University of Mumbai

No. AAMS_UGS/ICC/2024-25/30

CIRCULAR:-

All the Principals of the Affiliated Colleges, Directors of the Recognized Institutions and the Head, University Departments is invited to this office Circular No. AAMS_UGS/ICC/2023-24/23 dated 08th September, 2023 relating to the NEP UG & PG Syllabus.

They are hereby informed that the recommendations made by the Ad-hoc Board of Studies in Home Science at its online meeting held on 16th March, 2024 and subsequently passed by the Board of Deans at its meeting held on 18th April, 2024 **vide** item No. 8.19 (N) have been accepted by the Academic Council at its meeting held on 20th April, 2024 **vide** item No. 8.19 (N) and that in accordance therewith to introduce syllabus for **M.Sc. (Home Science – Food Processing and Preservation) Sem – II** and correction in **Sem – I** syllabus as per appendix (NEP 2020) with effect from the academic year 2024-25.

(The said circular is available on the University's website www.mu.ac.in).

MUMBAI – 400 032
02nd August, 2024

(Prof. (Dr.) Baliram Gaikwad)
I/c. REGISTRAR

To,

All the Principals of the Affiliated Colleges, Directors of the Recognized Institutions and the Head University Departments.

A.C/8.19 (N)/20/04/2024

Copy forwarded with Compliments for information to:-

1) The Chairman, Board of Deans,
2) The Dean, Faculty of Science & Technology,
3) The Chairman, **Ad-hoc Board of Studies in Home Science,**
4) The Director, Board of Examinations and Evaluation,
5) The Director, Department of Students Development,
6) The Director, Department of Information & Communication Technology,
7) The Director, Institute of Distance and Open Learning (IDOL Admin), Vidyanagari.

Copy forwarded for information and necessary action to :-	
1	The Deputy Registrar, (Admissions, Enrolment, Eligibility and Migration Dept)(AEM), dr@eligi.mu.ac.in
2	The Deputy Registrar, Result unit, Vidyanagari drresults@exam.mu.ac.in
3	The Deputy Registrar, Marks and Certificate Unit,. Vidyanagari dr.verification@mu.ac.in
4	The Deputy Registrar, Appointment Unit, Vidyanagari dr.appointment@exam.mu.ac.in
5	The Deputy Registrar, CAP Unit, Vidyanagari cap.exam@mu.ac.in
6	The Deputy Registrar, College Affiliations & Development Department (CAD), deputyregistrar.uni@gmail.com
7	The Deputy Registrar, PRO, Fort, (Publication Section), Pro@mu.ac.in
8	The Deputy Registrar, Executive Authorities Section (EA) eau120@fort.mu.ac.in He is requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to the above circular.
9	The Deputy Registrar, Research Administration & Promotion Cell (RAPC), rapc@mu.ac.in
10	The Deputy Registrar, Academic Appointments & Quality Assurance (AAQA) dy.registrar.tau.fort.mu.ac.in ar.tau@fort.mu.ac.in
11	The Deputy Registrar, College Teachers Approval Unit (CTA), concolsection@gmail.com
12	The Deputy Registrars, Finance & Accounts Section, fort draccounts@fort.mu.ac.in
13	The Deputy Registrar, Election Section, Fort drelection@election.mu.ac.in
14	The Assistant Registrar, Administrative Sub-Campus Thane, thanesubcampus@mu.ac.in
15	The Assistant Registrar, School of Engg. & Applied Sciences, Kalyan, ar.seask@mu.ac.in
16	The Assistant Registrar, Ratnagiri Sub-centre, Ratnagiri, ratnagirisubcentar@gmail.com

Copy for information :-	
1	P.A to Hon'ble Vice-Chancellor, vice-chancellor@mu.ac.in
2	P.A to Pro-Vice-Chancellor pvc@fort.mu.ac.in
3	P.A to Registrar, registrar@fort.mu.ac.in
4	P.A to all Deans of all Faculties
5	P.A to Finance & Account Officers, (F & A.O), camu@accounts.mu.ac.in

AC – 20/04/204
Item No. – 8.19

As Per NEP 2020

University of Mumbai

Title of the programme

A-	P.G. Diploma in Home Science – Food Processing and Preservation	**2023- 24**
B-	M.Sc. (Home Science – Food Processing and Preservation) (Two Years)	
C-	M.Sc. (Home Science – Food Processing and Preservation) (One Year)	**2027- 28**

Syllabus for

Semester – Sem I & II

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

University of Mumbai

(As per NEP 2020)

S. No.	Heading	Particulars	
1	**Title of programme** **O: _____A**	**A**	P.G. Diploma in Home Science – Food Processing and Preservation
	O: _____B	**B**	M.Sc. (Home Science – Food Processing and Preservation) (Two Years)
	O: _____C	**C**	M.Sc. (Home Science – Food Processing and Preservation) (One Year)
2	**Eligibility** **O: _____A**	**A**	For being eligible for admission, a learner must have passed: • B.Sc. Home Science with specialization in Foods, Nutrition and Dietetics or its equivalent. OR • B.Sc. with Foods and Nutrition/ Foods, Nutrition and Dietetics/ Food Technology or its equivalent. OR • B.Sc. General/ Composite Home Science OR • B.Sc. Home Science in any other Specialization OR • B.Sc. Microbiology/ Biochemistry/ Life Sciences/ Chemistry/ Biotechnology/ Biological Sciences as a major or part fulfilment. OR • B.Sc. Home Economics OR • B.Sc. Human Ecology OR • B.Sc. Family and Community Sciences OR • B.Sc. /B.A. in Human Sciences OR

			• B.Sc. Nursing or an equivalent Nursing Degree of another recognized University. OR • B.Sc. Pharmacology OR • B.Pt. (Bachelor of Physiotherapy) OR • Medical Graduates in any discipline (MBBS/ BAMS/ BHMS/ BDS) OR • B.Tech Food Technology OR • B.Voc Home Science/ Foods, Nutrition and Dietetics/ Foods and Nutrition/ Food Processing and Technology or its equivalent. OR • B.Sc. Catering and Hotel Management or its equivalent. OR • A graduate degree which includes at least four of the following subjects in the undergraduate programmes- Basic Nutrition, Biochemistry, Physiology, Food Science, Food processing/Food Preservation, Dietetics, Community Nutrition/Public Health Nutrition
	O: _____B	**B**	For being eligible for admission, a learner must have passed: • B.Sc. Home Science with specialization in Foods, Nutrition and Dietetics or its equivalent. OR • B.Sc. with Foods and Nutrition/ Foods, Nutrition and Dietetics/ Food Technology or its equivalent. OR • B.Sc. General/ Composite Home Science OR • B.Sc. Home Science in any other Specialization OR

			• B.Sc. Microbiology/ Biochemistry/ Life Sciences/ Chemistry/ Biotechnology/ Biological Sciences as a major or part fulfilment. OR • B.Sc. Home Economics OR • B.Sc. Human Ecology OR • B.Sc. Family and Community Sciences OR • B.Sc. /B.A. in Human Sciences OR • B.Sc. Nursing or an equivalent Nursing Degree of another recognized University. OR • B.Sc. Pharmacology OR • B.Pt. (Bachelor of Physiotherapy) OR • Medical Graduates in any discipline (MBBS/ BAMS/ BHMS/ BDS) OR • B.Tech Food Technology OR • B.Voc Home Science/ Foods, Nutrition and Dietetics/ Foods and Nutrition/ Food Processing and Technology or its equivalent. OR • B.Sc. Catering and Hotel Management or its equivalent. OR • A graduate degree which includes at least four of the following subjects in the undergraduate programmes- Basic Nutrition, Biochemistry, Physiology, Food Science, Food processing/Food Preservation, Dietetics, Community Nutrition/Public Health Nutrition
	O: _____C	**C**	Graduate with 4-year U.G. Degree (Honours/ Honours with Research) with Specialization in the concerned subject or equivalent academic level 6.0 **OR** A graduate with four years UG Degree programme with maximum credits required for the award of Minor degree can take up the Postgraduate programme in Minor subject provided the student has acquired the required number of credits as prescribed by the concerned Board of Studies.

3	**Duration of programme** **R: _____**	**A**	1 Year
		B	2 Years
		C	1 Year
4	**R: _____ Intake Capacity**	20	
5	**R: _____Scheme of Examination**	NEP 50% Internal 50% External, Semester End Examination Individual Passing in Internal and External Examination	
6	**Standards of Passing** **R: _____**	40%	
7	**Credit Structure** **R: _____**	Attached herewith	
8	**Semesters**	**A**	Sem. I & II
		B	Sem. I, II, III & IV
		C	Sem. I & II
9	**Programme Academic Level**	**A**	6.0
		B	6.5
		C	6.5
10	**Pattern**	Semester	
11	**Status**	New	
12	**To be implemented from the Academic Year Progressively**	A	2023 - 2024
		B	
		C	2027 - 2028

Preamble

1) Introduction

The College of Home Science Nirmala Niketan had instituted a M.Sc. programme in Foods and Nutrition in the year 1972, which was later amended to M.Sc. in Foods, Nutrition and Dietetics – a programme that covered the diverse areas of Foods, Nutrition and Dietetics. This highly successful programme has produced many acclaimed nutritionists in the field who have been gainfully employed in the various streams of the foods, nutrition and dietetics industries.

The field of nutrition is an extremely dynamic one and has evolved greatly in the last many decades. Advancement has been especially in the area of food processing and preservation as the food industry exponentially increased its products and its consumer reach. Thus, there arose a need to look at a new specialization which could produce nutritionists specially trained in this

niche area. With this purpose the M.Sc. programme in Food Processing and Preservation was started in the year 2010.

The M.Sc. programme in Food Processing and Preservation has been restructured with the guidelines and the goals of the National Education Policy 2020. This programme in Food Processing and Preservation provides an in-depth knowledge of both theoretical and practical components across the diverse areas of the subject. The coursework includes advanced concepts of core subjects required in designing food products for individuals at different stages of the life cycle. These core subjects include human nutrition, nutritional biochemistry and nutrition across the lifecycle. The programme enables advanced knowledge and skill development in the specialised areas of food processing and preservation such as food chemistry, food science, food processing and quality control, food preservation, packaging and food informatics, and food engineering with inputs on ethical and sustainable food production.

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, food science and quality control using latest research and trends with emphasis on the use of technology and innovative ideas. In the current times of evolution of though with respect to sustainable practices, this syllabus draws the students' attention to the UN Sustainable Development Goals (SDGs) related to health. Electives have been offered on ethics and sustainability in the food processing industry to ensure that future professionals qualified in the areas of food processing and quality control hold these values as a priority.

Focus has been given to areas of innovation, entrepreneurship and sustainability in the food health. Through this programme the student will get multiple opportunities to create and innovate with regards to food product development with inputs in Intellectual Property Rights (IPR) which they can continue ahead into their professional career.

The strong emphasis on research methods, descriptive and advanced statistics and research project strengthens the students' scientific temper and builds research expertise and applications. The courses in research methods and statistics will help the students to understand the techniques and methodologies used across the diverse branches of study in the field of Food Processing and Preservation.

Sign of Head of the Institute

Name of the Head of the Institute with Designation
Prof. Dr. Vishaka Ashish Karnad
I/C Principal &
Chairperson Board of Studies
Home Science

Sign of Dean

Name of the Dean

Name of the Faculty

Name of Department
Foods, Nutrition and Dietetics

The M.Sc. in Food Processing and Preservation 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 able to provide specialized expertise in the field to ensure that safe and healthy food products reach the market, thus being a significant contributor to the health and wellness of individuals, communities and the nation and participating in the creation of sustainable health.

2) Aims and Objectives

a. To prepare students to create a strong understanding of fundamental, advanced and applied concepts in the field of food processing and preservation.
b. To equip students with knowledge, skills and research competencies for practical applications into the areas of food science and processing, and food quality and its control.
c. To develop in students the ability to think critically, conduct innovative research projects in relation to food product development, processing, preservation and quality control, embrace new technologies, blend creativity with health and sustainable development goals to bring outcomes for improved individual and community well-being.
d. To foster an entrepreneurial mindset in students in the food processing and preservation course, enabling them to identify and seize opportunities within the industry, develop innovative food products, and create sustainable ventures in the field.
e. 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.
f. To develop skilled professionals who recognize the rapid rate of research and technological advancement in the food industry, possess the skills to adapt to new trends, and work with a perspective to contribute to both national and global health improvement.

