University of Mumbai

No. AAMS_UGS/ICC/2024-25/29

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. 8.18 (N) have been accepted by the Academic Council at its meeting held on 20th April, 2024 **vide** item No. 8.18 (N) and that in accordance therewith to introduce syllabus for **M.Sc. (Home Science – Food Nutrition and Dietetics) 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).

Baliram

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/8.18 (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. – 8.18

As Per NEP 2020

UNIVERSITY OF MUMBAI

Title of the Programme

A-	P.G. Diploma in Home Science – Foods, Nutrition and Dietetics	**2023-24**
B-	M.Sc. (Home Science – Foods, Nutrition and Dietetics) (Two Years)	
C-	M.Sc. (Home Science – Foods, Nutrition and Dietetics) (One Year)	**2027-28**

Syllabus for
Semester- 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 – Foods, Nutrition and Dietetics**
	O: _____B	**B**	**M.Sc. (Home Science – Foods, Nutrition and Dietetics) (Two Years)**
	O: _____C	**C**	**M.Sc. (Home Science – Foods, Nutrition and Dietetics) (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**	10 students	
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

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

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 the Dean

Name of the Faculty

Name of Department
Foods, Nutrition and Dietetics

Preamble

1) Introduction

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

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

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

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

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

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

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

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

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

2) Aims and Objectives

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

3) Programme Outcomes

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

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

	administration, diet planning, nutrition education as well as be aware of using digitation for entrepreneurial ventures.	
PO10	Work independently, identify appropriate resources for a project and manage a project to completion.	Self-Directed Learning
PO11	Be adept with regards to national and global multi-cultural aspects of foods and nutrition, thus being able to deliver food products and nutrition and lifestyle strategies for health in harmony with the existing cultural practices of the individual and the community.	Multicultural competence
PO12	Practice principles of food preservation, processing, dietetics and community health in the most sustainable and effective manner, placing consumer, patient, community and fraternity well-being at the center of operations and to refrain from unethical behavior at workplace, the community and research.	Moral and Ethical awareness and reasoning
PO13	Take on leadership positions formulating and sharing an inspiring vision and the eagerness to bring productive and sustainable positive results for the professional group, the community and the foods, nutrition and dietetics fraternity using organizational, entrepreneurial and managerial skills	Leadership readiness/qualities
PO14	Continue lifelong learning and be updated with cutting edge knowledge and practices in the field and the understanding that ongoing learning must 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:

- **PG Diploma in Home Science – Foods, Nutrition and Dietetics**
- **M.Sc. (Home Science – Foods, Nutrition and Dietetics) (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**	**FND01C1A** Advances in Nutritional Biochemistry- I Theory (2 Cr) **FND01C1BP** Food Analysis and Microbiology Practical (2 Cr) **FND01C2A** Human Physiology Theory (2 Cr) **FND01C2B** Advances in Food Microbiology Theory (2 Cr) **FND01C3A** Food Science and Quality Control Theory (2 Cr) **FND01C3BP** Food Science and Sensory Evaluation Practical (2 Cr) **FND01C4** Descriptive Statistics in Home Science Theory (2 Cr)	**FND01C5E1A** Food Product Development Theory (2 Cr) **FND01C5E1BP** Food Product Development Practical (2 Cr) **OR** **FND01C5E2B** Multidisciplinary Strategies for Health and Disease Management Theory (2 Cr) **FND01C5E2BP** Multidisciplinary Strategies for Health and Disease Management Practical (2 Cr)	**FND01C6** Research Methods in Home Science Theory (4 Cr)	-	-	22	**PG Diploma (after 3 Year Degree)**
Sem – I For P.G. Diploma & M.Sc. Year I (Two-Years)			**14**	**4**	**4**	**-**	**-**	**22**	

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

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

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

R_____

Post Graduate Programme in University:

- **PG Diploma in Home Science – Foods, Nutrition and Dietetics**
- **M.Sc. (Home Science – Foods, Nutrition and Dietetics) (Two Years)**

