</b>

	<ul style="list-style-type: none"> <li>iv. Autoimmune disorders, allergies, and immune-deficiencies</li> </ul> <p><b>E. The Respiratory System</b></p> <ul style="list-style-type: none"> <li>i. Respiratory System and Health</li> <li>ii. Mechanics of breathing and gas exchange</li> <li>iii. Importance of oxygen transport and carbon dioxide removal</li> <li>iv. Respiratory diseases and their impact on health</li> </ul> <p><b>F. The Renal and Urinary System</b></p> <ul style="list-style-type: none"> <li>i. Renal Function and Physiology</li> <li>ii. Regulatory Functions of the kidney in health and disease</li> <li>iii. Mechanism of urine formation and excretion</li> </ul>	
<b>II.</b>	<p><b>A. The Blood and the Cardiovascular System</b></p> <ul style="list-style-type: none"> <li>i. Constituents of Blood and their functions</li> <li>ii. Structure and function of the heart and blood vessels</li> <li>iii. Physiology of Cardiac cycle</li> <li>iv. Blood circulation and its role in maintaining health</li> <li>v. Common cardiovascular diseases and their physiological basis</li> </ul> <p><b>B. The Digestive System</b></p> <ul style="list-style-type: none"> <li>i. Physiology of the gastrointestinal system</li> <li>ii. Physiology of accessory organs – Liver, gall bladder and pancreas</li> <li>iii. The Gut as an Endocrine and Immune organ</li> <li>iv. Gut microbiota and its influence on health</li> <li>v. Gastrointestinal disorders and their physiological basis</li> </ul> <p><b>C. The Musculoskeletal System</b></p> <ul style="list-style-type: none"> <li>i. Structure and function of muscles, bones, and joints</li> <li>ii. Physiology of Muscle Contraction and its applications in exercise</li> <li>iii. Bone physiology</li> <li>iv. Musculoskeletal disorders and their physiological origins</li> </ul> <p><b>D. The Reproductive System</b></p> <ul style="list-style-type: none"> <li>i. Reproductive anatomy and hormonal regulation physiology of males and females</li> <li>ii. The Menstrual cycle, pregnancy, and fertility</li> <li>iii. Reproductive health issues and their physiological aspects</li> </ul>	<b>15</b>
	<b>Total Hours</b>	<b>30</b>

**References:**

- Guyton, A.C. (2020). Textbook of Medical Physiology 14th Edition., Saunders Company.
- Best and Taylor, (1975) The living Body. Chapman and Hall Ltd., London.
- Chatterjee C. C. (1988). Human Physiology, 10th Edition, Medical Allied Agency.
- Pal, G., Pal, P., Nanda, N. (2016). Comprehensive Textbook of Medical Physiology- Two Volume Set. India: Jaypee Brothers Medical Publishers Pvt. Limited.
- Tortora, G. J., Derrickson, B. H. (2017). Tortora's Principles of Anatomy and Physiology. Singapore: Wiley.
- Waugh, A., Grant, A. (2018). Ross & Wilson Anatomy and Physiology in Health and Illness. United Kingdom: Elsevier Health Sciences.

**Evaluation:**

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Class Test/ Quiz/ Group Discussion	10
Preparation of a summary Document of a physiological or applied physiological process/a presentation of a physiological process for education of the community/ student as infographics/videos	15
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
<b>Total</b>	<b>25</b>

M.Sc. (Home Science – Foods, Nutrition and Dietetics)

Level- 6.0  
(Under NEP)

Semester- I

Major (Mandatory Course)

Course Code	Title of the Course	Th/Pr	Credits
Course 2- B	Advances in Food Microbiology	Theory	2

**Course Objectives:**

1. To provide students with knowledge about pathogens and spoilage microorganisms of significance in the food industry and study their effect on human health.
2. To help students understand the mechanisms which enable survival of microorganisms in food.
3. To enable students to apply techniques for control of microbial growth in food.

**Course Outcomes (CO)**

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

CO No.	Course Outcomes
CO1	Describe the pathogenic and spoilage microorganisms of significance in the food industry.
CO2	Understand their growth and survival in food and thereby their role in food borne illness.
CO3	Apply the knowledge of food microbiology to select appropriate methods for their control in food.
CO4	Compare several technologies used for the control of microbes by food industry and identify the most effective one.
CO5	Investigate foodborne illness outbreak and assess the presence of microbes in food and environment.
CO6	Develop guidelines for microbiological safety of food.

Unit No.	Course Content	No. of Hours
<b>I.</b>	<b>Food-borne poisoning, infections and intoxication</b> i. Overview of the global burden of foodborne diseases ii. Causative agents of Food Borne Illness- Bacteria, fungi, viruses and parasites iii. Sources of contamination and foods commonly involved -Toxins produced -Symptoms and adverse effect iv. Microbial survival mechanisms in the food chain v. Foodborne outbreak investigation vi. Classical and novel methods of identification of food microbes vii. New trends in emerging foodborne pathogens	<b>15</b>
<b>II.</b>	<b>Microbial Food safety and Quality Control</b>	<b>15</b>



	<ul style="list-style-type: none"> <li>i. Overview of conventional methods of microbial control- Use of high temperature, refrigeration and freezing, dehydration &amp; concentration, chemical preservatives.</li> <li>ii. Emerging technologies used by the food industry for the reduction of pathogenic and spoilage organisms in food- microwave and radiofrequency heating, pulsed electric fields, high pressure processing, ionizing radiation, ohmic heating, ultraviolet light, hurdle technology and ozone technology.</li> <li>iii. General guidelines on sampling for microbiological analysis by FSSAI</li> <li>iv. Microbiological quality standards for various foods by FSSAI</li> <li>v. Food production plant sanitation &amp; hygiene practices to control microbial growth</li> <li>vi. Microbial risk assessment in food industry</li> </ul>	
	<b>Total Hours</b>	<b>30</b>

### References:

- Adams, M. R., Moss, M. O. (2007). Food Microbiology. India: New Age International (P) Limited.
- Food Safety and Standards Authority of India (FSSAI). Latest guidelines and standards along with amendments available on <https://www.fssai.gov.in/>
- Foodborne Diseases. (2017). Netherlands: Elsevier Science.
- Frazier, W. C. and Westoff, D. C. (1998). Food Microbiology New Delhi; Tata McGraw Hill
- James, M. J. (1996). Modern Food Microbiology (4th Ed.) New Delhi: Published by S.K. Jain for C.B.S. Publishers and distributors.
- Microbiology for Food and Health: Technological Developments and Advances. (2019). United States: Apple Academic Press.
- Microbial Biotechnology in Food Processing and Health: Advances, Challenges, and Potential. (n.d.). United Kingdom: Apple Academic Press.
- Pelczar, M. J., Reid, R. D. and Chan (2000) Microbiology. New Delhi: Tata McGraw Hill.
- \*\* All new research articles from journals related to Food Microbiology

### Evaluation:

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Class test	10
Seminar or group discussion or PowerPoint presentation based on current trends in microbiology, recent foodborne disease outbreaks	15
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
<b>Total</b>	<b>25</b>

**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Mandatory Course)**

Course Code	Title of the Course	Th/Pr	Credits
Course 3- A	Food Science and Quality Control	Theory	2

**Objectives:**

1. To help students understand the chemistry of food components and the chemical and biochemical reactions in different foods.
2. To impart systematic knowledge of basic and applied aspects of food processing and technology to students.
3. To enable students understand the various techniques of sensory evaluation of foods.
4. To familiarize students with food quality control and safety of foods.