3) Programme Outcomes

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

Programme Outcome (PO)	Definition	Graduate Attribute
	To be able to…	
PO1	Demonstrate an in-depth knowledge and understanding of core fundamentals of concepts of food preservation, food processing and its production. This will enable them to professionally practice in the industry of food preservation and processing competently.	Disciplinary Knowledge

PO2	Effectively develop holistic nutritious and sustainable food products, and to explain complex nutritional concepts in simple and understandable terms by both orally and in written communication to fellow professionals as well as the community.	Communication Skills
PO3	Design innovative food products for health, using sustainable methods, efficient processing methods along with its analysis to better community health will be addressed.	Critical Thinking
PO4	Creatively construct dietary, nutritional and lifestyle based products which help 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 Entrepreneurial Skills
PO5	Competently evaluate both traditional and newer food processing practices in relation to research-based products and draw applicable conclusions, using a scientific and an open mind with the vision of bettering food preservation and processing.	Analytical and Scientific Reasoning
PO6	Proficiently explore the cause-and-effect relationships of lifestyles on health and through a research-based temper and statistical analysis, draw adequate conclusions for applications of research in the food preservation and processing industry and community either as an employee or entrepreneur.	Research related skills
PO7	Successfully work in teams; and cooperate and derive significant and valuable conclusions for consumers of processed food through an interdisciplinary and collaborative efforts in the food preservation industry, community, research and organizational set-ups.	Cooperation /Team work
PO8	Translate research, recent innovations and personal and professional experiences into applications to benefit food processing and packaging industry, community health; and entrepreneurial ventures with self-awareness and contemplation.	Reflective Thinking

PO9	Use technology for food preservation and processing its communication, consumer information, hospital administration, nutrition education as well as be aware of using digitation for entrepreneurial ventures.	Information/digital literacy
PO10	Work independently or in groups, identify appropriate resources for a project and manage a project to its fruitful completion.	Self – Directed Learning
PO11	Be adept with use of 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.	Multi-cultural competence
PO12	Practice safe principles of food preservation, processing, and community health in the most sustainable and effective manner, placing consumer, patient, community and fraternity well-being at the centre of all operations and to refrain from unethical behaviour at workplace, the community and research.	Moral and Ethical awareness and reasoning
PO 13	To ensure that all aspects of the Intellectual Property Rights (IPR) are adhered to in the interest of the community.	Moral and Ethical values
PO14	Take on leadership positions in food product development its formulation its packaging and sharing an inspiring vision and the eagerness to bring productive and sustainable positive results for the professional group, the community and the food processing and packaging industry using organizational, entrepreneurial and managerial skills.	Leadership readiness/qualities
PO15	Continue lifelong training 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. P.G. Diploma in Home Science – Food Processing and Preservation

B. M.Sc. (Home Science – Food Processing and Preservation) (Two Years)

Parishishta – 1

Year (2 Yr PG)	Level	Sem. (2 Yr)	Major		RM	OJT/ FP	RP	Cum. Cr.	Degree
			Mandatory*	Electives (Any one)					
I	6.0	Sem-I	**FPP01C1** Advances in Food Science and Food Chemistry Theory (4 Cr) **FPP01C2A** Advanced Food Microbiology Theory (2 Cr) **FPP01C2B** Advanced Food Science Practical (2 Cr) **FPP01C3** Principles of Food Preservation Theory (4 Cr) **FPP01C4** Descriptive Statistics in Home Science Theory (2 Cr)	**FPP01C5E1A** Traditional Indian Foods Theory (2 Cr) **FPP01C5E1BP** Food Product Development using Indigenous Foods Practical (2 Cr) **OR** **FPP01C5E2A** Sustainability in Food Production Theory (2 Cr) **FPP01C5E2BP** Valorization of Food Waste through Food Product Development Practical (2 Cr)	**FPP01C6** Research Methods in Home Science Theory (4 Cr)	-	-	22	**PG Diploma (after 3 Year Degree)**
Sem – I (For PG Diploma/ M.Sc. Year I)			**14**	**4**	**4**	**-**	**-**	**22**	

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

A MOOC course on SWAYAM, NPTEL and 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. P.G. Diploma in Home Science – Food Processing and Preservation

B. M.Sc. (Home Science – Food Processing and Preservation) (Two Years)

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)**					
I	**6.0**	**Sem-II**	**FPP02C1** Nutrition Across Lifespan Theory (4 Cr) **FPP02C2A** Fundamentals of Food Processing Technology Theory (2 Cr) **FPP02C2BP** Fundamentals of Food Analysis and Microbiology Practical (2 Cr) **FPP02C3** Food Safety and Quality Assurance Theory (4 Cr) **FPP02C4** Advanced Statistics in Home Science Theory (2 Cr)	**FPP02C5E1A** Management of Micro Food Enterprise Theory (2 Cr) **FPP02C5E1BP** Management of Micro Food Enterprise Practical (2 Cr) **OR** **FPP02C5E2A** Nutrition and Food Safety Education Theory (2 Cr) **FPP02C5E2BP** Food Safety Education and Consumer Awareness Practical (2 Cr)	-	**FPP02C6** On Job Training/ Field Project in Food Processing & Preservation Practical (4 Cr)	-	22	**PG Diploma (after 3 Year Degree)**
Sem – II (For PG Diploma/ M.Sc. Year I)			**14**	**4**	**-**	**4**	**-**	**22**	
Cum. Cr. For PG Diploma			**28**	**8**	**4**	**4**	**-**	**44**	

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

A MOOC course on SWAYAM, NPTEL and 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:

A. M.Sc. (Home Science – Food Processing and Preservation) (Two Years)

B. M.Sc. (Home Science – Food Processing and Preservation) (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)**					
II	**6.5**	**Sem-III**	**FPP03C1** Nutrition and Biochemistry Theory (4 Cr) **FPP03C2A** Advances in Food Processing Technology Theory (2 Cr) **FPP03C2BP** Advances in Food Analysis and Microbiology Practical (2 Cr) **FPP03C3** Advanced Study of Food Safety and Quality Assurance Theory (4 Cr) **FPP03C4** Entrepreneurship and Innovation Theory (2 Cr)	**FPP03C5E1A** Therapeutic Foods for Health and Disease Theory (2 Cr) **FPP03C5E1BP** Therapeutic Food Product Development and Shelf-life Studies Practical (2 Cr) **OR** **FPP03C5E2A** Food Auditing Theory (2 Cr) **FPP03C5E2BP** Food Auditing Practical (2 Cr)	-	-	**FPP03C6** Research Project (4 Cr)	22	**PG Degree (after 3 Year UG)**
Sem – III (For M.Sc Degree)			**14**	**4**	**-**	**-**	**4**	**22**	

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

A MOOC course on SWAYAM, NPTEL and 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 – Food Processing and Preservation) (Two Years)

C. M.Sc. (Home Science – Food Processing and Preservation) (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)**					
II	**6.5**	**Sem-IV**	**FPP04C1** Advances in Human Nutrition Theory (4 Cr) **FPP04C2** Food Biotechnology Theory (4 Cr) **FPP04C3A** Food Packaging Technology Theory (2 Cr) **FPP04C3BP** Case Study Applications of Food Engineering in the Food Industry Practical (2 Cr)	**FPP04C4E1A** Digital Technologies, Artificial Intelligence and Robotics in Food Processing Theory (2 Cr) **FPP04C4E1BP** Food Psychology and Consumer Behaviour Practical (2 Cr) **OR** **FPP04C4E2A** Niche Markets in Food Production Theory (2 Cr) **FPP04C4E2BP** Niche Food Product Development Practical (2 Cr)	-	-	**FPP04C5** Research Project (6 Cr)	22	**PG Degree (after 3 Year UG)**
Sem – IV (For M.Sc Degree)			**12**	**4**	**-**	**-**	**6**	**22**	
Cum. Cr. (For M.Sc. Degree)			**26**	**8**	**-**	**-**	**10**	**44**	

Note: Curriculum will be enriched by extension work and educational trips for experiential learning with supplemental credits.
A MOOC course on SWAYAM, NPTEL and Coursera can be completed with supplemental credits.
Students can do a summer internship/ project (4 weeks) during the summer vacation with supplemental credits (Optional).

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

Name of the Head of the Institute with Designation
Prof. Dr. Vishaka Ashish Karnad
I/C Principal &
Chairperson Board of Studies
Home Science

Name of Department
Foods, Nutrition and Dietetics

Sign of Dean

Name of the Dean

Name of the Faculty

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

Semester I **Level 6.0** **Cumulative Credits: 22**

Mandatory Course (Credits)

COURSE CODE	COURSE NO.	CREDITS	COURSE TITLE	THEORY/ PRACTICAL
FPP01C1	Course 1	4	Advances in Food Science and Food Chemistry	Theory
FPP01C2A	Course 2 A	2	Advanced Food Microbiology	Theory
FPP01C2BP	Course 2 B	2	Advanced Food Science	Practical
FPP01C3	Course 3	4	Principles of Food Preservation	Theory
FPP01C4	Course 4	2	Descriptive statistics in Home Science	Theory
FPP01C5E1A & FPP01C5E1BP OR FPP01C5E2A & FPP01C5E2BP	Course 5 (Elective)	2	Traditional Indian Foods	Theory
		2	Food Product Development using Indigenous Foods	Practical
		2	Sustainability in Food Production	Theory
		2	Valorization of Food Waste through Food Product Development	Practical
FPP01C6	Course 6	4	Research Methods in Home Science	Theory

Syllabus: M.Sc. (Home Science – Food Processing and Preservation)

Semester II **Level 6.0** **Cumulative Credits: 22**

Mandatory Course (Credits)

Course Code	Course No.	Credits	Course Title	Theory/ Practical
FPP02C1	Course 1	4	Nutrition Across Lifespan	Theory
FPP02C2A	Course 2 A	2	Fundamentals of Food Processing Technology	Theory
FPP02C2BP	Course 2 B	2	Fundamentals of Food Analysis and Microbiology	Practical
FPP02C3	Course 3	4	Food Safety and Quality Assurance	Theory
FPP02C4	Course 4	2	Advanced Statistics in Home Science	Theory
FPP02C5E1A	Course 5 (Elective)	2	Management of Micro Food Enterprise	Theory
&		2	Management of Micro Food Enterprise	Practical
FPP02C5E1BP				
OR				
FPP02C5E2A		2	Nutrition and Food Safety Education	Theory
&		2	Food Safety Education and Consumer Awareness	Practical
FPP02C5E2BP				
FPP02C6	Course 6		On the Job Training in Food Processing and Preservation	Practical

Syllabus:

P.G. Diploma in Home Science – Food Processing and Preservation

M.Sc. (Home Science – Food Processing and Preservation)

(Semester I)

Semester I

Semester I: Mandatory Courses

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- I **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C1	**Advances in Food Science and Food Chemistry**	**Theory**	**4**

Course Objectives:

1. To provide students with an understanding of the chemistry of food components, the chemical and biochemical reactions in foods.
2. To impart systematic knowledge of basic and applied aspects of food chemistry to students.
3. To enable the students to learn fundamental and recent advances in food science.
4. To develop the students' understanding of industrial applications of concepts of food science in food product development.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Understand the chemistry of nutrients and additives found and used in various food groups.
CO2	Explain the functional role of nutrients and additives in influencing the properties of food.
CO3	Apply fundamentals of food chemistry in obtaining desired effect in a food product.
CO4	Analyze the effect of processing on properties of macro and micro nutrients.
CO5	Justify the use of cooking and processing techniques to enhance the organoleptic properties and shelf-life of foods.
CO6	Formulate strategies to prevent loss of nutrient values during processing.