Parishishta – 1

Exit option: PG Diploma (44 Credits) after Three Year UG Degree									
Year (2 Yr PG)	**Level**	**Sem.** (2 Yr)	**Major**		**RM**	**OJT/ FP**	**RP**	**Cum. Cr.**	**Degree**
			Mandatory*	**Electives (Any one)**					
I	**6.0**	**Sem II**	**FND02C1A** Advances in Nutritional Biochemistry- II Theory (2 Cr) **FND02C1BP** Clinical Biochemistry and Nutritional Assessment Practical (2 Cr) **FND02C2** Nutrition through the Life Cycle Theory (4 Cr) **FND02C3A** Nutritional Management in Chronic Degenerative Diseases Theory (2 Cr) **FND02C3BP** Diet Planning for Chronic Degenerative Diseases Practical (2 Cr) **FND02C4** Advanced Statistics in Home Science (2 Cr)	**FND02C5E1A** Lactation Management and Complementary Feeding Theory (2 Cr) **FND02C5E1BP** Lactation Management and Complementary Feeding Practical (2 Cr) **OR** **FND02C5E2A** Nutrition Communication for Health Sustainability Theory (2 Cr) **FND02C5E2BP** Nutrition Communication for Health Sustainability Practical (2 Cr)	-	4 Cr	-	22	**PG Diploma (after 3 Year Degree)**
Sem – II For P.G. Diploma & M.Sc. Year I (Two-Years)			**14**	**4**	**-**	**4**	**-**	**22**	
Cum. Cr. (For P.G. 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/COURSERA can be completed with supplemental credits.
Students are required to do Summer Internship as a mandatory requirement for four to six weeks (min. 120 hours) for OJT.

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

R_____

Post Graduate Programme in University:

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

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

Parishishta – 1

Exit option: PG Diploma (44 Credits) after Three Year UG Degree									
Year (2 Yr PG)	**Level**	**Sem.** (2 Yr)	**Major**		**RM**	**OJT/ FP**	**RP**	**Cum. Cr.**	**Degree**
			Mandatory*	**Electives (Any one)**					
II	**6.5**	**Sem III**	**FND03C1** Advances in Human Nutrition- I Theory (4 Cr) **FND03C2A** Advances in Clinical Nutrition- I Theory (2 Cr) **FND03C2BP** Medical Nutrition Therapy- I Practical (2 Cr) **FND03C3A** Public Health Nutrition and Epidemiology Theory (2 Cr) **FND03CBP** Nutritional Assessment and Education Practical (2 Cr) **FND03C4** Sports and Fitness Management Theory (2 Cr)	**FND03C5E1A** Innovation and Entrepreneurship in Foods, Nutrition and Dietetics Theory (2 Cr) **FND03C5E1BP** Innovation and Entrepreneurship in Foods, Nutrition and Dietetics Practical (2 Cr) **OR** **FND03C5E2A** Current and Emerging Digital Technologies in Foods, Nutrition and Dietetics Theory (2 Cr) **FND03C5E2BP** Current and Emerging Digital Technologies in Foods, Nutrition and Dietetics Practical (2 Cr)	-	-	**FND03C6** Research Project (4 Cr)	22	**PG Degree (after 3 Year UG)**
Sem – III (For M.Sc. Degree Two Years & One Year)			**14**	**4**	**-**	**-**	**4**	**22**	

Note: Curriculum will be enriched by extension work and educational trips for experiential learning with supplemental credits.
A MOOC course on SWAYAM/ NPTEL/COURSERA can be completed with supplemental credits.

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

R_____

Post Graduate Programme in University:

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

Parishishta – 1

Year (2 Yr PG)	**Level**	**Sem.** (2 Yr)	**Major**		**RM**	**OJT/ FP**	**RP**	**Cum. Cr.**	**Degree**
			Mandatory*	**Electives (Any one)**					
II	**6.5**	**Sem IV**	**FND04C1** Advances in Human Nutrition- II Theory (4 Cr) **FND04C2A** Advances in Clinical Nutrition- II Theory (2 Cr) **FND04C2BP** Medical Nutrition Therapy – 2 Practical (2 Cr) **FND04C3** Food Preservation, Processing and Quality Assurance Theory (4 Cr)	**FND04C4E1A** Food Psychology and Nutritional Counseling Theory (2 Cr) **FND04C4E1BP** Food Psychology and Nutritional Counseling Practical (2 Cr) **OR** **FND04C4E2A** Novel and Emerging Strategies in Disease Management Theory (2 Cr) **FND04C4E2BP** Novel and Emerging Strategies in Disease Management Practical (2 Cr)	-	-	**FND04C5** Research Project (6 Cr)	22	**PG Degree (after 3 Year UG)**
Sem – IV (For M.Sc. Degree Two Years & One Year)			**12**	**4**	**-**	**-**	**6**	**22**	
Cum. Cr. For 1 year P.G. Degree			**26**	**8**	**-**	**-**	**10**	**44**	
Cum. Cr. For 2 year P.G. Degree			**54**	**16**	**4**	**4**	**10**	**88**	

Note: 1. Curriculum will be enriched by extension work and educational trips for experiential learning with supplemental credits.