**Course Outcomes (CO)**

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

CO No.	Course Outcomes
CO1	Acquire knowledge about the fundamentals of food science and nutrition, food chemistry and biochemical changes during processing and preservation.
CO2	Apply the knowledge gained in food chemistry and sensory evaluation in development, processing and preservation of safe, nutritious and safe food products.
CO3	Compare the sensory properties of foods to determine consumer acceptability of foods using principles of food science.
CO4	Utilize advanced instruments and technologies to process and analyze food products.
CO5	Gain knowledge of various food additives and its application in food processing.
CO6	Design guidelines to maintain quality and safety of foods keeping in mind the food laws and regulations.

Unit No.	Course Content	No. of Hours
I.	<b>A. Principles of Food Science – Water, Carbohydrates</b> i. <b>Water:</b> States of water, water activity, use of water in food preparation, Water– Solute interactions, Types of water and colligative properties ii. <b>Physical Aspects of Food Preparation:</b> Energy and its transfer - Applications in food preparation, Mass transfer, States of Matter, Dispersions, Emulsions, Gels, Foams. iii. <b>Carbohydrates:</b> Properties of sugars- Hydrolysis, Caramelization, Maillard reaction. Applications of these properties in food processing e.g crystalline candies, syrup, sauces, jams and jellies, <b>Starch:</b> Structure, functional properties- Gelatinization, pasting, Syneresis, Retrogradation, Dextrinization. Factors affecting gelatinization and gelation. Modified and resistant starches, Gums- Functions, sources, applications. Pectic substances, pectin gels	15

	<p><b>B. Principles of Protein Chemistry-</b> Amino acids, peptides, proteins and Science of Protein Foods</p> <ol style="list-style-type: none"> <li>i. Physicochemical properties, functional properties of amino acids, peptides and proteins</li> <li>ii. Chemical and enzymatic modifications- Denaturation, non-enzymatic browning, and other chemical changes</li> <li>iii. Processing induced physical, chemical and nutritional changes.</li> <li>iv. Texturized proteins, Protein isolates, concentrates, Protein hydrolysates, Enzymes: Properties and isolation, Nature of enzymes - stability and action, Factors influencing enzymes - enzyme inactivation and control, Enzymes in food processing and modification - Proteolytic enzymes, oxidases, lipases, enzymes decomposing carbohydrates and applications, Immobilised enzymes in food processing. Enzymes in waste management.</li> </ol> <p><b>C. Principles of Lipids Chemistry</b></p> <ol style="list-style-type: none"> <li>i. Properties of Fats- Crystallinity of solid fats, Polymorphism, Melting points, Plasticity of Fats</li> <li>ii. Chemical Properties - Oxidative and hydrolytic rancidity, effect of heat, chemical modifications- Hydrogenation, Interesterification, Winterization, Smoke Point.</li> <li>iii. Lipid-protein complexes, emulsions: formation, stability, surfactants and emulsifiers.</li> <li>iv. Fat deterioration and antioxidants.</li> <li>v. Functional roles of fats- fat replacements.</li> </ol> <p><b>D. Flavors</b></p> <ol style="list-style-type: none"> <li>i. Individual aroma compounds- vegetable, fruit and spice/condiment flavors, flavors from lactic acid/ethanol fermentation, flavors volatiles from fats and oils, flavor volatiles in muscle foods and milk <ul style="list-style-type: none"> <li>· Composition, flavorings extracts– natural and synthetic</li> <li>· Thermally induced process flavors</li> </ul> </li> <li>ii. Natural and synthetic flavors: Interactions with other constituents</li> </ol>	
<p><b>II.</b></p>	<p><b>A. Quality Control and Sensory Evaluation</b></p> <ol style="list-style-type: none"> <li>i. Meanings and definition of food quality, Quality factors in foods, indicators of food quality. Meaning, importance and ways of food quality assessment</li> <li>ii. Sensory evaluation, physiological bases, sensory characteristics of foods, types, selection and training of sensory panel, requirements of sensory evaluation tests, types of tests, analysis and interpretation of sensory evaluation tests.</li> <li>iii. Significance of different sensory tests - Threshold test, Difference test – paired comparison, triangle and Duo-trio test, Rating test – Hedonic, Numerical, Composite, scoring and ranking test, Score card making, Graph Making (Radar Chart)</li> <li>iv. Objective evaluation – Basic guidelines, physical methods to evaluate volume, specific gravity, moisture, texture, rheological</li> </ol>	<p><b>15</b></p>

	characteristics, chemical analysis methods, microscopic methods, indices of microbial quality. v. Food Standards and Laws - FSSAI Introduction & Functions. vi. ISI, AGMARK, FPO, Codex Alimentarius, ISO vii. Role of FDA and Consumer Guidance Society in India. viii. Management systems in food quality control. HACCP, TQM and concept of food audits	
	<b>Total Hours</b>	<b>30</b>

**References:**

- Food Science and Technology. (2017). Germany: Wiley.
- Srilakshmi, B. (2007). Food Science. India: New Age International (P) Limited.
- Manay, N. S., Shadaksharaswamy, M. (2008). Food: Facts and Principles. India: New Age International (P) Limited.
- Vaclavik, V. A., Christian, E. W. (2013). Essentials of Food Science. Netherlands: Springer New York.
- McWilliams, M (2007). *Foods: Experimental Perspectives* 5th Ed, New Jersey: Macmillar Publishing Co.
- Potter, N. N. (2007). Food Science. India: CBS Publishers & Distributors.
- Jeantet, R., Croguennec, T., Schuck, P., Brule, G. (2016). Handbook of Food Science and Technology 2: Food Process Engineering and Packaging. Germany: Wiley.
- Food Science and Nutrition: Breakthroughs in Research and Practice. (2018). United States: IGI Global.
- Rick Parker (2003) *Introduction to Food Science*, New York: Delmar Thomson Learning.
- Scottsmith and Hui Y.H (Editors) (2004) *Food Processing – Principles and Applications* London Blackwell Publishing.
- Subbulakshmi, G and Udipi, S. A. (2001). *Foods Processing and Preservation*, New Delhi: New Age International (P) Ltd. Publishing.
- Swaminathan, M. (1995). *Food Science Chemistry and Experimental Food*. The Bangalore Printing and Publishing Co. Ltd.
- Borvers, J. (1992). *Food Theory and Application* (2ndEd), New York: Maxwell MacMillan International Edition.
- \*\* All new research articles from journals related to Food Science and Processing.