Unit No.	Course Content	No. of Hours
I.	**Introduction to Major Chemical Components in Food Groups** **A. Water** (i) Chemistry of water (ii) Water in food preparation and preservation, practical applications in industry **B. Carbohydrates** (i) Classification, isomerization, ring structures (ii) Properties of sugars- Hydrolysis, Caramelization, Maillard reaction (iii) Starch: Structure, functional properties - Gelatinization, pasting, syneresis, retrogradation, dextrinization, factors affecting gelatinization and gelation (iv) Overview of gums, pectic substances, pectin gels **C. Proteins** (i) Classification of proteins	**15**

	(ii) Properties of proteins (amphoterism, isoelectric point, water-binding capacity, hydrolysis, denaturation, coagulation, salting in, salting out, gluten complex development, gelation, texturization) (iii) Enzymes: Overview of exogenous enzymes (amylases, lipases, proteases) and endogenous enzymes (phenol oxidases, peroxidases, oxido-reductases, lipoxygenases), factors affecting enzyme activity **D. Lipids** (i) Brief classification and composition of fats, fatty acids (ii) Properties of Fats: crystalline nature of solid fats, polymorphism, melting points, plasticity, chemical degradation, oxidative and hydrolytic rancidity, effect of heat, chemical modifications (iii) Hydrogenation, Inter-esterification, Winterization	
II.	**Chemistry of Food Groups: Plant-Based** **A. Cereals** (i) Composition and nutritional value (ii) Flours, cooking cereals, breakfast cereals, (iii) Classes of batters and doughs (iv) Leavening process in baked products **B. Fruits and Vegetables** (i) Composition and nutritional value (ii) Physiochemical changes during, harvesting, post-harvesting, ripening, cooking, storage (iii) Organically grown fruits and vegetables (iv) Effect of processing on nutritive value **C. Pulses** (i) Composition and nutritional value (ii) Anti-nutritional factors in pulses (iii) Texturized vegetable proteins, soy isolates, beverages	**15**
III.	**Chemistry of Food Groups: Animal-Based** **A. Milk and Milk Products** (i) Composition and nutritional value (ii) Milk components as food ingredients (Lipid phase, protein micelles, milk salt system, whey proteins, lactose) (iii) Use of milk in formulated foods **B. Meat, fish, and Poultry** (i) Composition and nutritional value (ii) Rigor Mortis, Ageing, Tenderization (iii) Natural and induced post-mortem biochemical changes (cold shortening, thaw rigor, electrical stimulation) (iv) Fish – composition, spoilage (v) Eggs- structure and composition, cooking changes, effect of added ingredients on coagulation	**15**
IV.	**Introduction to Minor Chemical Components in Food Groups:** **A. Vitamins** Fat soluble (vitamin A, D, E and K) and water soluble (vitamins of B-complex and vitamin C)- effect of food processing, losses and stability **B. Minerals** Effect of food processing, losses and stability (ii) Overview of sodium and potassium replacers/substitutes **C. Flavours** (i) Molecular mechanism of flavor perception (sweet, bitter, salty, sour, umami, kokumi, pungent, cooling and astringent) (ii) Flavours from vegetables, fruits, spices, fats and oils, milk and meat products **D. Pigments** Overview of pigments in Animal and Plant tissues (Haeme compounds, Chlorophyll, Carotenoids, Anthocyanins, Betalins) **E. Additives** Overview and examples of: Buffer systems and salts, chelating agents, Antioxidants, Antimicrobials, Fat replacers, sweeteners, Masticatory substances, Firming texturizers,	**15**

	Clarifying agents, bleaching agents, Flour improvers, anti-caking agents, Gases and propellants	
	Total hours	**60**

References:

Vacklavick, V. and Christian, E. (2003). *Essentials of Food Science.New York*: Kluwer Academic/ Plenu Publisher.

Rick Parker (2003). *Introduction to Food Science*, New York: Delmar Thomson Learning

Srilakshmi, B (2018). *Food Science* (7th ed). New Delhi: New Age International Publishers

McWilliams, M (2007). *Foods:Experimental Perspectives* (5th ed)., New Jersey: Macmillar Publishing Co.

Scottsmith and Hui Y.H (Editiors) (2004) *Food Processing – Principles and Applications* London Blackwell.

Srilakshmi, B (2021). *Nutrition Science* (7th ed). New Delhi: New Age International Publishers

** All new journals related to Food Science**

Evaluation:

4 Credits 100 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Development of digital content on relevant topic (PowerPoint, infograph/ animation video)	30
Class participation, Class test/ Quiz	10
Group Discussion/ Debate	10
Total	**50**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
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
Total	**50**

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Semester- I **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C2A	**Advanced Food Microbiology**	**Theory**	**2**

Course Objectives:

1. To develop, in students, an advanced understanding of physiological processes of microorganisms associated with the food continuum.
2. To equip students with skills to identify organisms identified as leading causes of foodborne disease.
3. To facilitate in the students, the competencies of implementing food safety and quality norms in food processing units and create awareness in communities of the same.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Familiarize with the microorganisms relevant in food systems– microorganisms used in food processing.
CO2	Explain the classification of microorganisms and the factors that affect growth and activity of microorganisms in food.
CO3	Evaluate the difference between food intoxication and food infections and their relevance in outbreaks of food illnesses.
CO4	Review and analyse the conventional and modern techniques used for identification of microorganisms in food.
CO5	Justify the necessity for implementing food safety and quality control norms in food processing units to prevent microbial hazards.
CO6	Create a knowledge-base for awareness on spread and control of foodborne pathogens amongst stakeholders.

Unit No.	Course Content	No. of Hours
I.	**A. Review of Food Microbiology** (i) Microbial flora in common food groups (cereals, pulses, milk and milk products, meat, poultry, fish, eggs, vegetables, fruits, sugars and fats) (ii) Factors affecting microbial growth and control in foods: intrinsic factors, extrinsic factors, implicit factors **C. Foodborne Illnesses** (i) Produce as a source of foodborne disease (ii) Mechanisms of microbial survival in the food chain (iii) Epidemiology and etiology of food-borne disease (infections and intoxications)	**15**

II.	**A. Microbial Food Safety and Quality Control** (i) Food microbiology/safety history, disease, trends and emerging pathogens (ii) New and emerging technologies for the reduction of pathogenic and spoilage organisms in food (iii) Food production plant sanitation and hygiene practices for microbial control (iv) Conventional and rapid methods of food analysis -Limitations of classical methods -Rapid Microbiological Methods (RMM): manual, semi-automated and automated - Genetics-based diagnostic and identification systems (gene probes and PCR)- Predictive microbiology models and microbial risk assessment	**15**
	Total hours	**30**

References:

Frazier, W.C., and D.C. Westhoff. (2017). *Food Microbiology* (5th ed). McGraw-Hill, Inc., New York.

Jay, James M.; Loessner, Martin J.; Golden, David A. (2005). *Modern Food Microbiology* (7th ed). Springer.

Motarjemi Y; Adams, Martin. *Emerging Foodborne Pathogens* (2006). Woodhead Publishing.

Lund, B. M.; Baird-Parker, T. C.; Gould, G. W. *Microbiological Safety and Quality of Food*, Volumes 1-2. Springer - Verlag.

Blackburn, C.W.; McClure, P.J. (2002). *Foodborne Pathogens - Hazards, Risk Analysis and Control*. Woodhead Publishing.

Adams, M.R. and Moss, M.O. (2005) *Food Microbiology* (1st ed). New Age International (P) Limited, Publishers, New Delhi.

Banwant G,J, (2002) *Basic Food Microbiology* (2nd ed). Chapman and Hall Inc., New York.

Journals: Applied and Environmental Microbiology; Comprehensive Reviews in Food Science and Food Safety; International Journal of Food Microbiology; Food Control; Food Microbiology; Journal of Applied Microbiology; Journal of Food Protection; Journal of Food Science.

Evaluation:

2 Credits 50 Marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
PowerPoint, oral and written presentation of literature review with class discussion	10
Demonstration of awareness on foodborne illness among students/ professionals/ community through group street play	10
Class Test	5
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from both units	5
Total	**25**

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Semester- I **Major (Mandatory Course)**

Course Code	Title of the Course	Th/Pr	Credits
FPP01C2BP	**Advanced Food Science**	**Practical**	**2**

Course Objectives:

1. To enable students to understand principles of food science involved in bringing changes in foods.
2. To equip students with skills to observe and identify physical and chemical changes underlying the preparation of diverse foods and to create products applying principles of Food Science.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Recall the basics of food science and chemical interactions occurring in foods.
CO2	Describe the functional and nutritional role of each ingredient during recipe development.
CO3	Apply the principles of food chemistry and food science in recipe development.
CO4	Analyze the effect of physical and chemical parameters on the properties of cooked products.
CO5	Critique the theories of food science on studying the visual and textural attributes of cooked products.
CO6	Design experimental strategies to demonstrate the application of scientific principles in various processed foods.

Unit No.	Course Content	No. of Hours
I.	**A. Solutions and Ice Crystallisation** Effect of formulation and procedure on crystal size of frozen desserts **B. Cereals and Flours** (i) Comparison of different cereals for water absorption and consistency, comparison of-different methods of cooking rice among different varieties of rice (ii) Gelatinization of Starch (different types), starches as thickening agents (potato, corn and other) **C. Sugar Cookery** (i) Stages of sugar cookery (ii) Crystalline and non-crystalline candies **D. Temporary and Permanent Emulsions** Effect of Stabilizers and Emulsifiers in salad dressings, comparisons of low fat and high fat French dressing, preparation and comparison of Mayonnaise with variations (with and without egg) **E. Effect of Different Conditions on Properties of Proteins e.g. Milk** (i) Effect of acids (citric acid, lactic acid and acetic acid) on coagulation of milk proteins	**30**

	(ii) Effect of fat content, pH stabilizers in cream and whipped toppings (iii) Effect of gums on gelation (iv) Difference between natural and processed cheese	
II.	**A. Principles that Maintain High Quality Fried Foods** (i) Smoke point of different fats and oils (ii) Factors affecting fat absorption: temperature, formulation on fat absorption, coating and binding agents (iii) Comparison of texture, flavor and mouth-feel of food products using fat substitutes **B. Examination of properties of egg/meat** (i) Denaturation and Coagulation of egg (ii) Egg white foams- volume and stability (iii) Effect of acid and alkalis on meat/poultry **C. Factors Affecting Gelatin Gel** Temperature of liquid, proteolytic enzymes, whipping **D. Factors Affecting Vegetable Pigments** Temperature, Acid, Alkalis **E. Pectin Gel** Determination of pectin content, development of a fruit jam using natural and commercial pectin	**30**
	Total hours	**60**

References:

Manay, N.S. and Shadaksharaswamy, M. (2021). *Food Facts and Principles* (5th ed) New Age International Publishers. New Delhi.

Jameson K. (1998). *Food Science – A Laboratory Manual*, New Jersey:Prentice Hall Inc.

Lawless, H. and Heymann, H. (1998). *Sensory Evaluation of Food – Principles and Practices*, Kluwer Academic/Plemer Publishers. USA: CRC Press Inc.

McWilliam, M. (2001). *Foods – Experimental Perspectives* (4th ed.). New Jersey: Prentice Hall Inc.

Weaver, C. (1996). *Food Chemistry Laboratory – A manual for Experimental Foods*.

Damodaran S., Parkin KL. and Fennema O.R. *Fennema's Food Chemistry* (4th ed). Florida: CRC Press.

Evaluation:

2 Credit 50 Marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Class participation, Journal	5
Drafting of recipe protocol	10
Execution and presentation	10
Total	**25**

SEMESTER-END EXAMINATION (50%):	**Marks**
Planning and execution of recipe as per given topic and viva voce	25
Total	**25**

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Semester- I **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C3	**Principles of Food Preservation**	**Theory**	**4**

Course Objectives:

To help, guide and support students to:

1. Understand the principles of food preservation.
2. Learn important methods used in food preservation to ensure food quality.
3. Study and analyse the emerging techniques employed by food industry and design methodologies for preservation.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Describe the techniques used in extending the shelf life of foods.
CO2	Understand the principles of food preservation.
CO3	Apply the knowledge of principles of food preservation to select appropriate food processing techniques techniques.
CO4	Analyse the advantages and limitations of various methods used for food preservation.
CO5	Evaluate the various techniques used and judge their suitability for preservation of food commodities.
CO6	Design methodologies for shelf life extension of food.

Unit No.	Course Content	No. of Hours
I.	**A. Principles of Food Preservation** (i) Meaning, mode of action and changes in foods **B. Use of High temperature (Heat preservation)** (i) Moist heat methods (ii)Dry heat methods (iii) Blanching (iv) Dehydration (v) Concentration (vi) Canning and retorting (vii) Commercial sterilization (viii) Pasteurization **C. Use of Low Temperatures** (i) Cold Preservation: Freezing and Refrigeration- Air freezing (ii) Indirect contact freezing	**15**

	(iii) Immersion freezing (iv) Dehydro-freezing (v) Cryo-freezing (vi) Changes in foods during refrigeration and frozen storage	
II.	**A. Use of dehydration and Concentration** (i) Benefits and factors affecting heat and mass transfer (ii) Physical and chemical changes during dehydration and concentration (iii) Methods and techniques used in dehydration (Air convection, drum driers and vacuum driers, freeze driers) (iv) Use of various evaporators for concentration of foods **B. Use of Fermentation** (i) Benefits and mechanisms of fermentation (ii) Fermented food products- Beer, Wine, Soya sauce, Cheese, Soya bean products (iii) Microbial vs Industrial Fermentation	**15**
III.	**A. Use of Food Additives** (i) Broad classes (ii) Intentional and unintentional food additives **B. Use of Ionizing radiation and microwave heating** (i) Ionizing radiations and sources (ii) Units of radiation (iii) Radiation effects (iv) Mechanism of microwave heating (v) Application of radiation and microwave technology **C. Preservation by High Osmotic Pressure**	**15**
IV.	**A. Traditional Methods of Food Preservation** (i) Smoking (ii) Sun drying (iii) Pickling/ Salting (iv) Fermentation **B. Recent advances in food preservation** (i) Pulse electric field (ii) Hurdle technology (iii) Infra-red heating (iv) High Pressure Processing (v) Use of Natural compounds (antioxidants, antimicrobials)	**15**
	Total hours	**60**

References:

Manay, N. S. and Sharaswamy, S. M. (2008). Foods: Facts and Principles New Delhi: New Age International Publishers.

McWilliams, M (2017). Foods: Experimental Perspectives 8th Ed, New Jersey: Macmillar Publishing Co.

Potter, N. N. and Hutchkiss, J. H. (2012). Food Science, 5th Ed, New Delhi: CBS Publishers and Distributors.