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

3. Students can do a summer internship/project (4 weeks) during the summer vacation with supplemental credits.

Sign of the Head of Institute

Name of the Head of the Institute
I/C Principal
Prof. Dr. Vishaka Ashish Karnad

Name of the 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
FND01C1A	Course 1 A	2	Advances in Nutritional Biochemistry- I	Theory
FND01C1BP	Course 1 B	2	Food Analysis and Microbiology	Practical
FND01C2A	Course 2 A	2	Applied Physiology	Theory
FND01C2B	Course 2 B	2	Advances in Food Microbiology	Theory
FND01C3A	Course 3 A	2	Food Science and Quality Control	Theory
FND01C3BP	Course 3 B	2	Food Science and Sensory Evaluation	Practical
FND01C4	Course 4	2	Descriptive Statistics in Home Science	Theory
FND01C5E1A	Course 5 (Elective)	2	Food Product Development	Theory
&				
FND01C5E1BP		2	Food Product Development	Practical
OR				
FND01C5E2A		2	Multidisciplinary Strategies for Health and Disease Management	Theory
&				
FND01C5E2BP		2	Multidisciplinary Strategies for Health and Disease Management	Practical
FND01C6	Course 6	4	Research Methods in Home Science	Theory

Syllabus:

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

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

(Semester I)

Semester I

Semester I: Mandatory Courses

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C1A	Advances in Nutritional Biochemistry—I	Theory	2

Course Objectives: To enable students to:

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

Course Outcomes (CO)

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

Unit No.	Course Content	No. of Hours
I	**A. Cell biochemistry:** i. Cell membrane and cellular communication: Cellular transport- Principles of mechanisms of passive, facilitated diffusion and active transport. Na- K ATPase, GLUT proteins and SGLT. ii. Cell signaling- General principles. Signaling via G- proteins embedded cell surface receptors. iii. Gap junctions in extracellular communication **B. Carbohydrate biochemistry:** i. Detailed classification of carbohydrates: Monosaccharaides, oligosaccharides, polysaccharides, sugar alcohols, glycosides. ii. Carbohydrate metabolism: Overview of EMP Pathway, TCA cycle, glycogen metabolism and gluconeogenesis, HMP shunt, galactose metabolism. iii. Phosphorylation reactions (ATP synthesis), energy rich compounds, overview of ETC.	**15**

	iv. Metabolism of carbohydrate in fed, fasting and starvation states and carbohydrate metabolism in hyperglycemia and hypoglycemia (Complications of Diabetes Mellitus- Sorbitol formation, ketogenesis). v. Inborn errors of carbohydrate metabolism	
II	**A. Protein biochemistry:** i. Essential and non-essential amino acids, chemical structure of amino acids, formation of specialized products from amino acids and their functions- Glutathione, creatine & creatinine, biogenic amines (dopamine, norepinephrine, tyramine, serotonin, GABA, histamine). ii. Four levels of protein structure and functions of Insulin, Haemoglobin, Carboxypeptidase, Keratin) iii. Overview of amino acid metabolism: Transamination, deamination, ammonia formation, detoxification and Urea cycle, decarboxylation iv. Metabolism of aromatic amino acids, BCAA, methionine and trans-methylation reactions. Inborn errors of amino acid metabolism v. Reactions of one carbon metabolism. **B. Enzymes chemistry:** i. Enzyme classification, structure, factors affecting enzyme activity and enzyme inhibition. Units to measure enzyme activity, significance of Km. ii. Clinical Enzymology and use of ELISA & RIA- Enzymes of clinical significance in diagnosis- LDH, ALT, AST, CK/CPK, GGT, Alkaline phosphatase, amylase, etc. iii. Overview of enzymes in digestion of carbohydrate, protein and fats.	**15**
	Total Hours	**30**

References:

Berg, J. M., Tynocrko, J. L. et al *Biochemistry* (6th ed.) New York W.H. Freeman and Co 2006.

Brody Tom. *Nutritional Biochemistry* 2nd ed. New Delhi Elsevier/Reed Elsevier India Pvt. Ltd. 2004.

Chatterjee M.N. Shinde and Rana *Textbook of Medical Biochemistry* 8th ed. New Delhi Jaypee Brothers Medical Publishers 2012.

Devlin Thomas, M (ed.) *Textbook of Biochemistry with Clinical Correlation* New York, John Wiley and Sons Inc.1997.

Montgomery, Rex and others *Biochemistry A case oriented Approach* St. Louis The C.V. Mosby Co. 1977.