**Evaluation:**

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Class test	15
Seminar/ Power-point Presentation on latest trends in Food Science	10
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
<b>Total</b>	<b>25</b>

**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Mandatory Course)**

<b>Course Code</b>	<b>Title of the Course</b>	<b>Th/Pr</b>	<b>Credits</b>
<b>Course 3- B</b>	<b>Food Science and Sensory evaluation</b>	<b>Practical</b>	<b>2</b>

**Course Objectives:**

1. To enable the learners to gain knowledge and skills in food science principles required in preparation of food and food product development.
2. To train the students in techniques of objective and sensory evaluation of food quality and characteristics that can be applied in food product evaluation.
3. To help students identify ideal or desirable food attributes related to improving food palatability that would enable food consumption.
4. To enable students to use principles of food science in preserving the nutritive value of food products.

**Course Outcomes (CO)**

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

<b>CO No.</b>	<b>Course Outcomes</b>
CO1	Describe food science principles related to the major food groups.
CO2	Summarize and compare the role of various food components and their interactions in various food preparations.
CO3	Apply the principles of food science in understanding various phenomena observed in the food that alters their physico-chemical and sensory attributes.
CO4	Appraise the role of various food, food components, elements of the environment and method of cooking in the preparation, preservation and spoilage of food.
CO5	Evaluate the sensory and objective characteristics of food using appropriate tools and methods.
CO6	Design various experiments and methods to demonstrate and quantify the objective characteristics of food that would find an application in food product development and evaluation.

<b>Unit No.</b>	<b>Course Content</b>	<b>No. of Hours</b>
<b>I.</b>	<b>A. Sugar cookery</b> i. Tests for stages of sugar cookery ii. Effect of dry heat on sucrose. iii. Crystalline and Non crystalline candies <b>B. Cereals and Flours</b> i. Gelatinization of Starch (different types) and Starches as thickening agents (potato, corn and other) ii. Comparison of different cereals for water absorption and consistency using a viscometer	<b>30</b>

	<ul style="list-style-type: none"> <li>iii. Comparison of - different methods of cooking rice, different varieties of rice</li> <li>iv. Factors affecting Gluten formation</li> </ul> <p><b>C. Lipids</b></p> <ul style="list-style-type: none"> <li>i. Smoke point of different fats and oils</li> <li>ii. Factors affecting fat absorption</li> <li>iii. Comparison of texture, flavor and mouth-feel of food products using fat substitutes (if available)</li> <li>iv. Temporary and Permanent emulsions in Salad Dressings, Effect of Stabilizers and Emulsifiers in salad dressings. Comparisons of low fat and high fat French dressing: Preparation and Comparison</li> </ul> <p><b>D. Solutions and ice crystallization:</b> Effect of formula and procedure on crystal size of frozen desserts.</p>	
<b>II.</b>	<p><b>A. Examination of properties of Milk, Egg and Meat</b></p> <ul style="list-style-type: none"> <li>i. Denaturation and Coagulation of milk proteins</li> <li>ii. Egg white foams – volume and stability</li> <li>iii. Effect of acid and alkalis on meat/poultry</li> </ul> <p><b>B. Factors affecting gelatin gel</b> - Temperature of liquid, proteolytic enzymes and whipping</p> <p><b>C. Fruits and Vegetables</b></p> <ul style="list-style-type: none"> <li>i. Pectin gel: Determination of pectin content, development of a fruit jam, using natural and commercial pectin</li> <li>ii. Factors affecting vegetable pigments – Temperature, acid, alkalis</li> </ul> <p><b>D. Sensory Evaluation</b></p> <ul style="list-style-type: none"> <li>i. Training of sensory panels and organizing the Evaluation Laboratory.</li> <li>ii. To perform recognition and sensitivity tests for four basic tastes.</li> <li>iii. Difference Tests</li> <li>iv. Reporting using Radar graphs and statistical analysis</li> </ul>	<b>30</b>
	<b>Total Hours</b>	<b>60</b>

**References:**

- Lawless, H. T., Heymann, H. (2010). *Sensory Evaluation of Food: Principles and Practices*. Germany: Springer.
- Food Science: *Sensory Evaluation Techniques*. (2016). United States: Syrawood Publishing House.
- Amerine, M. A., Pangborn, R. M., Roessler, E. B. (2013). *Principles of Sensory Evaluation of Food*. United States: Elsevier Science.
- Joshi, V. K. (2006). *Sensory Science: Principles and Application in Food Evaluation*. India: Agrotech Publishing Academy.
- Jameson K. (1998). *Food Science – A Laboratory Manual*, New Jersey: Prentice Hall Inc. Lawless, H. and Heymann, H. (1998).
- McWilliam, M. (2001). *Foods – Experimental Perspectives* (4th Ed.), New Jersey: Prentice Hall Inc. USA: CRC Press Inc.
- Weaver, C. (1996), *Food Chemistry Laboratory – A manual for Experimental Foods*, Rao E. S. (2013). *Food Quality Evaluation*. Variety Books.

Pomeranz Y and Meloan CE (2002). Food Analysis – Theory and Practice, CBS Publishers and Distributors, New Delhi.

Meilgard (1999). Sensory Evaluation Techniques, 3rd ed. CRC Press LLC, 1999.

**Evaluation:**

2 credits Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Class test (MCQ or Objective type questions)	10
Method of work, precision and use of various skills while performing the practical	10
Journal	5
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 Questions designed to test applications of food science	10
Question 2 Plan an experiment based on sensory evaluation	10
Question 3 Viva Voce	5
<b>Total</b>	<b>25</b>



**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Mandatory Course)**

<b>Course Code</b>	<b>Course Name</b>	<b>Th/Pr</b>	<b>Credits</b>	<b>Hours</b>
<b>Course 4</b>	<b>Descriptive Statistics in Home Science</b>	<b>Theory</b>	<b>2</b>	<b>30</b>

**Course Objectives:**

1. To help students value the sine qua non role of statistics in quantitative research.
2. To enable in students the skills in selecting, computing, interpreting and reporting descriptive statistics.
3. To facilitate comprehension of elementary concepts in probability.
4. To introduce students to a specialised statistical software such as SPSS.