Subbulakshmi, G and Udipi, S. A. (2006). Foods Processing and Preservation, New Delhi: New Age International (P) Ltd. Publishing.

Vacklavick, V. and Christian, E. (2020). Essentials of Food Science. New York: Kluwer Academic/ Plenum Publisher.

Research articles from journals related to Food Preservation.

Evaluation:

4 Credits 100 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Literature review on emerging technologies in Food preservation	20
Group discussion/ debate	15
Class participation, Class Test	15
Total	**50**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
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
Total	**50**

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Semester- I **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C4	**Descriptive Statistics in Home Science**	**Theory**	**2**

Course Objectives:

1. To enable students to 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:

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

CO No.	Course Outcome
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	Acquire necessary knowledge and skills to design and conduct descriptive research studies.
CO5	Use SPSS for data entry, data management, and descriptive statistics effectively.

Unit No.	Course Content	No. of Hours
I.	**A. Introduction and overview to statistics** (i) Role of statistics in (quantitative) research (ii) Definition/changing conceptions (iii) Prerequisite concepts in mathematics (e.g., basic algebra, properties of the summation sign) **B. Descriptive Statistics for summarizing ratio level variables** (i) Frequencies and percentages (ii) Computing an average/measure of a central tendency Mean, median, mode(s) Contrasting the mean vs. median Computing an average when there are outliers or extreme values in the data set Robust measures of the center (5% trimmed mean; M estimators) Quartiles and percentiles (iii) Computing a measure of variability or dispersion Why? (inadequacy of the mean) Minimum value and maximum value Range Interquartile range Variance and standard deviation (iv) Discrete and continuous variables (v) Histograms and line graphs	**15**

II	**A. Descriptive Statistics for summarizing nominal, ordinal and interval level variables** **B. Using specialised software such as SPSS** (i) Data Entry (ii) Data Management (iii) Descriptive Statistics **C. Probability** (i) Definition (ii) Role of probability in research and statistics (iii) Elementary concepts in probability Sample space, experiment, event/outcome/element of the sample space Equally likely outcomes and the uniform probability model Stabilization of the relative frequency	**15**
	Total hours	**30**

References:

Bhattacharyya, G.K., and 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., and Bhattacharyya, G. K. (2019). *Statistics: Principles and methods* (8th ed.). John Wiley.

Martin, W. E., and Bridgmon, K. D. (2012). *Quantitative and statistical research methods*. Jossey-Bass.

Kachigan, S. K. (1986). *Statistical analysis: An interdisciplinary introduction to univariate and multivariate methods*. Radius Pr

Kerlinger, F. N. and 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 50 marks

CONTINUOUS INTERNAL EVALUATION:	**Marks**
Class participation, Written Short Quizzes	10
SPSS data entry and descriptive statistical analysis assignment	5
Problem-solving Exercises (in pairs or individually) and Practice Sums (individually)	10
Total	**25**
SEMESTER-END EXAMINATION	**Marks**
All questions are compulsory with internal choice	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
Total	**25**

Semester I: Elective Courses

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Semester- I **Major (Elective Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C5E1A	**Traditional Indian Foods**	**Theory**	**2**

Course Objectives:

1. To encourage students to comprehend the origin and history of different foods and food habits and the impact of culture on them.
2. To understand the similarities and differences in meal patterns across India.
3. To enable students to attain knowledge of different food ingredients indigenous to India and the significance of incorporating them in modern food products.
4. To guide students to formulate a plan for incorporation of traditional Indian foods into newer food products.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Familiarize themselves with inception and development of agricultural practices and settlement that gave rise to variations in food habits.
CO2	Explain the impact of culture on food in the terms of cooking, meal patterns and social occasions.
CO3	Evaluate the traditional techniques used for processing of different agricultural commodities, milk and milk products.
CO4	Compare the traditional and modern foods with respect to cost, safety, nutritional composition and bioactive content.
CO5	Critique the indigenous foods in India and their health benefits in traditional context.
CO6	Formulate a plan for merger of indigenous Indian foods and modern food processing techniques to provide the food product market with unique products.

Unit No.	Course Content	No. of Hours
I.	**A. Significance of Food in History and Culture** (i) Foraging, advent of agriculture, horticulture and pastoralization (ii) Impact of food on culture: variability, diversity, customs and traditions (iii) Heterogenity within cultures and specific social contexts (festivals, celebrations, mourning, fasting, Kosher, Halal, etc.) **B. Traditional food patterns** (i) Traditional breakfast, meal and snack foods of different regions of India (ii) Typical regional foods that have become pan-Indian and global (iii) Traditional fermented foods, pickles, preserves, beverages, snacks and desserts (iv) Over view of intellectual property rights in traditional foods	**15**
II.	**A. Traditional Methods of Food Processing** (i) Traditional post-harvest techniques used at house-hold level- milling grains, extraction of edible oil (iii) Traditional methods for processing of paneer, butter and ghee	**15**

	(iv) Traditional ingredients used for special ailments (v) Traditional foods and ingredients used to improve nutritional status and boost immunity in physiological conditions- pregnancy, lactation, infant feeding and weaning (ARF), geriatrics. (v) Commercial production of traditional foods- case study on types of traditional foods currently manufactured, market turnover, brands and companies involved, marketing strategies **B. Development of Food Product Using Indigenous Ingredients** (i) Crops that are indigenous to Indian sub-continent- properties, economic feasibility, nutritive value and safety (ii) Need for development of more food products that incorporate indigenous ingredients (iii) Energy and environmental impact of indigenous foods	
	Total hours	**30**

References:

Sen, Colleen T. (2005). *Food Culture in India.* Greenwood Press.

Davidar, Ruth N. (2001). *Indian Food Science: A Health and Nutrition Guide to Traditional Recipes*. East West Books.

Vaidya, A., Smith. (2011). *Ayurvedic Nutrition*. Motilal Banarsi Dass Publishers Pvt. Ltd, Delhi.

Matz, S.A. (2018). *The Chemistry and Technology of Cereals as Food and Feed*. (Kindle ed.). CBS Publishers and Distributors Pvt. Ltd, New Delhi.

Steinkrus, K.H. (2018). *Handbook of Indigenous Fermented Foods*. CRC Press.

Srilakshmi, B (2018). *Food Science* (7th ed). New Delhi: New Age International Publishers.

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Class participation, Literature review and PowerPoint presentation on health benefits of any one indigenous ingredient used in India	15
Survey on the traditional food items relevant to the culture/ region of the student and poster presentation on the same	10
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from both units	5
Total	**25**

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Semester- I **Major (Elective Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C5E1BP	Food Product Development using Indigenous Foods	Practical	2

Course Objectives:

1. To enable students to apply the principles of food science in the development of innovative indigenous food products.
2. To develop skills of students in identification of a suitable packaging material, label and storage conditions for the product.
3. To facilitate students in designing a standardized process-flow and crafting unique marketing strategies for sale of indigenous foods.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Understand the fundamental steps involved in developing indigenous food products.
CO2	Explain the role of different ingredients in enhancing the nutritional value of indigenous foods.
CO3	Apply food processing techniques to create indigenous food prototypes.
CO4	Analyze the impact of processing methods on the preservation of bioactive compounds found in indigenous ingredients.
CO5	Critique the sensory evaluation methods to assess the palatability of indigenous food products.
CO6	Design innovative indigenous food products that merge traditional ingredients with modern technology.

Unit No.	Course Content	No. of Hours
I.	**A. Concepts in Food Product Development** (i) Hypothetical proposal for new product development (ii) Enhancement of nutritive value of foods (iii) Understanding weights and measures, metric conversions (iv) Role of ingredients (v) Use of Ready Reckoners /Exchange list/ NIN Food database/ USDA Food Database (vi) Construction of Recipes (Standard, File Card format, Picture recipes) (vii) Waste Utilisation, Cost Effectiveness, Value Addition **A. Sensory Evaluation of Foods** (i) Threshold concentrations of primary tastes (ii) Effect of temperature on taste (iii) Identification of samples through Difference, Descriptive and Affective testing (iv) Determination of sensory evaluation methods for evaluating quality (v) Developing score card as an evaluation tool	30
II.	**A. Indigenous Food Product Formulation Laboratory Trials** (i) Product development/ value addition using indigenous foods- any one of the following product categories- baked foods, yoghurt, beverage, salad dressing, fermented food, preserves, pickle, desserts OR any other relevant product	30

	(ii) Development of the formula (Modification of Home based recipes for Innovation) (iii) Preparing a flow chart indicative of the operational processes (iv) Understanding the concept of scale up (v) Identifying suitable packaging material (vi) Shelf life studies in various altered conditions **B. Marketing Exercise** (i) Business analysis and marketing strategy (ii) Launching of the product (iii) Evaluation of product acceptability on the basis of cost effectiveness and other nutritive parameters through survey	
	Total hours	**60**

References:

deMan J. (2007). *Principles of Food Chemistry* (3rd ed.). Springer.

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.USA: CRC Press Inc.

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

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

Rao E. S. (2013). *Food Quality Evaluation*. Variety Books.

Weaver, C. (1996), *Food Chemistry Laboratory – A manual for Experimental Foods*.

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Class participation, Journal	5
Development of a new food product in groups (Writing the research proposal for development new product, standardization, packaging, labeling, marketing and sales)	20
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
Questions based on concepts of food product development and sensory evaluation from both units.	20
Viva-voce examination	5
Total	**25**

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Semester- I **Major (Elective Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C5E2A	Sustainability in Food Production	Theory	2

Course Objectives:

1. To generate in students the awareness about the environmental impact of food industry waste and the need for sustainable practices in food process operations.
2. To encourage students to understand the various techniques employed by food industry for treating food waste.
3. To enable students to create novel food products through valorization of food waste.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Understand physical and chemical composition of wastes generated in food processing operations.
CO2	Describe regulatory aspects and environmental impact of food wastes.
CO3	Evaluate the working and design of Effluent Treatment Plant (ETP).
CO4	Analyze the functional elements of solid and liquid waste management.
CO5	Critique the methods used in primary, secondary and tertiary treatment of food wastes.
CO6	Formulate solutions for reduction in food wastes and sustainable use of resources from entry point till exit point.

Unit No.	Course Content	No. of Hours
I.	**A. Food waste generated by different sectors of food industry:** (i) Cereals Grains, Pulses, Fruits and Vegetables, Oilseeds processing (ii) Dairy, Meat, Fish & Poultry processing **B. Environment Impact of food waste generated by various sectors of the food industry** (i) Food industry waste and carbon footprint (ii) Environmental Regulations **C. Sustainable operational processes used by the food industry to minimize waste generation** (i) Sustainable practices used in farms, manufacture, supply chain and distribution.	15
II.	**A. Food Waste Treatment** (i) Screening, sedimentation, skimming, floatation, coagulation & flocculation, filtration, adsorption, membrane separation, ion exchange (ii) Anaerobic & aerobic digestion of organic wastes	15

	B. Value added products from food waste (i) Extraction Technologies (ii) Bioactive compounds and other products from food waste **C. Sustainable strategies for minimization of food waste at household and local level** (i) Composting (ii) Food bank initiatives	
	Total hours	**30**

References:

Norman, G. Marriott. and Robert, B. Gravani. (2018). *Principles of Food Sanitation,(6th ed).* Springer.

Cybulska G. (2000). *Waste Management in the Food Industry: An Overview*; Publisher: Campden and Chorleywood Food Research Association.

Green, J.H. and Kramer A. (1979). *Food Processing Waste Management*; AVI Publishing

Ioannis S. Arvanitoyannis. (2007). *Waste management for the Food Industry*; Publisher: Academic Press.

Jha S. N. (2004). *Dairy and Food Processing Plant Maintenance: Theory and Practice*; International Book Distribution (Publication Division) Company, Lucknow.

Recent research articles reported in various research journals

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Class participation, Quiz	5
Review of literature on environmental impact of food waste	10
Presentation of case studies on valorization of food waste by food industries	10
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from both units	5
Total	**25**

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- I **Major (Elective Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C5E2BP	**Valorization of Food Waste through Food Product Development**	**Practical**	**2**

Course Objectives:

1. To build the students' ability to apply the knowledge of waste management by re-utilisation of food waste into value-added products**.**
2. To facilitate skill building in the students through practical hands-on training on treatment of food waste in food industries.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Understand the principles of food waste management.
CO2	Explain the techniques used in treatment of food waste to ensure retention of maximum resources.
CO3	Interpret the impact of utilisation of by-products of food processing on value-addition of products.
CO4	Utilize scientific understanding to address challenges in developing and effective value-added product suing food waste.
CO5	Evaluate the functional attributes of various by-products of food processing and scope for their use.
CO6	Develop novel value-added products using by-products of food processing and determine the utility of the product.