Murray, R.K. and others. *Harper's Biochemistry* 25th ed. Connecticut, Appleton and large Publications. London, Prentice Hall Int. Inc 1996.

Lehninger, A.L.; Nelson D.L. and Cox. M.M., *Principles of Biochemistry* 3rd ed. New York. Worth Publishers McMullan Press, 2000.

Puri Dinesh *Textbook of Biochemistry*. A Clinically oriented Approach New Delhi B.I. Churchill Livingstone Pvt. Ltd. 2002.

Rastogi, S. C. Biochemistry. 4th ed. New Age International Publishers, 2019.

Satyanarayan U. and Chakrapani U., *Biochemistry* 4th ed. Elsevier 2013.

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

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Class test/Quiz (MCQ)/Open book test	10
Creating summary of biochemical pathways or reactions and highlighting the role of nutrients in it in the form of presentations/ Charts/2D or 3 D models) or creating activities to improve knowledge retention of nutritional implications of biochemistry for nutrition professionals.	10
Group discussion	05
Total Marks for Internal Assessment	**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 Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C1BP	**Food Analysis and Microbiology**	**Practical**	**2**

Course Objectives:

1. To enable the students to understand the principles involved in various laboratory techniques and apply them in the analysis of food.
2. To equip the students with skills required for the extraction and determination of components in food.
3. To familiarise students with the working of equipment used in the laboratory and to assess the microbiological quality of food and
4. To enable conceptualization of development nutritious food products and devise strategies to maintain food safety and quality

Course Outcomes (CO)

On successful completion of the course, the student will be able to:	
CO No.	**Course Outcomes**
CO1	Describe the underlying principles involved in various analytical techniques used in the laboratory.
CO2	Understand the processes involved in extraction and estimation of food components as well the working mechanism of various laboratory equipment.
CO3	Apply the knowledge of principles of Food Science and Microbiology to select appropriate techniques of determination.
CO4	Analyze various food products and identify and quantify various components present in them.
CO5	Assess food samples and evaluate their nutritional quality and microbiological safety.
CO6	Develop nutritious food products and devise strategies to maintain food safety and quality.

Unit No.	Course Content	No. of Hours
I	**A. Food Analysis:** i. Preparation of Buffers and pH measurement ii. Determination of the optimum pH of amylase isolated from sweet potato. iii. Estimation of Total Reducing Sugars in fruit juice by DNSA method iv. Estimation of Albumin in egg white using Bn succesiuret method v. Separation of Lipids by Thin Layer Chromatography vi. Estimation of Total Phenolics in tea by Folin Ciocalteu's method vii. Measurement of the Antioxidant Activity of foods by DPPH Method viii. Estimation of Lycopene content in tomatoes by spectrophotometry ix. Determination of the chlorophyll content in leafy vegetables by spectrophotometry.	**30**
II	**B. Extraction and Isolation of food components:** i. Starch from potato ii. Casein in milk using isoelectric precipitation iii. Cholesterol from egg yolk iv. Pectin from fruits v. Essential oils from spices, herbs and orange peels	**30**

	C. Microbial Testing of Food: i. Simple staining method and Differential staining (Gram Staining) ii. Fungal staining iii. Techniques of sterilization- Autoclaving, Hot air drying iv. Preparation of culture media v. Maintenance of microbial culture on agar slants vi. Isolation of microbes by plate streaking vii. Enumeration of Total Plate Counts, Yeast and Mold counts and Coliform counts using Pour plate method, Spread plate method viii. Testing of Water Quality- MPN method ix. Antimicrobial Testing of Food Extracts- Agar well method, disc diffusion method	
	Total Hours	**60**

References:

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

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

Gomori, G. (1955). *Preparation of buffers for use in enzyme studies.*

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

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

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

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

Evaluation:

2 CREDIT COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Quiz (Objective type)	10
Group project or MOOCs (with course completion certificate and completed in the same semester)	10
Journal	05
Total Marks for Internal Assessment	**25**
SEMESTER-END EXAMINATION	**MARKS**
All questions are compulsory with internal choice.	
Question 1 Performing an experiment in food analysis	10
Question 2 Performing an experiment in food microbiology	10
Question 3 Viva	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C2A	**Human Physiology**	**Theory**	**2**

Course Objectives:

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

Course Outcomes (CO)

On successful completion of the course, the student will be able to:	
CO No.	**Course Outcomes**
CO1	Outline the basic physiological processes of various systems.
CO2	Understand the various interactions between physiological processes in the body.
CO3	Apply the concepts of physiology to pathological conditions.
CO4	Analyze the aspects of disease development in abnormal physiology.
CO5	Design diagnostic criteria using the understanding of physiological processes.