**Course Outcomes (CO)**

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

<b>CO No.</b>	<b>Course Outcomes</b>
CO1	Identify the level of measurement of a variable and the corresponding suitable statistical technique to describe this variable.
CO2	Identify, differentiate between, evaluate, and select different descriptive statistical techniques to numerically summarise data.
CO3	Identify, differentiate between, evaluate, and select different descriptive statistical techniques to graphically summarise data.
CO4	Have the necessary knowledge and skills to design and conduct descriptive research studies.
CO5	Use SPSS for data entry, data management, and descriptive statistics effectively.
CO6	Design various experiments and methods to demonstrate and quantify the objective characteristics of food that would find an application in food product development and evaluation.

Unit No.	Course Content	No. of Hours
I.	<p><b>A. Introduction and overview to statistics</b></p> <p>(i) Role of statistics in (quantitative) research</p> <p>(ii) Definition/changing conceptions</p> <p>(iii) Prerequisite concepts in mathematics (e.g., basic algebra, properties of the summation sign)</p> <p><b>B. Descriptive Statistics for summarizing ratio level variables</b></p> <p>(i) Frequencies and percentages</p> <p>(ii) Computing an average/measure of a central tendency</p> <p>Mean, median, mode(s)</p> <p>Contrasting the mean vs. median</p> <p>Computing an average when there are outliers or extreme values in the data set</p> <p>Robust measures of the center (5% trimmed mean; M estimators)</p> <p>Quartiles and percentiles</p> <p>(iii) Computing a measure of variability or dispersion</p> <p>Why? (inadequacy of the mean)</p> <p>Minimum value and maximum value</p> <p>Range</p> <p>Interquartile range</p> <p>Variance and standard deviation</p> <p>(iv) Discrete and continuous variables</p> <p>(v) Histograms and line graphs</p>	15
II.	<p><b>A. Descriptive Statistics for summarizing nominal, ordinal and interval level variables</b></p> <p><b>B. Using specialised software such as SPSS</b></p> <p>(i) Data Entry</p> <p>(ii) Data Management</p> <p>(iii) Descriptive Statistics</p> <p><b>C. Probability</b></p> <p>(i) Definition</p> <p>(ii) Role of probability in research and statistics</p> <p>(iii) Elementary concepts in probability</p> <p>Sample space, experiment, event/outcome/element of the sample space</p> <p>Equally likely outcomes and the uniform probability model</p> <p>Stabilization of the relative frequency</p>	15
	<b>Total Hours</b>	30

**References:**

- Bhattacharyya, G.K., & Johnson, R.A. (1977). *Statistical concepts and methods*. John Wiley. (classic)
- Jackson, S. L. (2012). *Research methods and statistics: A critical thinking approach* (4th ed.). Wadsworth Cengage Learning.
- Johnson, R. A., & Bhattacharyya, G. K. (2019). *Statistics: Principles and methods* (8th ed.). John Wiley.
- Martin, W. E., & Bridgmon, K. D. (2012). *Quantitative and statistical research methods*. Jossey-Bass.
- Kachigan, S. K. (1986). *Statistical analysis: An interdisciplinary introduction to univariate & multivariate methods*. Radius Pr.
- Kerlinger, F. N. & Lee, H. B. (2000). *Foundations of behavioral research*. Harcourt.
- Wheelan, C. J. (2014). *Naked statistics: Stripping the dread from the data*. W.W. Norton.

**Evaluation:**

2 credits    Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Written Short Quizzes	10
SPSS data entry & descriptive statistical analysis assignment	5
Problem-solving Exercises (in pairs or individually) & Practice Sums (individually)	10
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
<b>Total</b>	<b>25</b>

# **Semester I: Elective courses**

**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Elective Course)**

<b>Course Code</b>	<b>Title of the Course</b>	<b>Th/Pr</b>	<b>Credits</b>
<b>Course 5- Elective 1A</b>	<b>Food Product Development</b>	<b>Theory</b>	<b>2</b>

**Course Objectives:**

1. To introduce the students to the process of new food product development using appropriate scientific methods.
2. To help students apply principles of food science and processing in the development of an innovative product that is nutritious utilizing indigenous foods, novel ingredients or food industry by-products.
3. To enable the students to identify and use suitable packaging and storage conditions for the developed product.
4. To build in students, nutritious food product development skills with good consumer acceptability.

**Course Outcomes (CO)**

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

<b>CO No.</b>	<b>Course Outcomes</b>
CO1	Identify novel or indigenous ingredients for food product development.
CO2	Outline the process of food product development.
CO3	Apply the knowledge of food science and microbiology in selection of ingredients and food processing and preparation techniques for deriving palatable and nutritive products.
CO4	Compare variations of the recipe and identify the best product based on innovation, cost and sustainability.
CO5	Assess and evaluate the sensory quality, nutritional value, cost effectiveness of the products and other value additions in terms of public health (nutrient density and improved shelf life).
CO6	Develop a nutritious product and create a suitable flow of production/preparation techniques with good consumer acceptability as well as keeping quality and design strategies for its promotion.

Unit	Course Content	No. of Hours
I.	<b>A. Process of new food product development</b> <ol style="list-style-type: none"> <li>i. Process of idea generation and documentation: <ul style="list-style-type: none"> <li>● Market research of various new food products</li> <li>● Idea generation</li> <li>● Identification of ingredients (indigenous or novel) for food product development.</li> <li>● Writing a proposal for development of food product with justification for its development</li> <li>● Various sources for procurement of materials and ingredients</li> </ul> </li> <li>ii. Standardization process of the product: <ul style="list-style-type: none"> <li>● Documentation of ingredients used (Weights and volumes)</li> <li>● Method of preparation</li> <li>● Variation in ingredients and technique of preparation.</li> <li>● Measurement of recipe yield (Serving size, number of portions)</li> </ul> </li> </ol>	15
II.	<b>A. Evaluation and marketing of the developed product</b> <ol style="list-style-type: none"> <li>i. Evaluation: <ul style="list-style-type: none"> <li>● Sensory evaluation (Trained and semi-trained panelist)</li> <li>● Calculation of nutritive value (Indian Food Composition tables, USDA Food Database)</li> <li>● Method of deriving cost</li> <li>● Shelf-life study of the product</li> </ul> </li> <li>ii. Packaging, labeling and marketing <ul style="list-style-type: none"> <li>● Packaging material (Types and suitability for food) and pre-requisite for a label content and design.</li> <li>● Promotion and marketing techniques</li> </ul> </li> </ol>	15
	<b>Total hours</b>	30

**References:**

- Developing New Food Products for a Changing Marketplace. (2007). United States: CRC Press.
- Fuller, G. W. (2016). New Food Product Development: From Concept to Marketplace, Third Edition. United States: CRC Press.
- Jameson K. (1998). Food Science- A Laboratory Manual, New Jersey: Prentice Hall Inc.
- McWilliam, M. (2001). Foods – Experimental Perspectives (4th Ed.), New Jersey: Prentice Hall Inc. Practices, Kluwer Academic/Plemer Publishers.USA: CRC Press Inc.
- Weaver, C. (1996), Food Chemistry Laboratory – A manual for Experimental Foods.