Unit No.	Course Content	No. of Hours
I.	**A. Student-led Project Work:** Re-cycling and utilisation of waste/ by-product from food processing/ agro industry into a value-added product: (i) Identification of suitable by-product: Bagasse, chitin, fruit/ vegetable peels, oil-seed cakes, husks of cereals and pulses etc. (ii) Justification and objectives for creation of selected value-added product (iii) Standardisation of the formulation and protocol (iv) Development of product (v) Testing of efficacy of the product (vi) Report and demonstration	30
II.	A. Visit to waste treatment plant in food processing unit and reporting on the treatment procedures carried out there B. Case studies on Food Bank Initiatives	**30**
	Total Contact Hours	**60**

References:

Food Waste to Valuable Resources: Applications and Management. (2020). Netherlands: Elsevier Science.

H. Panda (2011). *The Complete Book on Managing Food Processing Industry Waste*. Asia Pacific Business Press Inc.

Valorization of Agri-Food Wastes and By-Products: Recent Trends, Innovations and Sustainability Challenges. (2021). Netherlands: Elsevier Science.

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Visit to effluent treatment plant (ETP) in food processing unit and submission of detailed report	5
Evaluation of project on by-product utilization of food processing and report submission	20
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
Development of recipe for specific target population by incorporation of given food waste sample.	20
Viva Voce	5
Total	**25**

Semester I:
Research Methods in Home Science

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- I **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP01C6	**Research Methods in Home Science**	**Theory**	**4**

Course Objectives:

1. To build in students appreciation for high quality research in their specialisation and allied areas.
2. To enable students to 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:

CO1	Acquire 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	Develop 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.	**A. Introduction and overview** (i) What is a research? (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 (iii) Steps in the research process (iv) Qualitative versus quantitative research (v) Objectivity and subjectivity in scientific inquiry: Premodernism, modernism, and postmodernism **B. The beginning steps in the research process** (i) Identifying broad areas of research in a discipline (ii) Identifying interest areas; using multiple search strategies (iii) Prioritising topics; specifying a topic; feasibility (iv) Review of literature/scholarly argument in support of study (v) Specifying research objectives/hypotheses/questions	**15**
II.	**A. Variables** (i) Definition (ii) Characteristics (iii) Types (iv) Levels of measurement **B. Measurement** (i) Conceptual definitions and operational definitions (ii) Types of validity and reliability in quantitative research **C. Data entry in quantitative research** (i) Codebook and mastersheet (ii) Creating data files and data management	**15**
III.	**A. Sampling techniques in quantitative research** (i) Probability and nonprobability sampling methods in current use/examples from current research (ii) Issues with regard to sampling techniques **B. Research designs in quantitative research** Distinguishing between the following research designs; and, selecting research designs that are congruent with one's research purpose. (i) Experimental, quasi-experimental, and pre-experimental research designs; correlational research design Inferring causality, internal validity, external validity (ii) Epidemiological research designs (cross-sectional, cohort, and case-control studies); developmental research designs (cross-sectional, longitudinal, sequential research designs; additive, mediator and moderator models; cross-lagged panel analyses); survey and market research designs; meta-analysis (iv) Exploratory, descriptive, and explanatory designs (i) Mixed methods research designs	**15**
IV.	**A. Qualitative research methods** (i) Ideology/worldview of the qualitative researcher (ii) Research designs in qualitative research (iii) Sampling techniques in qualitative research (iv) Data collection methods in qualitative research (v) Data analytic strategies in qualitative research (vi) Reporting of results in qualitative research **B. Scientific writing** (i) Distinguishing scientific writing from popular and literary writing styles	**15**

	(ii) Publication guidelines (APA7); characteristics/principles of scientific writing; examples of good scientific writing (iii) Writing a research proposal/research grant; seeking funding (iv) Reporting statistical findings in text **C. Ethics** (i) In academia (ii) In research in general (iii) In research with human participants (Nuremberg Code, Belmont Report, ICMR Guidelines) (iv) In research with animal subjects	
	Total hours	**60**

References:

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

Bhattacharyya, G.K., and 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., and Lincoln, Y. S. (2011). *The Sage handbook of qualitative research.* Sage

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

Jackson, S. L. (2012). *Research methods and statistics: A critical thinking approach* (4th ed.). Wadsworth Cengage Learning

Johnson, R. A., and Bhattacharyya, G. K. (2019). *Statistics: Principles and methods* (8th ed.). John Wiley

Martin, W. E., and Bridgmon, K. D. (2012). *Quantitative and statistical research methods*. Jossey-Bass

Merriam, S. B., and Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation* (4th ed.). John Wiley

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Sage

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

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

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

Evaluation:

4 credits 100 marks

CONTINUOUS INTERNAL EVALUATION:	**Marks**
Class participation, 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
Total	**50**
SEMESTER-END EXAMINATION	**Marks**
All questions are compulsory with internal choice	
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
Total	**50**

Syllabus:

P.G. Diploma in Home Science – Food Processing and Preservation

M.Sc. (Home Science – Food Processing and Preservation)

(Semester II)

Semester II

Semester II: Mandatory Courses

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- II **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP02C1	**Nutrition Across Lifespan**	**Theory**	**4**

Course Objectives:

1. To understand the changes in human body composition during different stages of life.
2. To study the influence of nutrition on man during the different stages of life cycle.
3. To be aware and update the knowledge in the field of applied nutrition during the life cycle.

Course Outcomes (CO):

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

CO No.	Course Outcomes
CO1	Recall the nutritional requirements for various age groups, including infants, children, adolescents, adults, and older adults.
CO2	Explain the physiological changes that occur during different life stages and their implications for nutritional needs.
CO3	Develop personalized dietary plans for individuals at different life stages, considering specific nutritional needs and health conditions
CO4	Analyze case studies to identify and address nutritional issues in diverse populations.
CO5	Assess the impact of various factors affecting nutritional choices and health outcomes.
CO6	Design educational materials or interventions to promote healthy nutrition practices in specific life stages or population groups.

Unit No.	Course Content	No. of Hours
I.	**Pre-conceptional Nutrition & Epigenetic Implications -Overview** **Nutrition during Pregnancy & Lactation** A. Pregnancy: (i) Physiology of pregnancy (ii) Effect of nutritional status on pregnancy outcome (iii) Factors affecting fertility (iv) Nutritional requirements and dietary guidelines (macro and micro) (v) Nutrition related complications (vi) Role of dietary supplements and physical activity B. Lactation: (i) Physiology of lactation- mammary gland development, lactogenesis (ii) Let-down reflex (iii) Human milk composition (iv) Benefits of breastfeeding (v) Complications of breastfeeding (vi) Nutritional requirements & dietary guidelines for lactating mothers (vii) Supplements and maternal medications	**15**
II.	**Nutrition in Infancy & Childhood** A. Nutrition in Infancy: (i) Overview of breastfeeding (ii) Complementary feeding stages (7-12 months) (iii) Nutrition for preterm babies, LBW, VLBW B. Nutrition in Toddlerhood & Early Childhood (4-6 years) (i) Physiological changes (ii) Nutritional requirements (iii) Nutrition education C. Nutrition in Middle (6-8 years) & Late childhood (9-12 years) (i) Physiological changes (ii) Nutritional requirements (iii) Nutrition education (iv) Growth monitoring	**15**
III	**Nutrition in Adolescence & Adulthood** A. Nutrition in Adolescence (i) Physiological and psychosocial changes (ii) Growth and sexual maturity (iii) Nutritional and lifestyle requirements (iv) Concerns B. Nutrition in Adults (i) Physiological and psychosocial changes (ii) Nutritional requirements of adults (early and middle adulthood) (iii) Concerns	**15**

IV	**Nutrition for Geriatrics** (i) Theories of aging, physiological and psychosocial changes in the elderly (ii) The aging process (iii) Stages of aging (iv) Nutritional requirements of the elderly (v) Common nutritional concerns- sarcopenia, osteoporosis, osteoarthritis, fractures, falls, injuries, dementia, metabolic syndrome, respiratory problems – COPD, pneumonia, tuberculosis and lung cancer (vi) Nutrition care process for elderly- assessment, consultation (vii) Food, medicines and nutraceutical interactions	**15**
	Total Contact Hours	**60**

References:

Nutrition Across the Lifespan for Healthy Aging: Proceedings of a Workshop. (2017). United States: National Academies Press.

Ageing and Nutrition Through Lifespan. (2020). Switzerland: Mdpi AG.

Shepherd, S., Thodis, A. (2020). *Food and Nutrition Throughout Life: A Comprehensive Overview of Food and Nutrition in All Stages of Life*. United Kingdom

Brown, J. E., Isaacs, J. S. (2011). *Nutrition Through the Life Cycle*. United Kingdom: Wadsworth Cengage Learning.

Langley-Evans, S. (2013). *Nutrition: A Lifespan Approach*. Germany: Wiley.

Nutraceuticals in Brain Health and Beyond. (2020). Netherlands: Elsevier Science.

Bernstein, M., McMahon, K. (2022). *Nutrition Across Life Stages*. United States: Jones & Bartlett Learning.

Bennion, H. (1979) *Clinical Nutrition*, New York Harper and Raw Publishers

Brown, J. E. (1998). *Nutrition Now*, West/Wadsworth: International Thomson Pub. Co.

Brown, J. E., Sugarman, I. J. (2002). Nutrition *through the Life Cycle*, Wadsworth Thomson Learning.

Groff, J. L and Gropper, S. S. (1999). *Advanced Nutrition and Human Metabolism*, Belmount CA: Wadsworth/Thomson Learning.

Jackson, M. S., Rees, Jane, M., Golden, Neville, H.; Irwin Charles, E. (ed) (1997). *Adolescent Nutritional Disorders*. NewYork: The New York Academy of Science.

Evaluation:

4 credits (Total marks 100)

CONTINUOUS INTERNAL EVALUATION:	**Marks**
Written and oral presentations on assigned topic / Literature review with class discussion	20
Class participation, Class test/ Quiz/ Group Discussion	20
Creating learning resources (videos or posters or brochures)	10
Total	**50**
SEMESTER-END EXAMINATION	**Marks**
All questions are compulsory with internal choice.	
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
Total	**50**

M.Sc. (Home Science – Food Processing and Preservation)
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Semester- II **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP02C2A	**Fundamentals of Food Processing Technology**	**Theory**	**2**

Course Objectives:

1. To understand the principles of processing plant-based and animal-based foods.
2. To study the need for processing foods, composition and nutritive value of foods and storage practices.
3. To understand the present scenario in India with respect to processing of different foods.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Understand the fundamentals involved in the processing of various food groups**.**
CO2	Describe the steps and instruments involved in milling of cereals, and decortication and germination of pulses.
CO3	Evaluate the conventional and modern techniques and devices in place for processing and packaging of fruits, vegetables, milk and milk products.
CO4	Compare the properties of minimally processed and fully refined products made from cereals, nuts and oilseeds.
CO5	Critique the basic manufacturing practices involved in meat, poultry, eggs and seafood industry.
CO6	Design flowcharts for quick understanding of process flow in food processing industries.

Unit No.	Course Content	No. of Hours
I.	**A. Cereals, Millets and Pseudo-Cereals** (i) Overview of types of cereals, millets and pseudo-cereals (ii) Milling technology of wheat and rice (iii) Introduction to value-added products: puffs, flakes, extruded products, pasta, bakery items) (iv) Quality and grading of grains (v) Flour fortification to improve nutritive value **B. Pulses and Legumes** (i) Milling and processing of pulses for value added products (ii) Germination, decortication and splitting of pulses and legumes (iii) Fermented and non-fermented soy products (iv) Meat analogues from pulse-proteins (v) Overview of texturised vegetable protein, plant-origin protein concentrates, isolates and hydrolysates **C. Fruits and Vegetables** (i) Post harvest management techniques (ii) Processing and preservation of himalayan fruits, temperate fruits, tropical fruits	**15**

	(iii) Overview of controlled atmosphere packaging and modified atmosphere packaging **D. Nuts and oilseeds:** (i) Extraction and refining of oil (ii) Hydrogenation, plasticizing, tempering of oils and inter-esterification	
II.	**A. Meat** (i) Slaughtering technique and slaughtering practices (ii) Meat cuts and portions of meat (iii) Post-mortem changes in meat (Rigor Mortis), color of meat (iv) Introduction to meat processing- smoking and curing, introduction to meat products including fermented meats, sausages, bacon, salami, kebabs, frozen meat (v) Packaging of meat products **B. Poultry:** (i) Processing of poultry meat (iii) Introduction to value-added products (frozen chicken, dehydrated powders, Salami, Sausages) **C. Eggs** (i) Egg Types (ii) Quality check and grading of eggs (iii) Introduction to value-added products (Frozen eggs, canned egg whites/yolks, pasteurized egg products, dried eggs, pickled eggs) **D. Seafood** (i) Classification of fish (ii) Commercial handling, storage and transport of raw seafood (iii) Criteria for freshness, spoilage of seafood (iv) Introduction to processed products: canned fish, frozen fish, dried fish, smoked fish, cured fish **E. Milk and Milk Products** (i) Pasteurization, homogenization, standardization (ii) Introduction to processed products: condensed milk, milk powder, cheese, cream, butter, ghee, khoa, paneer, curd, flavoured beverages	**15**
	Total hours	**30**

References:

Khetarpaul N (2010) *Emerging Trends in Post Harvest Processing and Utilization of Plant Foods*. ATPA

P J Fellows (2009) *Food Processing Technology: Principles and Practice*. Woodhead Publishing Series in Food Science, Technology and Nutrition

Amalendu Chakraverty and Arun S. Mujumdar. (2003) *Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices*.