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

	F. The Renal and Urinary System i. Renal Function and Physiology ii. Regulatory Functions of the kidney in health and disease iii. Mechanism of urine formation and excretion	
II	**A. The Blood and the Cardiovascular System** i. Constituents of Blood and their functions ii. Structure and function of the heart and blood vessels iii. Physiology of Cardiac cycle iv. Blood circulation and its role in maintaining health v. Common cardiovascular diseases and their physiological basis **B. The Digestive System** i. Physiology of the gastrointestinal system ii. Physiology of accessory organs – Liver, gall bladder and pancreas iii. The Gut as an Endocrine and Immune organ iv. Gut microbiota and its influence on health v. Gastrointestinal disorders and their physiological basis **C. The Musculoskeletal System** i. Structure and function of muscles, bones, and joints ii. Physiology of Muscle Contraction and its applications in exercise iii. Bone physiology iv. Musculoskeletal disorders and their physiological origins **D. The Reproductive System** i. Reproductive anatomy and hormonal regulation physiology of males and females ii. The Menstrual cycle, pregnancy, and fertility iii. Reproductive health issues and their physiological aspects	**15**
	Total Hours	**30**

References:

Guyton, A.C. (2020). *Textbook of Medical Physiology* 14th Edition., Saunders Company.

Best and Taylor, (1975) *The living Body*. Chapman and Hall Ltd., London.

Chatterjee C. C. (1988). *Human Physiology*, 10th Edition, Medical Allied Agency.

Pal, G., Pal, P., Nanda, N. (2016). *Comprehensive Textbook of Medical Physiology*- Two Volume Set. India: Jaypee Brothers Medical Publishers Pvt. Limited.

Tortora, G. J., Derrickson, B. H. (2017). *Tortora's Principles of Anatomy and Physiology*. Singapore: Wiley.

Waugh, A., Grant, A. (2018). *Ross & Wilson Anatomy and Physiology in Health and Illness.* United Kingdom: Elsevier Health Sciences.

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Class Test/ Quiz/ Group Discussion	10
Preparation of a summary Document of a physiological or applied physiological process/a presentation of a physiological process for education of the community/ student as infographics/videos	15
Total Marks for Internal Assessment	**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	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C2B	**Advances in Food Microbiology**	**Theory**	**2**

Course Objectives:

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

Course Outcomes (CO)

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

Unit No.	Course Content	No. of Hours
I	**Food-borne poisoning, infections and intoxication** i. Overview of the global burden of foodborne diseases ii. Causative agents of Food Borne Illness- Bacteria, fungi, viruses and parasites iii. Sources of contamination and foods commonly involved -Toxins produced -Symptoms and adverse effect iv. Microbial survival mechanisms in the food chain v. Foodborne outbreak investigation vi. Classical and novel methods of identification of food microbes vii. New trends in emerging foodborne pathogens	**15**
II	**Microbial Food safety and Quality Control** i. Overview of conventional methods of microbial control- Use of high temperature, refrigeration and freezing, dehydration & concentration, chemical preservatives. ii. Emerging technologies used by the food industry for the reduction of pathogenic and spoilage organisms in food- microwave and radiofrequency heating, pulsed electric fields, high pressure processing, ionizing radiation, ohmic heating, ultraviolet light, hurdle technology and ozone technology. iii. General guidelines on sampling for microbiological analysis by FSSAI iv. Microbiological quality standards for various foods by FSSAI v. Food production plant sanitation & hygiene practices to control microbial growth vi. Microbial risk assessment in food industry	**15**
	Total Hours	**30**

References:

Adams, M. R., Moss, M. O. (2007). *Food Microbiology*. India: New Age International (P) Limited.

Food Safety and Standards Authority of India (FSSAI). Latest guidelines and standards along with amendments available on https://www.fssai.gov.in/

Foodborne Diseases. (2017). Netherlands: Elsevier Science.

Frazier, W. C. and Westoff, D. C. (1998). *Food Microbiology* New Delhi; Tata McGraw Hill

James, M. J. (1996). *Modern Food Microbiology* (4th Ed.) New Delhi: Published by S.K. Jain for C.B.S. Publishers and distributors.

Microbiology for Food and Health: Technological Developments and Advances. (2019). United States: Apple Academic Press.

Microbial Biotechnology in Food Processing and Health: Advances, Challenges, and Potential. (n.d.). United Kingdom: Apple Academic Press.