**Evaluation:**

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Individual writing of the research proposal for development of new product, methodology, process of standardization and proposed budget	15
Sample designing of packaging, labeling and marketing/sales material	10
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
<b>Total</b>	<b>25</b>

**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Elective Course)**

<b>Course Code</b>	<b>Title of the Course</b>	<b>Th/Pr</b>	<b>Credits</b>
<b>Course 5- Elective 1B</b>	<b>Food Product Development</b>	<b>Practical</b>	<b>2</b>

**Course Objectives:**

1. To help students apply principles of food science in the development of an innovative product.
2. To provide students with skills for development of nutritious products utilizing indigenous foods, novel ingredients or food industry by-products.
3. To enable students to identify and use suitable packaging and storage conditions for the developed product.

**Course Outcomes (CO)**

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

<b>CO No.</b>	<b>Course Outcomes</b>
CO1	Identify novel or indigenous ingredients for food product development.
CO2	Outline the process of food product development.
CO3	Apply the knowledge of food science and microbiology in selection of ingredients and food processing and preparation techniques for deriving palatable and nutritive products.
CO4	Compare variations of the recipe and identify the best product based on innovation, cost and sustainability.
CO5	Assess and evaluate the sensory quality, nutritional value, cost effectiveness of the products and other value additions in terms public health (nutrient density and improved shelf life).
CO6	Develop a nutritious product and creation of suitable flow of production/preparation techniques with good consumer acceptability as well as keeping quality and design strategies for its promotion.

<b>Unit</b>	<b>Course Content</b>	<b>No. of Hours</b>
I.	<b>A. Process of new food product development</b> <b>i. Ideation of the product:</b> <ul style="list-style-type: none"><li>• Conduct market research of various new food products</li><li>• Idea generation - Identification of ingredients (indigenous or novel) for food product development.</li><li>• Writing a proposal for development of food product with justification for its development and budget.</li></ul> <b>ii. Standardization of the product:</b> <ul style="list-style-type: none"><li>• Documentation of ingredients used (Weights and volumes)</li><li>• Method of preparation</li><li>• Variation in ingredients and technique of preparation.</li><li>• Measurement of recipe yield (Serving size, number of portions)</li></ul>	30



II.	<b>B. Evaluation, packaging and marketing of developed product</b> <b>i. Evaluation of the product:</b> <ul style="list-style-type: none"> <li>● Sensory evaluation (Trained and semi-trained panelist)</li> <li>● Calculation of nutritive value (Indian Food Composition tables, USDA Food Database)</li> <li>● Calculating the cost</li> <li>● Shelf-life study of the product</li> </ul> <b>ii. Packaging, labeling and marketing:</b> <ul style="list-style-type: none"> <li>● Identification of suitable packaging material and designing a label (graphic design and content)</li> <li>● Product promotion and marketing (Design marketing material)</li> </ul>	30
	<b>Total Hours</b>	60

**References:**

- Developing New Food Products for a Changing Marketplace. (2007). United States: CRC Press.  
Fuller, G. W. (2016). New Food Product Development: From Concept to Marketplace, Third Edition. United States: CRC Press.  
Jameson K. (1998). Food Science- A Laboratory Manual, New Jersey: Prentice Hall Inc.  
McWilliam, M. (2001). Foods – Experimental Perspectives (4th Ed.), New Jersey: Prentice Hall Inc. Practices, Kluwer Academic/Plenum Publishers.USA: CRC Press Inc.  
Weaver, C. (1996), Food Chemistry Laboratory – A manual for Experimental Foods.

**Evaluation:**

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Development of a new food product in groups (Writing the research proposal for development of new product, standardization, packaging, labeling, marketing and sales)	25
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 Product designing	10
Question 2 Labelling and packaging	10
Question 3 Viva	5
<b>Total</b>	<b>25</b>

M.Sc. (Home Science – Foods, Nutrition and Dietetics)

Level- 6.0  
(Under NEP)

Semester- I

Major (Elective Course)

Course Code	Title of the Course	Th/Pr	Credits
Course 5- Elective 2A	Multidisciplinary Strategies for Health and Disease Management	Theory	2

**Course Objectives:**

1. To help students understand the principles of multidisciplinary strategies in preserving health and combating disease.
2. To build competencies in students to apply the use of multidisciplinary strategies in health preservation and as adjuncts in disease management.

**Course Outcomes (CO)**

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

CO No.	Course Outcomes
CO1	Outline the various multidisciplinary strategies for preserving health and for disease management.
CO2	Understand the various interactions between traditional therapy and alternative strategies.
CO3	Apply the concepts of healing and health preservation by multidisciplinary strategies to individual and community patient care.
CO4	Analyze the application possibilities of alternative strategies to disease management.
CO5	Evaluate and comprehend the short term and long term effects and compliance with respect to alternative strategies as well as to be able to recommend suitable strategies for patient care.
CO6	Design seminars, workshops and education materials to empower practitioners/patients with information on alternative strategies for health and disease and its potential.

Unit No.	Course Content	No. of Hours
I.	<b>A. Principles of Multidisciplinary Strategies to preserve health and combat diseases that have lifestyle based etiologies:</b> i. Mindfulness and Intuitive Eating ii. Yoga iii. Physical Activity Therapy – Dance therapy, Martial Arts, Exercise Therapy iv. Matching Circadian Rhythm v. Ayurveda vi. Hypnotherapy vii. Naturopathy viii. Any Other	15

<b>II.</b>	<b>A. Principles of Multidisciplinary Strategies to preserve emotional and mental well-being and for pain management</b>	<b>15</b>
	<ul style="list-style-type: none"> <li>i. Meditation</li> <li>ii. Energy healing</li> <li>iii. Laughter therapy</li> <li>iv. Acupuncture / acupressure</li> <li>v. Massage Therapy</li> <li>vi. Neuro Linguistic Programming</li> <li>vii. Art Based Therapy</li> <li>viii. Visualisation</li> <li>ix. Journaling and Reflection</li> <li>x. Social support for Well being</li> <li>xi. Any Other</li> </ul>	
	<b>Total Hours</b>	<b>30</b>