Scottsmith and Hui Y.H (Editiors) (2004) *Food Processing – Principles and Applications.* London Blackwell Publishing.

Subbulakshmi, G and Udipi, S. A. (2021).*Foods Processing and Preservation* (2nd ed). New Delhi: New Age International (P) Ltd. Publishing.

Srilakshmi, B (2018). *Food Science* (7th ed). New Delhi: New Age International Publishers

Evaluation:

4 Credits 100 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Literature review and presentation on any one emerging technology in food processing	15
Class participation, Class test/ Quiz	10
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from multiple units	5
Total	**25**

M.Sc. (Home Science – Food Processing and Preservation)
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Semester- II **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP02C2BP	**Fundamentals of Food Analysis and Microbiology**	**Practical**	**2**

Course Objectives:

1. To enable students to understand the principles of chemical and microbiological analysis of foods.
2. To equip students with conventional and emerging techniques used in analysis of foods.
3. To build the capacity of students to skillfully execute key tests in food analysis, as needed to function in a professional food quality control set-up.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Understand the techniques used in qualitative and quantitative chemical and microbial analysis of foods.
CO2	Explain the tests required for detecting the presence of adulterants in various foods.
CO3	Apply the principles of food chemistry in estimation of nutritional parameters in any given food sample.
CO4	Comparatively analyse the factors affecting food spoilage and the microbial load of different food commodities, based on regulations.
CO5	Justify the use of specific protocols and techniques in food analysis.
CO6	Develop complete understanding of basic tests carried out in food analysis laboratories as per prescribed standards.

Unit No.	Course Content	No. of Hours
I.	**A. Chemical Analysis of Foods** (i) Estimation of ash content in different foods (ii) Estimation of moisture content by air oven method (iii) Estimation of calcium content in different foods (redox titration) (iv) Determination of phosphorous content of foods by colorimetry (v) Determination of phytin phosphorus in foods (vi) Estimation of iron content of different foods by colorimetric method (vii) Sodium and potassium content in different foods by Flame photometric method (viii) Determination of iodine content in salt (ix) Estimation of reducing and non-reducing sugars in different foods by Lane Eynon's method (x) Tannin content in tea (xi) Determination of crude fiber in different foods **B. Tests for Detection of Food Adulteration**	**30**

	Spices and condiments, cereals and pulses, honey, jaggery, tea, coffee, fats and oils, milk and milk products	
II.	**Microbiological Analysis of Foods** (i) Safety rules in microbiology lab (ii) Introduction to instruments used in microbiology lab and their principles: microwave, autoclave, laminar air flow, hot air oven, incubator, centrifuge, pH meter, spectrophotometer, etc. (iii) Washing of glassware and procedure for sterilization of laboratory, instruments, media and reagents (iv) Food sampling techniques (v) Microbial staining techniques: Simple staining, Gram's staining, fungal staining for identification of microorganisms (vi) Study of bacterial motility by hanging drop method (vii) Study of composition of culture media useful in enumeration of food-borne microorganisms (viii) Preparation of culture media: broth, agar, slant tube, deep tube (ix) Concept and preparation of serial dilution (x) Pour plate, spread plate and streaking techniques (x) Investigation and enumeration of microflora from foods using total plate count: raw foods, home-cooked foods, packaged foods, street-side foods and drinking water (xi) Antimicrobial testing of food extracts: agar well method and disc diffusion method	**30**
	Total hours	**60**

References:

A.O.A.C. (2023). *Official Methods of Analysis* (23rd ed.). Association of official analytical chemists, Washington, D.C.

Nielsen, S. Suzanne (ed). (2002). *Introduction to the Chemical Analysis of Foods.* CBS Publishers and Distributors, New Delhi

Bureau of Indian standards: *specifications and standard methods* volume I to XII

Glazer AN and Nikaido H. (2007). *Microbial Biotechnology* (2nd ed). Cambridge University Press

Glick BR, Pasternak JJ and Patten CL.(2010). Moelecular Biotechnology (4th ed). ASM Press

Mahindru, S.N. (2000). *Food safety - a techno legal analysis.* Tata McGraw Hill Publishing Co. Ltd New Delhi

Nielson, S.S. (1994). *Introduction to the chemical analysis of foods.* Jones and Bartlet Publishers Boston

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Class participation, Journal	5
Involvement in, and adherence to, laboratory protocols	5
Presentation on conventional versus latest technique/ tool in any one chemical or microbial test used in food analysis	15
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
Performance of practical from Unit 1	10
Performance of practical from Unit 2	10
Viva voce	5
Total	**25**

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- II **Major (Mandatory Course)**

Course Code	Course Title	Th/Pr	Credits
FPP02C3	**Food Safety and Quality Assurance**	**Theory**	**4**

Course Objectives:

1. To encourage students in studying the scientific principles involved in the attainment of food quality.
2. To prepare students to to learn the various aspects of evaluating and controlling food quality.
3. To acquaint students with existing norms on food safety and related food laws.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Appreciate the terminologies used in food quality, food safety, sensory evaluation and objective evaluation.
CO2	Describe the types of food additives used commercially, their coding systems and functions in food.
CO3	Utilize the information about food adulteration practices into detection of common adulterants.
CO4	Examine the Indian laws on food quality, safety, packaging, labeling and consumer awareness.
CO5	Endorse the importance of hygiene at all stages of food production.
CO6	Develop techniques for identifying hazards and the methods for controlling them in any food business set-up.

Unit No.	Course Content	No. of Hours
I.	**A. Food Quality** (i) Meanings and definition of food quality (ii) Quality factors in foods (iii) Indicators of food quality (iv) Meaning, importance and ways of food quality assessment **B. Sensory and Objective Evaluation of Foods** (i) Sensory characteristics of foods (ii) Selection and training of sensory panel (iii) Pre-requisites of sensory evaluation (iv) Design of sensory evaluation lab (v) Types of tests (vi) Analysis and interpretation of sensory evaluation tests (vii) Objective evaluation: Basic guidelines, overview of physical methods to evaluate volume, specific gravity, moisture, texture, rheological characteristics, chemical analysis methods, microscopic methods, indices of microbial quality	**15**

II.	**A. Food Additives** (i) Brief overview and classification (ii) Guidelines for use (iii) Overview of maximum acceptable quantities (MAQ) of food additives (iv) Toxicological studies in selection of food additives, toxicity tests to determine safe level – acute test, prolonged test, chronic test (v) Overview of potential toxins in plants and herbs and their detection **B. Food Adulteration** (i) Meaning and definition (ii) Methods for detection of common adulterants (iii) FSSAI laws related to food adulteration **C. Food Safety, Hazards and Risks** (i) Meaning and definition (ii) Types of hazards: biological, physical and chemical (iii) Natural toxicants in foods (iv) Overview of pesticide residues in foods	**15**
III.	**A. Hygiene, Sanitation and Control of Food Quality** (i) Principles of food hygiene, personal hygiene, environmental hygiene and sanitation (ii) Microbiology in food plant sanitation (iii) Water quality assessment (iv) Overview of waste treatment and disposal in food business operations (v) Employee health and safety **B. Labeling and Packaging of Foods** (i) Components of food label (ii) Concept, types and examples of health claims (iii) Concept, types and examples of nutrition claims (iv) Nutritional information on food product labels (v) Overview of laws and standards (FSSAI) related to food labeling and packaging	**15**
IV.	**A. Food Quality Control** (i) Principles of quality control (ii) Overview of government regulations, amendments and initiatives (FSSAI) (iii Overview of national and international food standards – ISI, BIS, AGMARK, Codex Alimentarius, ISO, BRC Global Standards (iii) Role of FDA and Consumer Guidance Society of India **B. Management Systems in Food Quality Control** (i) Concept of, and training in, HACCP (through workshop) (ii) Concept of TQM and Kaizen (iii) Introduction to Schedule 2 of FSSAI (Licensing and Registration of Food Businesses) (iv) Introduction to Schedule 4 of FSSAI (Food Audits) (v) Brief introduction of food audits as per international standards **Review of associations/ agencies/ bodies involving food processing and agriculture: NITI Aayog, FAO, NIN, All India Food Processors Association, AFSTI, Indian Dairy Association, National Agriculture & Food Analysis & Research Institute, other national/ central research institutes**	**15**
	Total hours	**60**

References:

Srilakshmi, B (2018). *Food Science* (7th ed). New Delhi: New Age International Publishers

Manay, N.S. and Shadaksharaswamy, M. (2021). *Food Facts and Principles* (5th ed) New Age International Publishers. New Delhi.

Shearshet, A. (2020). *Food Safety For Food Processors + Quality Assurance in Manufacturing* (2nd ed.). NutriNiche System LLC.

Weaver, C.M., Daniel, J.R. (2003). *The Food Chemistry Laboratory: A Manual for Experimental Foods, Dietetics, and Food Scientists* (2nd ed.). CRC Press. London

Alli, I. (2003). *Food Quality Assurance* (1st ed.). CRC Press.

Knechtges, P. (2011). *Food Safety: Theory and Practice* (1st ed.). Jones & Bartlett Learning

Andres, V. J. (2005). *Quality Assurance for the Food Industry - a Practical Approach*. CRC press.

Mortimore, S. and Wallace, C. (2013). *HACCP - a Practical Approach* (3rd ed.). Chapman and Hall, London.

* Regulations and schedules under Food Safety and Standards Authority of India (FSSAI)

Evaluation:

4 Credits 100 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Creation of set-up for mock sensory evaluation in class (any one sensory test) – group led	10
Demonstration of any one food adulteration test in class	10
Training session on food hygiene for street food vendors (group-led)	20
Class participation, Visit to a local food business and assessment of food safety norms with presentation on the same	10
Total	**50**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
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
Total	**50**

MSc (Home Science – Food Processing & Preservation)

(Under NEP)

Level – 6.0

SEMESTER – II **Type of Course: Mandatory**

Course Code	Course Title	Th/Pr	Credits	Hours
FPP02C4	**Advanced Statistics in Home Science**	**Theory**	**2**	**30**

Course Objectives:

1. To enable students to value the crucial role of advanced/inferential statistics in quantitative research.
2. To enable students to master the prerequisite concepts needed for the use of advanced/inferential statistics.
3. To enable in students the skills in selecting, computing, interpreting and reporting advanced statistics.
4. To facilitate students in learning how to run advanced statistical tests using SPSS.

Course Outcomes:

At the successful completion of the course:
CO1: Students will be able to explain each of the prerequisite concepts needed for the use of advanced/inferential statistics (e.g., sampling distribution, Type I and Type II errors, central limit theorem, standard error).
CO2: Students will be able to identify the types of variables needed for each advanced statistical test and the level of measurement of each selected variable, and also meet test assumptions, such that the advanced statistical test can be used in a suitable manner.
CO3: Students will be able to identify, differentiate between, evaluate, select, and use (compute, interpret and report test results for) different advanced statistical tests to compare and contrast phenomena.
CO4: Students will be able to identify, differentiate between, evaluate, select, and use (compute, interpret and report test results for) different advanced statistical tests to examine interrelationships between phenomena.
CO5: Students will have the necessary knowledge and skills to design and conduct explanatory research design studies.
CO6: Students will demonstrate working knowledge of the use of SPSS for selected advanced statistical tests.