Pelczar, M. J., Reid, R. D. and Chan (2000) *Microbiology.* New Delhi: Tata McGraw Hill.

** All new research articles from journals related to Food Microbiology

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Class test	10
Seminar or group discussion or PowerPoint presentation based on current trends in microbiology, recent foodborne disease outbreaks	15
Total Marks for Internal Assessment	**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 Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C3A	**Food Science and Quality Control**	**Theory**	**2**

Course Objectives:

1. To facilitate students' understanding of students understand the chemistry of food components and the physical and chemical changes and chemical reactions in different foods.
2. To impart systematic knowledge of basic and applied aspects of food safety and sensory evaluation to students.
3. To enable students understand the various subjective and objective techniques of sensory evaluation of foods.
4. To familiarize students with food quality control and safety of foods.

Course Outcomes (CO)

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

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

	i. Physicochemical properties, functional properties of amino acids, peptides and proteins ii. Chemical and enzymatic modifications- Denaturation, non-enzymatic browning, and other chemical changes iii. Processing induced physical, chemical and nutritional changes. iv. Texturized proteins, Protein isolates, concentrates, Protein hydrolysates, Enzymes: Properties and isolation, Nature of enzymes - stability and action, Factors influencing enzymes - enzyme inactivation and control, Enzymes in food processing and modification - Proteolytic enzymes, oxidases, lipases, enzymes decomposing carbohydrates and applications, Immobilized enzymes in food processing. Enzymes in waste management. **C. Principles of Lipids Chemistry** i. Properties of Fats- Crystallinity of solid fats, Polymorphism, Melting points, Plasticity of Fats ii. Chemical Properties - Oxidative and hydrolytic rancidity, effect of heat, chemical modifications- Hydrogenation, Interesterification, Winterization, Smoke Point. iii. Lipid-protein complexes, emulsions: formation, stability, surfactants and emulsifiers. iv. Fat deterioration and antioxidants. v. Functional roles of fats- fat replacements. **D. Flavors** i. Individual aroma compounds- vegetable, fruit and spice/condiment flavors, flavors from lactic acid/ethanol fermentation, flavors volatiles from fats and oils, flavor volatiles in muscle foods and milk · Composition, flavorings extracts– natural and synthetic · Thermally induced process flavors ii. Pigments present in vegetables, fruits and other foods	
II	**Quality Control and Sensory Evaluation** i. Meanings and definition of food quality, Quality factors in foods, indicators of food quality. Meaning, importance and ways of food quality assessment ii. Sensory evaluation, physiological bases, sensory characteristics of foods, types, selection and training of sensory panel, requirements of sensory evaluation tests, types of tests, analysis and interpretation of sensory evaluation tests. iii. Significance of different sensory tests - Threshold test, Difference test – paired comparison, triangle and Duo-trio test, Rating test – Hedonic, Numerical, Composite, scoring and ranking test, Score card making, Graph Making (Radar Chart) iv. Objective evaluation – Basic guidelines, physical methods to evaluate volume, specific gravity, moisture, texture, rheological characteristics, chemical analysis methods, microscopic methods, indices of microbial quality. v. Food Standards and Laws - FSSAI Introduction & Functions. vi. ISI, AGMARK, FPO, Codex Alimentarius, ISO vii. Role of FDA and Consumer Guidance Society in India. viii. Management systems in food quality control. HACCP, TQM and concept of food audits	**15**
	Total Hours	**30**

References:

Food Science and Technology. (2017). Germany: Wiley.

Srilakshmi, B. (2007). *Food Science*. India: New Age International (P) Limited.

Manay, N. S., Shadaksharaswamy, M. (2008). *Food: Facts and Principles.* India: New Age International (P) Limited.

Vaclavik, V. A., Christian, E. W. (2013). *Essentials of Food Science*. Netherlands: Springer New York.

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

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

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Class test	15
Seminar/ Power-point Presentation on latest trends in Food Science	10
Total Marks for Internal Assessment	**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	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
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Semester- I **Major (Mandatory Course)**

Course Code	Course Title	Theory/ Practical	Credits
FND01C3BP	**Food Science and Sensory evaluation**	**Practical**	**2**

Course Objectives:

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

Course Outcomes (CO)

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

Unit No.	Course Content	No. of Hours
I	**A. Sugar cookery** i. Tests for stages of sugar cookery ii. Effect of dry heat on sucrose. iii. Crystalline and Non crystalline candies **B. Cereals and Flours** i. Gelatinization of Starch (different types) and Starches as thickening agents (potato, corn and other) ii. Comparison of different cereals for water absorption and consistency using a viscometer iii. Comparison of - different methods of cooking rice, different varieties of rice iv. Factors affecting Gluten formation	**30**