**References:**

- Alman, B. M., Lambrou, P. (2013). *Self-Hypnosis: The Complete Manual for Health and Self-Change*, Second Edition. United Kingdom: Taylor & Fran.
- Angelo, J. (2016). *Spiritual Healing: Energy Medicine for Health & Well-being*. United Kingdom: Pavilion Books.
- Art Therapy and Health Care. (2012). United States: Guilford Publications.
- Ayurveda: A Preventive Approach to Lifestyle Diseases. (2023). (n.p.): Book Bazooka Publication.
- Bays, J. C. (2017). *Mindful Eating: A Guide to Rediscovering a Healthy and Joyful Relationship with Food* (Revised Edition). United Kingdom: Shambhala.
- Church, D. (2012). *Soul Medicine: Awakening Your Inner Blueprint for Abundant Health and Energy*. United States: Hay House.
- Circadian Clocks: Role in Health and Disease. (2016). United States: Springer New York.
- Elkins, G. (2016). *Handbook of Medical and Psychological Hypnosis: Foundations, Applications, and Professional Issues*. United States: Springer Publishing Company.
- Henwood, S., Lister, J. (2007). *NLP and Coaching for Health Care Professionals: Developing Expert Practice*. Germany: Wiley.
- Jarmey, C., Hearn, G. (2001). *The Book of Meditation: Practical Ways to Health and Healing*. United States: Journey Editions.
- Khalsa, S. B., Cohen, L., McCall, T., Telles, S. (2016). *Principles and Practice of Yoga in Health Care*. United Kingdom: Jessica Kingsley Publishers.
- Luthra, O. P. (2016). *Healing Without Medicine: Restoring Well-Being with Accupressure*. India: B. Jain Publishers Pvt. Limited.
- Nelson JB. (2017). *Mindful Eating: The Art of Presence While You Eat*. *Diabetes Spectr*. 2017 Aug;30(3):171-174.
- Pittler, M. H., Wider, B. (2007). *Complementary Therapies for Pain Management: An Evidence-based Approach*. United Kingdom: Elsevier/Mosby.cis.
- Sant R. S. (2012). *Meditation as Medication for the Soul*. India: Radiance Publishers.
- Sarris, J., Wardle, J. (2010). *Clinical Naturopathy: An Evidence-based Guide to Practice*. United Kingdom: Elsevier Health Sciences.
- Scott Shannon. (2002). *Complementary and Alternative Strategies for Mental Health*. Elsevier Inc.

Tribole, E., Resch, E. (2020). Intuitive Eating, 4th Edition: A Revolutionary Anti-Diet Approach. United States: St. Martin's Publishing Group.

**Evaluation:**

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Debates/Group Discussions/ Role Plays	5
Development of resources to understand a specified multidisciplinary approach for health maintenance and disease management intended for health practitioners, using appropriate review of disease management / completion of an online or in person short term course conducted by a certified practitioner to gain added knowledge in a specific multidisciplinary strategy (completion certificate to be submitted).	10
Preparation of learning resources (videos or posters or brochures) for nursing or dietetic students	10
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
<b>Total</b>	<b>25</b>

**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Elective Course)**

<b>Course Code</b>	<b>Title of the Course</b>	<b>Th/Pr</b>	<b>Credits</b>
<b>Course 5- Elective 2B</b>	<b>Multidisciplinary Strategies for Health and Disease Management</b>	<b>Practical</b>	<b>2</b>

**Course Objectives:**

1. To help students understand the principles of multidisciplinary strategies in preserving health and combating disease.
2. To equip students with skills to plan and organize information sessions on multidisciplinary strategies for health professionals and the community
3. To empower students with the skills to develop educational resources on multidisciplinary strategies in health preservation and as adjuncts in disease management for healthcare professionals and the community.

**Course Outcomes (CO)**

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

<b>CO No.</b>	<b>Course Outcomes</b>
CO1	Outline the various multidisciplinary strategies for preserving health and for disease management
CO2	Understand the various interactions between traditional therapy and alternative strategies
CO3	Apply the concepts of healing and health preservation by multidisciplinary strategies to individual and community patient care.
CO4	Analyze the application possibilities of alternative strategies to disease management.
CO5	Evaluate and comprehend the short term and long term effects and compliance with respect to alternative strategies as well as to be able to recommend suitable strategies for patient care.
CO6	Design Seminars, workshops and education materials to empower practitioners/patients with information on alternative strategies for health and disease and its potential.

Unit No.	Course Content	No. of Hours
I.	A. Planning and organizing information sessions and developing nutrition education resources with respect to Alternative Strategies to preserve health and combat diseases with lifestyle based etiologies: <ol style="list-style-type: none"> <li>i. Mindfulness and Intuitive Eating</li> <li>ii. Yoga</li> <li>iii. Physical Activity Therapy – Dance therapy, Martial Arts, Exercise Therapy</li> <li>iv. Matching Circadian Rhythm</li> <li>v. Ayurveda</li> <li>vi. Hypnotherapy</li> <li>vii. Naturopathy</li> <li>viii. Any Other</li> </ol>	30
II	B. Planning and organizing information sessions and developing nutrition education resources with respect to Alternative Strategies to preserve emotional and mental well-being and for pain management <ol style="list-style-type: none"> <li>i. Meditation</li> <li>ii. Energy healing</li> <li>iii. Laughter therapy</li> <li>iv. Acupuncture / acupressure</li> <li>v. Massage Therapy</li> <li>vi. Neuro Linguistic Programming</li> <li>vii. Art Based Therapy</li> <li>viii. Visualisation</li> <li>ix. Journaling and Reflection</li> <li>x. Social support for Well being</li> <li>xi. Any Other</li> </ol>	30
<b>Total Hours</b>		<b>60</b>

**References:**

- Alman, B. M., Lambrou, P. (2013). *Self-Hypnosis: The Complete Manual for Health and Self-Change*, Second Edition. United Kingdom: Taylor & Fran.
- Angleo, J. (2016). *Spiritual Healing: Energy Medicine for Health & Well-being*. United Kingdom: Pavilion Books.
- Art Therapy and Health Care*. (2012). United States: Guilford Publications.
- Ayurveda: A Preventive Approach to Lifestyle Diseases*. (2023). (n.p.): Book Bazooka Publication.
- Bays, J. C. (2017). *Mindful Eating: A Guide to Rediscovering a Healthy and Joyful Relationship with Food* (Revised Edition). United Kingdom: Shambhala.
- Church, D. (2012). *Soul Medicine: Awakening Your Inner Blueprint for Abundant Health and Energy*. United States: Hay House.
- Circadian Clocks: Role in Health and Disease*. (2016). United States: Springer New York.
- Elkins, G. (2016). *Handbook of Medical and Psychological Hypnosis: Foundations, Applications, and Professional Issues*. United States: Springer Publishing Company.