Course Content		Hours
Unit I	**A. Prerequisite concepts needed for the use of advanced/inferential statistics** (i) Types of distribution Frequency distribution Normal distribution & departures from normality Probability distribution Sampling distribution (ii) Central limit theorem & normality of sampling distributions (iii) Test assumptions, & parametric and nonparametric methods (iv) Point estimation vs. interval estimation (v) Standard error (and confidence intervals) (vi) Null hypothesis vs. alternative hypotheses (vii) Significant vs. nonsignificant findings, Type I error vs. Type II error, Type I error and levels of significance	15

	B. Using an advanced statistical method (steps in using an advanced statistical method)	
Unit II	**A. To study statistics that allows us to contrast phenomena** (a) Univariate chi-square test (b) Bivariate chi-square test (c) One sample t-test (d) t- or z- test for contrasting two independent groups (e) Paired t-test (f) one-way independent groups ANOVA & conceptualising other ANOVAs **4 B. To study statistics that allows us to examine relationships between variables** (a) Bivariate chi-square test (b) Product-moment correlation coefficient & conceptualising applications for simple linear regression **4 C. Ethics in the use of statistics** (e.g., the importance of test assumptions, the number of statistical tests in a research and levels of significance)	15

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:

CONTINUOUS INTERNAL EVALUATION:	**Marks**
Class participation, Written Short Quizzes (individually) & Problem-solving Exercises (in pairs or small groups)	5
Completion of an Add-On SPSS short-term course on using SPSS to compute the following advanced statistical tests and their nonparametric equivalents: univariate chi square, bivariate chi square, one sample t-test, t- or z-test of independent groups, paired t-test, one-way independent groups ANOVA, and correlation coefficient.	10
Practice Sums (individually), at least three for each of the following: standard error of the mean, univariate chi square, bivariate chi square, one sample t-test, t- or z-test of independent groups, paired t-test, one-way independent groups ANOVA, and correlation coefficient.	10
Total	25
SEMESTER-END EXAMINATION	**Marks**
All questions are compulsory. Up to 50% choice to be given within each question.	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from both units	5
Total	25

Semester II: Elective Courses

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- II **Major (Elective Course)**

Course Code	Course Title	Th/Pr	Credits
FPP02C5E1A	**Management of Micro Food Enterprise**	**Theory**	**2**

Course Objectives:

1. To enable students to comprehend the process involved in setting up a micro, small and medium enterprises (MSMEs).
2. To acquaint students with the factors involved in management of a food entrepreneurship venture.
3. To familiarize students with the initiatives of the government, as well as private funding agencies in supporting the growth of food-based MSMEs.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Understand the fundamental notions in entrepreneurship, related to micro, small and medium food-based enterprises.
CO2	Explain the prospects of setting up a food-based enterprise.
CO3	Evaluate the role of local population, especially women, in contributing towards the management of a micro/ small food business set-up.
CO4	Compare the various policies of the government and seed funding opportunities that assist and encourage new entrepreneurs.
CO5	Critique the steps involved and the challenges faced in the management of micro, small and medium food enterprise.
CO6	Develop a proposal for a micro food enterprise along with a strategy execution.

Unit No.	Course Content	No. of Hours
I.	**A. Fundamentals of Micro, Small and Medium Enterprise** (i) Concept and definitions (ii) Current scenario and rise of entrepreneurship in India (iii) Promotion of local culture and employment opportunities in MSMEs (iv) Concerns and challenges of MSMEs **B. Setting Up of Micro Food Enterprises** (i) Recognition of a suitable food-based entrepreneurship prospect (ii) Documentation and legal formalities in setting up a food enterprise (iii) Steps involved in enterprise set-up (iv) Empowerment of locals and women entrepreneurs (v) Environmental impact of a micro food enterprise	**15**

II.	**A. Management of Micro Food Enterprises** (i) Maintenance of production and product line (ii) Communication with clients (iii) Tools for marketing and advertising of the product (iv) Evaluation of performance of the enterprise **B. Government Initiative and Generation of Financial Support** (i) MSME policy in India (ii) Overview of agencies involved in MSME policy formation: DIC, SISI, EDII, NIESBUD, NEDB (iii) Government schemes and special benefits for MSMEs (iv) Financial support and seed funding from private funding platforms (v)Review of associations/ agencies/ bodies involving micro entrepreneurs	**15**
	Total hours	**30**

References:

Charanthimath, P. M. (2006). *Entrepreneurship Development Small Business Enterprises*. Pearson.

Paul, P. and Hunt, J. W. (2010). *Small Business Entrepreneurship*. Palgrave Macmillan Publishers.

Chaudhury, S. K. (2013). *Micro Small and Medium Enterprises in India*. Raj Publications.

Aneet and Agarwal, M. (2009). *Small And Medium Enterprises In Transitional Economies: Challenges And Opportunities*. Deep and deep Publications.

Sudheer, K.P. and Indira, V. (2017). *Entrepreneurship Development in Food Processing*. New India Publishing Agency, New Delhi.

Sehrawat, A. (2022). *MSME Management: One Step towards Innovation and Entrepreneurship*. Notion Press, Chennai.

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Presentation of case study on one successful and one unsuccessful micro food enterprise in India/ globally	15
Class participation, Class test	10
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from both units	5
Total	**25**

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- I **Major (Elective Course)**

Course Code	Course Title	Th/Pr	Credits
FPP02C5E1BP	**Management of Micro Food Enterprise**	**Practical**	**2**

Course Objectives:

1. To prepare students to apply their theoretical knowledge into planning and execution of a micro food enterprise
2. To promote the spirit of entrepreneurship amongst students as a prospective and empowering career option.
3. To encourage students in setting up a micro food enterprise of their own, thereby enriching their learning experience.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Cognize the requirement of documentation and standard protocols in the setting up of a micro food-based enterprise.
CO2	Describe the procedure involved in application to various MSME schemes in order to seek financial aid.
CO3	Estimate the need and demand of particular food product through extensive market research.
CO4	Compare the food product with existing foods in the market in terms of price, shelf-life, ingredients and consumer preference.
CO5	Analyze the challenges in setting up a micro food enterprise in the form of a home-based business, food truck, etc.
CO6	Develop a micro food enterprise and efficiently market the product.

Unit No.	Course Content	No. of Hours
I.	**Planning of MSME Model** (i) Development of business prototype based on food product development in semester 1 elective practical (ii) Conducting market research and survey to gauge the demand of, and existing competition for, the product (iii) Identification and listing of possible facilities and equipment needed for micro-scale production of the product (iv) Development of standardized process flow-chart (v) Identification and subsequent application to suitable assistance scheme for micro food enterprises	**30**

II.	**A. Setting-up of MSME Model** (i) Starting a micro food enterprise: home-based/ food truck/ cloud kitchen/ franchise (ii) FSSAI registration (iii) Formulation of scaling-up plan in terms of finances, infrastructure and facilities **B. Marketing of MSME Model** (i) Online marketing, offline marketing, setting up a campus market	**30**
	Total hours	**60**

References:

Sethi, M. (2005). *Institutional Food Management*. New Age International Publishers.

Desai, V. (2011). *The Dynamics of Entrepreneurial Development and Management*. Himalya Publishing House Pvt. Ltd., Mumbai.

Charanthimath, P. M. (2006). *Entrepreneurship Development Small Business Enterprises*. Pearson.

Paul, P. and Hunt, J. W. (2010). *Small Business Entrepreneurship*. Palgrave Macmillan Publishers.

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Class participation, Submission of reports for planning and execution of model	15
Organizing and managing food product market in campus	10
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
Question 1: To write a proposal for setting up of a micro enterprise, based on a case provided	10
Question 1: To write a marketing plan for a micro enterprise, based on a case provided	10
Viva	5
Total	**25**

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- II **Major (Elective Course)**

Course Code	Course Title	Th/Pr	Credits
FPP02C5E2A	**Nutrition and Food Safety Education**	**Theory**	**2**

Course Objectives:

1. To ensure that students understand the importance of good nutrition and food safety in everyday life as well as in food business set-ups.
2. To cultivate students' understanding of the impact of poor food choices on human health and the need to minimize lifestyle diseases.
3. To develop an affirmative attitude towards food safety and hygiene amongst students and positively shape their understanding of good practices in a food business set-up.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Comprehend the significance of nutrition and food safety in daily lives of humans.
CO2	Explain the techniques and tools that can be useful in creating nutrition awareness from a young age.
CO3	Assess the role of food service/ business workers, manufacturers and consumers in ensuring food safety at all levels of food production/ service.
CO4	Relate the function of specific nutrients in ensuring reproductive health and preventing lifestyle issues.
CO5	Review the kind of information included on a food label and the correct way to interpret it.
CO6	Design and apply good manufacturing, hygiene, retail and transportation practices in food service/business set-up.

Unit No.	Course Content	No. of Hours
I.	**Nutrition Education** (i) Concept of good nutrition, wellness, health, physical activity and exercise to achieve better health outcomes (ii) Inculcating nutrition awareness in pre-schoolers, school-age children and adolescents: programs and tools (iii) Maintenance of optimum reproductive health through nutrition and exercise (iv) Nutrition and lifestyle modification: weight management, diabetes, osteoporosis, polycystic ovarian disease/ syndrome, cardiovascular diseases, renal disease (v) Identification of suitable food products for management of lifestyle conditions and diseases (vi) Exposure or inputs with new emerging technology (vii) Review of associations/ agencies/ bodies involving nutrition education and consumer awareness	**15**
II.	**Food Safety Education** (i) Concept of food safety and its significance	**15**

	(ii) Adulteration and misbranding of food: meaning and household tests (iii) Study of good manufacturing practices, good hygiene practices, good retail practices, good transport practices (iv) Consumer awareness of products and correct interpretation of product information (reading food labels) (v) Accidents in a food business set-up and their prevention (vi) Training and education of food service/ business workers (vii) Exposure or inputs with new emerging technology viii) Review of associations/ agencies/ bodies involving food safety education and consumer awarenes	
	Total hours	**30**

References:

Park, K. (2017). *Textbook of Preventive and Social Medicine* (24th ed.). Banarsidas Bhanot Publishers

Mahajan, B.K., Roy, R.N., Saha, I., Gupta, M.C. (2013). *Text book of Preventive and Social Medicine* (4th ed.). Japee Brothers

Pandya, R. (2010). *Community Health Education*. Rawat Publications.

Chadha, R. and Mathur, P. (2015). *Nutrition : A Lifecycle Approach*. Orient Blackswan, New Delhi.

Roday, S. (2003). *Food Hygiene and Sanitation*. Tata McGraw Hill Publication Ltd.

Mathur, P. (2018). *Food Safety and Quality Control*. Orient BlackSwan Pvt. Ltd., Hyderabad.

Andres, V.J. (2005). *Quality Assurance for the Food industry - A Practical Approach*. CRC press.

Mortimore, S. and Wallace, C. (2013). *HACCP - A Practical Approach* (3rd ed.). Chapman and Hall, London.

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
Organisation of, and participation in, seminar on nutrition and food safety for any one category of individuals working in a food set-up: home-based food entrepreneurs/ food vendors/ midday meal cooks/ food handlers in community kitchens/ Anganwadi workers, etc., and submission of report	15
Class participation, Class test	10
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
All questions are compulsory with internal choice	
Question 1 from Unit 1	10
Question 2 from Unit 2	10
Question 3 from both units	5
Total	**25**

M.Sc. (Home Science – Food Processing and Preservation)
Level- 6.0
(Under NEP)

Semester- II **Major (Elective Course)**

Course Code	Course Title	Th/Pr	Credits
FPP02C5E2BP	**Food Safety Education and Consumer Awareness**	**Practical**	**2**

Course Objectives:

1. To generate an interest in students for community awareness on food safety.
2. To acquaint students with the use digital tools for spreading food safety- related information amongst the masses.
3. To generate confidence in students for interacting with various stakeholders in food business set-ups and conveying the importance of food safety.

Course Outcomes:

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

CO No.	Course Outcome
CO1	Understand the relevant issues pertaining to food safety, hygiene and sanitation.
CO2	Describe the need for consumer awareness on good hygiene, storage, consumption and disposal practices.
CO3	Evaluate the impact of digital content and social media on all the stakeholders involved in a food business/ service set-up, including consumers.
CO4	Co-relate the correct practices involved in handling of food with the prevention of food-borne illnesses.
CO5	Review the response of street food vendors and food business operators towards government initiatives in improving safety of street foods.
CO6	Develop and design suitable training element for street food vendors with the aim of piquing their interest in following good hygiene practices.

Unit No.	Course Content	No. of Hours
I.	**Planning and Initiative on Food Safety Awareness** (i) Student-led visit to local street food stalls and conducting Eat Right survey, as per FSSAI norms (ii) Identification of suitable topics on food safety: treatment of raw material, safety during processing and production, safe food storage and handling, consumption, disposal (iii) Development of print media, e-posters and infographs (iv) Creation of informative videos and podcasts (v) Creation of official social media page for uploading approved content to generate awareness	**30**

II.	**Training and Interaction with Stakeholders for Quality Transformation of Food Business** (i) Conducting hygiene audit of street-food stalls as per FSSAI Eat Right checklist (ii) Conducting training sessions for local street food vendors through skits and presentations (iii) Follow-up on the progess at weekly intervals, with maintenance of the checklists	**30**
	Total hours	**60**

References:

Roday, S. (2003). *Food Hygiene and Sanitation*. Tata McGraw Hill Publication Ltd.
Mathur, P. (2018). *Food Safety and Quality Control*. Orient BlackSwan Pvt. Ltd., Hyderabad.
Mortimore, S. and Wallace, C. (2013). *HACCP - A Practical Approach* (3rd ed.). Chapman and Hall, London.