	C. Lipids i. Smoke point of different fats and oils ii. Factors affecting fat absorption iii. Comparison of texture, flavor and mouth-feel of food products using fat substitutes (if available) iv. Temporary and Permanent emulsions in Salad Dressings, Effect of Stabilizers and Emulsifiers in salad dressings. Comparisons of low fat and high fat French dressing: Preparation and Comparison **D. Solutions and ice crystallization**: Effect of formula and procedure on crystal size of frozen desserts.	
II	**A. Examination of properties of Milk, Egg and Meat** i. Denaturation and Coagulation of milk proteins ii. Egg white foams – volume and stability iii. Effect of acid and alkalis on meat/poultry **B. Factors affecting gelatin gel** - Temperature of liquid, proteolytic enzymes and whipping **C. Fruits and Vegetables** i. Pectin gel: Determination of pectin content, development of a fruit jam, using natural and commercial pectin ii. Factors affecting vegetable pigment**s** – Temperature, acid, alkalis **D. Sensory Evaluation** i. Training of sensory panels and organizing the Evaluation Laboratory. ii. To perform recognition and sensitivity tests for four basic tastes. iii. Difference Tests iv. Reporting using Radar graphs and statistical analysis	**30**
	Total Hours	**60**

References:

Lawless, H. T., Heymann, H. (2010). *Sensory Evaluation of Food: Principles and Practices*. Germany: Springer.

Food Science: Sensory Evaluation Techniques. (2016). United States: Syrawood Publishing House.

Amerine, M. A., Pangborn, R. M., Roessler, E. B. (2013). *Principles of Sensory Evaluation of Food*. United States: Elsevier Science.

Joshi, V. K. (2006). *Sensory Science: Principles and Application in Food Evaluation*. India: Agrotech Publishing Academy.

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

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

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

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

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

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

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Class test (MCQ or Objective type questions)	10
Method of work, precision and use of various skills while performing the practical	10
Journal	05
Total Marks for Internal Marks	**25**
SEMESTER-END EXAMINATION	**MARKS**
All questions are compulsory with internal choice.	
Question 1 Questions designed to test applications of food science	10
Question 2 Plan an experiment based on sensory evaluation	10
Question 3 Viva Voce	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
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Semester- I **Major (Mandatory Course)**

Course Code	Course Title	Theory/ Practical	Credits	Hours
FND01C4	**Descriptive Statistics in Home Science**	**Theory**	**2**	**30**

Course Objectives:

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

Course Outcomes (CO)

On successful completion of the course, the student will be able to:	
CO No.	**Course Outcomes**
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 summarize data.
CO3	Identify, differentiate between, evaluate, and select different descriptive statistical techniques to graphically summarize data.
CO4	Have the necessary knowledge and skills to design and conduct descriptive research studies.
CO5	Use SPSS for data entry, data management, and descriptive statistics effectively.
CO6	Design various experiments and methods to demonstrate and quantify the objective characteristics of food that would find an application in food product development and evaluation.

Unit No.	Course Content	No. of Hours
I	**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 specialized 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., & Johnson, R.A. (1977). *Statistical concepts and methods*. John Wiley. (classic)

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

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

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

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

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

Wheelan, C. J. (2014). *Naked statistics: Stripping the dread from the data.* W.W. Norton.

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Written Short Quizzes	10
SPSS data entry & descriptive statistical analysis assignment	05
Problem-solving Exercises (in pairs or individually) & Practice Sums (individually)	10
Total Marks for Internal Assessment	**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	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

Semester I: Elective courses

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C5E1A	**Food Product Development**	**Theory**	**2**

Course Objectives:

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

Course Outcomes (CO)

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

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

Unit No.	Course Content	No. of Hours
I	**A. Process of new food product development** i. Process of idea generation and documentation: ● Market research of various new food products ● Idea generation ● Identification of ingredients (indigenous or novel) for food product development. ● Writing a proposal for development of food product with justification for its development ● Various sources for procurement of materials and ingredients ii. Standardization process of the product: ● Documentation of ingredients used (Weights and volumes) ● Method of preparation ● Variation in ingredients and technique of preparation. ● Measurement of recipe yield (Serving size, number of portions)	**15**
II	**A. Evaluation and marketing of the developed product** i. Evaluation: ● Sensory evaluation (Trained and semi-trained panelist) ● Calculation of nutritive value (Indian Food Composition tables, USDA Food Database) ● Method of deriving cost ● Shelf-life study of the product ii. Packaging, labeling and marketing ● Packaging material (Types and suitability for food) and pre-requisite for a label content and design. ● Promotion and marketing techniques	**15**
	Total Hours	**30**

References:

Developing New Food Products for a Changing Marketplace. (2007). United States: CRC Press.