- Henwood, S., Lister, J. (2007). NLP and Coaching for Health Care Professionals: Developing Expert Practice. Germany: Wiley.
- Jarmey, C., Hearn, G. (2001). The Book of Meditation: Practical Ways to Health and Healing. United States: Journey Editions.
- Khalsa, S. B., Cohen, L., McCall, T., Telles, S. (2016). Principles and Practice of Yoga in Health Care. United Kingdom: Jessica Kingsley Publishers.
- Luthra, O. P. (2016). Healing Without Medicine: Restoring Well-Being with Accupressure. India: B. Jain Publishers Pvt. Limited.
- Nelson JB. (2017). Mindful Eating: The Art of Presence While You Eat. Diabetes Spectr. 2017 Aug;30(3):171-174.
- Pittler, M. H., Wider, B. (2007). Complementary Therapies for Pain Management: An Evidence-based Approach. United Kingdom: Elsevier/Mosby.cis.
- Sant R. S. (2012). Meditation as Medication for the Soul. India: Radiance Publishers.
- Sarris, J., Wardle, J. (2010). Clinical Naturopathy: An Evidence-based Guide to Practice. United Kingdom: Elsevier Health Sciences.
- Scott Shannon. (2002). Complementary and Alternative Strategies for Mental Health. Elsevier Inc
- Tribole, E., Resch, E. (2020). Intuitive Eating, 4th Edition: A Revolutionary Anti-Diet Approach. United States: St. Martin's Publishing Group.

**Evaluation:**

2 credits

Total marks 50

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Plan and organise an information session for the class and the community on a specific multidisciplinary strategy	10
Create infographs, educational resources as brochures/videos/or other resources for creating community awareness in patients/healthcare workers/community of the benefits of a specific multi-disciplinary approach and presenting one case study.	15
<b>Total</b>	<b>25</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Develop a strategy for multidisciplinary approach for management of the specified health condition.	15
Viva Voce	5
Journal	5
<b>Total</b>	<b>25</b>

**Semester I:**  
**Research Methods in Home Science**



**M.Sc. (Home Science – Foods, Nutrition and Dietetics)**

**Level- 6.0  
(Under NEP)**

**Semester- I**

**Major (Mandatory Course)**

<b>Course Code</b>	<b>Course Name</b>	<b>Th/Pr</b>	<b>Credits</b>
<b>Course 6</b>	<b>Research Methods in Home Science</b>	<b>Theory</b>	<b>4</b>

**Course Objectives:**

1. To build in students appreciation for high quality research in their specialisation and allied areas.
2. To help students master the knowledge and skills needed in conducting specialisation-specific and interdisciplinary research relevant to the multiple disciplines under the umbrella of Home Science.
3. To promote academic, research and professional ethics in students.
4. To introduce students to principles of good scientific writing.

**Course Outcomes:**

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

<b>CO No.</b>	<b>Course Outcomes</b>
CO1	Have heightened appreciation for high quality research in their specialisation and allied areas.
CO2	Identify, differentiate between, evaluate, and select different sampling techniques and research designs for particular research aims.
CO3	Formulate a research proposal on a worthwhile topic in their discipline, as also on interdisciplinary topics.
CO4	Abide with ethical guidelines for research.
CO5	Have the necessary knowledge and skills to contribute to their discipline through conducting primary and original research on socially relevant, green, and high priority topics.

Unit No.	Course Content	No. of Hours
I.	<p><b>A. Introduction and overview</b></p> <p>(i) What is a research?</p> <p>(ii) Importance of research in general, and in each specialisation of Home Science and allied areas; illustration of research in each specialisation of Home Science and allied areas</p> <p>(iii) Steps in the research process</p> <p>(iv) Qualitative versus quantitative research</p> <p>(v) Objectivity and subjectivity in scientific inquiry: Premodernism, modernism, and postmodernism</p> <p><b>B. The beginning steps in the research process</b></p> <p>(i) Identifying broad areas of research in a discipline</p> <p>(ii) Identifying interest areas; using multiple search strategies</p> <p>(iii) Prioritising topics; specifying a topic; feasibility</p> <p>(iv) Review of literature/scholarly argument in support of study</p> <p>(v) Specifying research objectives/hypotheses/questions</p>	15
II	<p><b>A. Variables</b></p> <p>(i) Definition</p> <p>(ii) Characteristics</p> <p>(iii) Types</p> <p>(iv) Levels of measurement</p> <p><b>B. Measurement</b></p> <p>(i) Conceptual definitions and operational definitions</p> <p>(ii) Types of validity and reliability in quantitative research</p> <p><b>C. Data entry in quantitative research</b></p> <p>(i) Codebook and mastersheet</p> <p>(ii) Creating data files and data management</p>	15
III	<p><b>A. Sampling techniques in quantitative research</b></p> <p>(i) Probability and nonprobability sampling methods in current use/examples from current research</p> <p>(ii) Issues with regard to sampling techniques</p> <p><b>B. Research designs in quantitative research</b></p> <p>Distinguishing between the following research designs; and, selecting research designs that are congruent with one's research purpose.</p> <p>(i) Experimental, quasi-experimental, and pre-experimental research designs; correlational research design</p> <p>Inferring causality, internal validity, external validity</p> <p>(ii) Epidemiological research designs (cross-sectional, cohort, &amp; case-control studies); developmental research designs (cross-sectional, longitudinal, sequential research designs; additive, mediator &amp; moderator models; cross-lagged panel analyses); survey and market research designs; meta-analysis</p> <p>(iv) Exploratory, descriptive, and explanatory designs</p> <p>(v) Mixed methods research designs</p>	15

<b>IV</b>	<p><b>A. Qualitative research methods</b></p> <ul style="list-style-type: none"> <li>(i) Ideology/worldview of the qualitative researcher</li> <li>(ii) Research designs in qualitative research</li> <li>(iii) Sampling techniques in qualitative research</li> <li>(iv) Data collection methods in qualitative research</li> <li>(v) Data analytic strategies in qualitative research</li> <li>(vi) Reporting of results in qualitative research</li> </ul> <p><b>B. Scientific writing</b></p> <ul style="list-style-type: none"> <li>(i) Distinguishing scientific writing from popular and literary writing styles</li> <li>(ii) Publication guidelines (APA7); characteristics/principles of scientific writing; examples of good scientific writing</li> <li>(iii) Writing a research proposal/research grant; seeking funding</li> <li>(iv) Reporting statistical findings in text</li> </ul> <p><b>C. Ethics</b></p> <ul style="list-style-type: none"> <li>(i) In academia</li> <li>(ii) In research in general</li> <li>(iii) In research with human participants (Nuremberg Code, Belmont Report, ICMR Guidelines)</li> <li>(iv) In research with animal subjects</li> </ul>	15
	<b>Total Hours</b>	60

**References:**

American Psychological Association. (2019). *Publication manual of the American Psychological Association* (7th ed.). APA.