Resources from Eat Right India website

Evaluation:

2 Credits 50 marks

CONTINUOUS INTERNAL EVALUATION (50%):	**Marks**
E-poster/ Infograph	5
Magazine article	5
Class participation, Blog post	5
Video	5
Podcast	5
Total	**25**
SEMESTER-END EXAMINATION (50%):	**Marks**
Follow-up report on FSSAI Eat Right Initiative for local street food vendors	15
Organization of, and participation in training session on food safety	10
Total	**25**

M.Sc. (Home Science – Food Processing and Preservation)
(Under NEP)
Level : 6.0

Semester – II **Type of Course: OJT/ FP**

Course Code	Course Name	Th/Pr	Credits	Hours
FPP02C6	**On Job Training/Field Project**	**Practical**	**4**	**120**

Course Objectives:

1. To introduce students to Dietetics and Applied Nutrition related agency/organization and understand the nature of work offered.
2. To enhance subject related knowledge base development and learn to apply theoretical learnings on field.
3. To develop ethics and skill-sets required to be a Dietetics professional.
4. To develop a creative/innovative and entrepreneurial mind-set through working in and observing the organisation.
5. To become well versed in positive group dynamics and learn strategies for effective team work, leadership development and responsibility completion.

Course Outcomes (CO):

At the successful completion of the course, students will be able to:

CO 1	Identify different agencies/organizations related to food processing and preservation, catering to people with different ages and needs.
CO 2	Enhance knowledge of the subject and be able to apply theories of food processing and preservation in the professional space
CO 3	Develop and demonstrate skill-sets and ethics expected out of a food processing and preservation professional.
CO 4	Apply creative, innovative and /or entrepreneurial concepts into professional practical settings
CO 5	Work effectively in teams with collaboration and responsibility.

Content of OJT:

1. **Understanding the Vision, Mission, and Goals of the Organization**

- Organizational aspects: Familiarize oneself with the organogram, hierarchy, chain of command, and overall organizational structure.
- Roles and responsibilities: Understand the specific roles and responsibilities of employees in the food processing and preservation department.
- Acquaintance with human resource and resource management policies (specifically with food processing and preservation) management. Inventory control, standard operating procedures and any other services offered.
- HR Policies: Comprehend policies related to human resource management, ensuring a thorough understanding of employee rights and responsibilities.
- Inventory Control and SOPs: Learn the intricacies of inventory control, standard operating procedures, and other services offered within the department.

2. **Aspects Related to Increasing the Existing Knowledge and Skills; and Specialised Training to Gain Expertise in Specific Aspects in the Food Processing and Preservation Sector**

- Food Industry: Gain theoretical and practical insights into food production, quality control, and adherence to industry standards.

3. Hands-On Training and Skill Development

- Equipment Use: Gain hands-on experience with equipment and tools related to the area of food production, processing and preservation; quality assessment and control, sensory evaluation and workflow process and related software.
- Digital Media, Communication and Technology Application: (If applicable in the particular set up) Understand the application of technology – mechanical/AI/Robotics in food production, preservation and processing.
- Hands-On Projects and Case Studies: (As many as applicable)
    - ❖ Product quality control and product development
    - ❖ Action research in: Food Industry
    - ❖ Content development for consumer awareness and education in print, voice or digital formats

4. Development of Interpersonal Skills and Leadership

- Participation in organizational activities
- Teamwork: Collaborate with organizational teams on existing or new projects, fostering interpersonal skills and leadership qualities.
- Learning to work for consumer/ client satisfaction/ management
- Community and social engagement: Plan and execute community and social engagement projects related to food processing and preservation.

5. **Inculcation of a mind-set of Research, Creativity, Innovation, and Entrepreneurship:** (As many as applicable)

- Make a study of the organization's initiatives in research, creativity, innovation and entrepreneurship
- Learn techniques of market research, analysis and branding
- Recipe/Food Product Development: Standardize and develop innovative food products or recipes
- Food Safety Communication Resources: Create communication resources, prototypes, or models to convey food safety related information effectively.
- Entrepreneurial Venture: Develop a feasible product or service for entrepreneurial ventures, emphasizing unique features and feasibility, addressing specific needs and problems in the relevant field.
- Case Studies and Project Work: Prepare and present case study reports or work on a research project aligned with industry needs.

Process Outline:

1. Preparation:

- Identifying the age and target group the student wants to work for; contacting different human development agencies/organisations catering to them and co-ordinating with staff in-charge to get approval and seek permission with the organisation.
- Procuring job profile and assisting the employer with tasks assigned within the framework of their job profile.
- Maintaining comprehensive observations/records of tasks accomplished.
- Making a self-reflection report at the end of every week.

2. Enhancing Practical Skills through OJT:

- The On-the-Job Training (OJT) program spans 4-6 weeks, requiring a minimum of 120 hours of physical presence at the organization.
- Students are expected to find their own OJT placements, although the institution provides support and guidance in securing positions with reputable organizations.
- OJT must be conducted outside the home institution to expose students to real-world work environments.
- OJT covers any subject within the syllabus, allowing students to align their experience with their academic interests.
- In recognition of changing dynamics, some OJT sessions can be conducted online to accommodate virtual work environments.
- OJT will offer students the opportunity to apply classroom learning in a real-world setting, fostering the development of technical and non-technical skills.
- Mutual Benefits: Organizations gain insights into the program's curriculum and industry requirements, enabling them to provide constructive feedback and enhance course relevance.
- OJT bridges the gap between theoretical knowledge and practical application, preparing students for successful careers in Home Science

3. Interning Organizations:

- Students have the flexibility to pursue their OJT in various types of organizations, including but not limited to:
- Food processing and preservation industries
- Food quality control units
- Food processing organisations working with sustainability concepts
- Governmental and non-governmental organisations pertaining to food
- Global online internship programmes
- Food processing startups
- Quantity meal production and service units, cloud kitchens
- Organisations working with regulatory affairs in food processing and preservation

4. Role of OJT Mentors:

- To enhance the learning experience and ensure the quality of the MSc programme, each student participating in the OJT will be assigned two mentors:
    i. A faculty mentor from the institution
    ii. An industry mentor from the organization where the student is interning

- By having both an industry mentor and a faculty mentor, students benefit from a comprehensive guidance system that combines industry expertise and academic support.

5. Role of Industry Mentor:

The industry mentor plays a crucial role in:

- Guiding the student during the internship.
- Ensuring that the intern fulfills the requirements of the organization and successfully meets the demands of the assigned project.
- Providing valuable insights into real-work practices and industry expectations through their expertise and experience.

6. Role of Faculty Mentor:

The faculty mentor serves as the overall coordinator of the OJT program.

- Oversee the entire internship process
- Evaluate the quality of the OJT in a consistent manner across all students.
- Ensures that the OJT aligns with the programme objectives by providing valuable learning opportunities.
- Facilitates communication between the institution, industry mentor, and student ensuring a fruitful OJT experience.

7. Submission of Documentation for OJT

The student will make two documents as part of the OJT:

a. Online Diary: This ensures that the student updates daily activity, which could be accessed by both the mentors. Daily entry can be of 3- 4 sentences giving a very brief account of the learning/activities/interaction taken place. The faculty mentor will be monitoring the entries in the diary regularly as shown in Appendix-I

b. OJT Report: A student is expected to make a report based on the OJT he or she has done in an organization. It should contain the following:

- ✓ **Certificate:** A certificate in the prescribed Performa from the organization where the OJT was done.
- ✓ **Title:** A suitable title giving the idea about what work the student has performed during the OJT.
- ✓ **Description of the organization:** A small description of the organization where the student has interned.
    - Description of the activities done by the section where the intern has worked: A description of the section or cell of the organization where the intern worked. This should give an idea about the type of activity a new employee is expected to do in that section of the organization.
    - Description of work allotted and done by the intern: A detailed description of the work allotted, and actual work performed by the intern during the OJT (Online/In Person/Onsite) period. It shall be the condensed and structured version of the daily report mentioned in the online diary.
- ✓ **Self-assessment:** A self-assessment by the intern on what he or she has learned during the OJT period. It shall contain both technical as well as interpersonal skills learned in the process.

8. Interaction between mentors:

- To ensure the smooth conduct of the OJT a meet-up involving the intern, industry mentor, and the faculty mentor will be scheduled as a mid-term review.
- The meeting can preferably be online to save time and resources.
- The meeting ensures the synergy between all stakeholders of the OJT.
- A typical meeting can be of around 15 minutes where at the initial stage the intern brief about the work and interaction goes for about 10 minutes.
- This can be followed by the interaction of the mentors in the absence of the intern. This ensures that issues between the intern and the organization, if any, are resolved.

9. OJT Workload for the Faculty: Every student is provided with a faculty member as a mentor. So, a faculty mentor will have a few students under him/her. A faculty mentor is the overall in charge of the OJT of the student. He/she constantly monitors the progress of the OJT by regularly overseeing the diary, interacting with the industry mentor, and guiding on the report writing etc. Considering the time and effort involved, a faculty mentor who is in-charge of 10-12 students shall be provided by a workload of 3 hours.

Evaluation:
4 credits (Total marks 100)

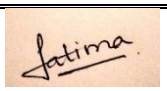
CONTINUOUS INTERNAL EVALUATION:	**Marks**
Online Diary	25
Mid-term interaction and case study presentation	25
Total	**50**

EXTERNAL EVALUATION:	**Marks**
OJT Documentation	25
Case Study Presentation	10
OJT Viva	15
Total	**50**

Letter Grades and Grade Points

Semester GPA/Programme CGPA Semester/ Programme	% of Marks	Alpha-Sign/ Letter Grade Result
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	Signature
Prof. Dr. Vishaka Karnad I/C Principal	College of Home Science Nirmala Niketan	
Mrs. Vibha Hasija Head of the Department	College of Home Science Nirmala Niketan	
Dr. Minelly Rodrigues Assistant Professor	College of Home Science Nirmala Niketan	
Mrs. Fatima Nevrekar Assistant Professor (Temporary: Self-financed Faculty)	College of Home Science Nirmala Niketan	

Sign of Head of the Institute

Sign of Dean

Name of the Head of the Institute
PROF. DR. VISHAKA ASHISH KARNAD
(I/C Principal & Chairperson of Board of Studies in Home Science)

Name of the Dean

Name of Department
Foods, Nutrition and Dietetics

Name of the Faculty

Appendix B

Justification for M.Sc. (Home Science - Food Processing and Preservation)

1.	Necessity for starting the course:	The Master of Home Science in Food Processing and Preservation Programme has been meticulously designed following the guidelines of the National Education Policy (NEP) 2020. Food science and processing is a sector with tremendous scope for growth and is among the most rapidly expanding areas of science and technology. Increase in world population has resulted in an increase in the demand for food. Improvement in education and better employment options have triggered the need to provide the market with convenience foods that meet optimal quality standards along with being nutritionally well-balanced. On the other hand, there is also the rising issue of wastage and spoilage of agricultural produce in huge amount. To address these queries and provide smart solutions, it is the need of the hour to have professionals in food processing and preservation who are equipped with the finest knowledge and skills to improve food production and tackle food-safety and food-wastage related problems. The programme in M.Sc. (Home Science – Food Processing and Preservation) has been designed to equip students with a broad foundation of, as well as comprehensive knowledge in advanced concepts in food processing, basics of nutrition, food safety, food quality assurance, food analysis and food microbiology. The elective courses and practical components focus on cultivating crucial skills and enhancing employability. This education is pivotal for nurturing a professional workforce in food processing businesses and their practical implementations within communities. Graduates of the programme are equipped to contribute effectively to food business operations, approaching their work with a scientific perspective and actively participating in innovative research projects. This M.Sc. programme's aim is to nurture food professionals who can make meaningful contributions in both practical and research domains by fostering a holistic understanding of food processing and preservation and its real-world applications within communities.
2.	Whether the UGC has recommended the course:	YES

3.	Whether all the courses have commenced from the academic year 2023-2024:	Master's Course (Home Science – Food Processing and Preservation) shall commence from the academic year 2023-2024. Semester I and Semester II shall commence from the academic year 2023-2024. Semester III and Semester IV shall commence from the academic year 2024-2025.
4.	The courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available?	The course is SELF-FINANCED. Adequate eligible faculty members are recruited each year.
5.	To give details regarding the duration of the Course and is it possible to compress the course?	Two Years Full Time (Four Semesters) It is NOT possible to compress the course.
6.	The intake capacity of each course and no. of admissions given in the current academic year:	Intake Capacity: 20 Number of admissions given in the current academic year: Ongoing
7.	Opportunities of Employability/ Employment available after undertaking these courses:	The course emphasizes practical applications significantly by training the students in food auditing, food analysis and product development. The course also exposes students to entrepreneurship, consumer psychology, branding and marketing strategies, as a means to promote self-employment and to widen the scope of work. Over the past several years, our students have found successful positions in various sectors such as Food Industries, Food Testing Laboratories, Food Consultancies and Academia. Furthermore, a substantial number of students opt to pursue higher education at national and international universities.

Sign of Head of the Institute **Sign of Dean**

Name of the Head of the Institute
PROF. DR. VISHAKA ASHISH KARNAD
(I/C Principal & Chairperson of Board of Studies in Home Science)

Name of the Dean

Name of Department
Foods, Nutrition and Dietetics

Name of the Faculty