Bhattacharyya, G.K., & Johnson, R.A. (1977). *Statistical concepts and methods*. John Wiley. (classic)

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage.

Denzin, N. K., & Lincoln, Y. S. (2011). *The Sage handbook of qualitative research*. Sage.

Fraenkel, J. R., & Wallen, N. E. (2006). *How to design and evaluate research in education* (6th ed.). McGraw-Hill.

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Kerlinger, F. N. & Lee, H. B. (2000). *Foundations of behavioral research*. Harcourt.

Leong, F.T.L. & Austin, J. T. (Eds.) (2006). *The psychology research handbook: A guide for graduate students and research assistants* (2nd ed.). Sage.

Rubin, A., & Babbie, E. R. (2011). *Research methods for social work* (7th ed.). Thomson, Brooks/Cole.

**Evaluation:**

4 credits    Total marks 100

<b>Continuous Internal Evaluation:</b>	<b>Marks</b>
Written Short Quizzes	10
Short Exercises	10
Group project to be completed in pairs or threes: Formulating a Research Proposal on a High Priority Topic relevant to each student group's specialisation; students can opt to work on interdisciplinary research project proposals with team members from more than one specialisation of Home Science	30
<b>Total</b>	<b>50</b>

<b>Semester-end Examination</b>	<b>Marks</b>
<b>All questions are compulsory with internal choice.</b>	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from Unit 3	10
Question 4 from Unit 4	10
Question 5 from multiple units	10
<b>Total</b>	<b>50</b>

## Letter Grades and Grade Points

<b>Semester GPA/Programme CGPA Semester/ Programme</b>	<b>% of Marks</b>	<b>Alpha-Sign/ Letter Grade Result</b>
9.00-10.00	90.0-100	O (Outstanding)
8.00-<9.00	80.0-<90.0	A+ (Excellent)
7.00-<8.00	70.0-<80.0	A (Very Good)
6.00-<7.00	60.0-<70	B+ (Good)
5.50-<6.00	55.0-<60.0	B (Above Average)
5.00-<5.50	50.0-<55.0	C (Average)
4.00-<5.00	40.0-<50.0	P (Pass)
Below 4.00	Below 40	F (Fail)
Ab (Absent)		Absent

### Team for Creation of Syllabus

Name	College Name	Sign
Dr. Anuradha J. Bakshi (I/C Principal)	College of Home Science Nirmala Niketan	
Ms. Vibha Hasija Head of Department	College of Home Science Nirmala Niketan	
Ms. Fatima Aziz Kader Assistant Professor	College of Home Science Nirmala Niketan	
Dr. Sheetal Joshi Assistant Professor	College of Home Science Nirmala Niketan	
Dr. Minelly Rodrigues Assistant Professor	College of Home Science Nirmala Niketan	

**Sign of Head of the Institute**

**Sign of Dean**

Name of the Head of the Institute  
**Dr. Anuradha J. Bakshi**  
(I/C Principal)

Name of the Dean

Name of Department  
**Foods, Nutrition and Dietetics**

Name of the Faculty

### Justification for M.Sc. (Home Science – Foods, Nutrition and Dietetics)

1.	Necessity for starting the course:	The M.Sc. programme in Foods, Nutrition and Dietetics has been thoughtfully designed to ensure that all aspects of the National Education Policy (NEP) has been translated into the teaching learning framework. The programme provides detailed and deep knowledge about fundamental concepts of the science of Foods, Nutrition and Dietetics along with provision of advanced concepts of the subject, taking into cognisance the dynamic nature of the field. There is adequate inclusion of recent research applications, translational research concepts, evidence based practices and current and emerging trends in the field. The programme places a strong emphasis on fostering essential skills, inter and multidisciplinary thinking and practices, ability to be suited to the industry for employability and entrepreneurship, intellectual curiosity, scientific attitude, creativity, and a spirit of service. It offers a well-balanced blend of academic knowledge and hands-on application, ensuring students receive thorough disciplinary training while also encouraging a cross-disciplinary approach.
2.	Whether the UGC has recommended the course:	YES
3.	Whether all the courses have commenced from the academic year 2023-2024:	<p>Master's Course (Home Science – Foods, Nutrition and Dietetics) shall commence from the academic year 2023-2024.</p> <p>Semester I and Semester II shall commence from the academic year 2023-2024.</p> <p>Semester III and Semester IV shall commence from the academic year 2024-2025.</p>
4.	The courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available?	<p>The course is NOT Self-Financed.</p> <p>Adequate number of eligible permanent faculties are NOT recruited.</p> <p>Sanctioned Faculty Positions: 8</p> <p>Currently filled faculty positions are '4' and awaiting NOCs for '4' sanctioned post. In the meanwhile visiting faculty are recruited.</p>
5.	To give details regarding the duration of the Course and is it possible to compress the course?:	<p>Two Years Full Time (Four Semesters)</p> <p>It is NOT possible to compress the course.</p>
6.	The intake capacity of each course and no. of admissions given in the current academic year:	<p>Intake Capacity: 10</p> <p>Number of admissions given in the current academic year: 10</p>

<p>7. Opportunities of Employability/ Employment available after undertaking these courses:</p>	<p>Over the past several years, our students have found successful positions in various sectors such as food industry, NGOs, hospitals, and academia. Many have established their own businesses as Food Entrepreneurs and Dietetic and Public Health consultants. Furthermore, a substantial number of students opt to pursue higher education at international universities.</p> <p>This syllabus restructuring in accordance with the goals of NEP 2020 will continue to provide high levels of employment opportunities. The course provides knowledge and skills of advanced concepts in all areas of Foods, Nutrition and Dietetics as well as emphasis on practical skills and applications significantly, both in accordance to industry needs. New trends and multidisciplinary approaches to health management have been included. This will make our students highly employable. Innovation and Entrepreneurship has been included in the programme to provide the students with the mind-set and skills to start their venture in the field.</p>
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*Anuradha*

Sign of Head of the Institute

Sign of Dean

**INCHARGE PRINCIPAL  
COLLEGE OF HOME SCIENCE**

*Nirmala Niketan*

Name of the Head of the Institute

Name of the Dean

**Dr. Anuradha J. Bakshi**  
(I/C Principal)

Name of Department

Name of the Faculty

**Foods, Nutrition and Dietetics**