Fuller, G. W. (2016). *New Food Product Development: From Concept to Marketplace,* Third Edition. United States: CRC Press.

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

McWilliam, M. (2001). *Foods – Experimental Perspectives (4th Ed.)*, New Jersey: Prentice Hall Inc. Practices, Kluwer Academic Plemer Publishers. USA: CRC Press Inc.

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

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION	**MARKS**
Class participation, Individual writing of the research proposal for development of new product, methodology, process of standardization and proposed budget	15
Sample designing of packaging, labeling and marketing/sales material	10
Total Marks for Internal Assessment	**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 Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C5E1BP	**Food Product Development**	**Practical**	**2**

Course Objectives:

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

Course Outcomes (CO)

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

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

Unit No.	Course Content	No. of Hours
I.	**A. Process of new food product development** **i. Ideation of the product:** • Conduct market research of various new food products • Idea generation - Identification of ingredients (indigenous or novel) for food product development. • Writing a proposal for development of food product with justification for its development and budget. **ii. Standardization of the product:** ● Documentation of ingredients used (Weights and volumes) ● Method of preparation ● Variation in ingredients and technique of preparation. ● Measurement of recipe yield (Serving size, number of portions)	30

II.	**B. Evaluation, packaging and marketing of developed product** **i. Evaluation of the product:** ● Sensory evaluation (Trained and semi-trained panelist) ● Calculation of nutritive value (Indian Food Composition tables, USDA Food Database) ● Calculating the cost ● Shelf-life study of the product **ii. Packaging, labeling and marketing:** ● Identification of suitable packaging material and designing a label (graphic design and content) ● Product promotion and marketing (Design marketing material)	30
	Total Hours	60

References:

Developing New Food Products for a Changing Marketplace. (2007). United States: CRC Press.

Fuller, G. W. (2016). *New Food Product Development: From Concept to Marketplace*, Third Edition. United States: CRC Press.

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

McWilliam, M. (2001). *Foods – Experimental Perspectives* (4th Ed.), New Jersey: Prentice Hall Inc. Practices, Kluwer Academic/Plemer Publishers. USA: CRC Press Inc.

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

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Development of a new food product in groups (Writing the research proposal for development of new product, standardization, packaging, labeling, marketing and sales)	25
Total Marks for Internal Assessment	**25**
SEMESTER-END EXAMINATION	**MARKS**
All questions are compulsory with internal choice.	
Question 1 Product designing	10
Question 2 Labelling and packaging	10
Question 3 Viva	5
Total for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C5E2A	**Multidisciplinary Strategies for Health and Disease Management**	**Theory**	**2**

Course Objectives:

1. To facilitate students' understanding of the application of the principles of multidisciplinary teams, modalities and strategies in preserving health and combating disease.
2. To build competencies in students to apply the use of multidisciplinary strategies in health preservation and as adjuncts in disease management.

Course Outcomes (CO)

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

Unit No.	Course Content	No. of Hours
I.	**A. The Multidisciplinary Health Management system:** • The definition, history and rationale of multidisciplinary system for health care • The multidisciplinary team in health care – A study of principles and methods for preventive and therapeutic management of degenerative, lifestyle based and clinical diseases ➢ Medicine and its branches ➢ Nutrition, counseling and psychotherapy ➢ Physiotherapy ➢ Speech language pathology ➢ Specialized surgery (Bariatric surgery) ➢ Exercise physiology and kinesiology ➢ Fitness training ➢ Chiropractice	**15**

	➢ Other related disciplines	
II.	**Principles of Alternative health and wellness strategies to preserve health, combat diseases, promote emotional and mental wellbeing; and help pain management in conditions with lifestyle based etiologies:** i. Meditation, Mindfulness, Matching Circadian Rhythm and Intuitive Eating ii. Yoga iii. Physical Activity Therapy – Dance therapy, Martial Arts, Exercise Therapy iv. Ayurveda v. Hypnotherapy vi. Naturopathy and massage therapy vii. Energy healing and laughter therapy viii. Acupuncture / acupressure ix. Neuro Linguistic Programming x. Art Based Therapy xi. Spirituality, introspection and self-care – Concept of spirituality, prayer, techniques of visualisation, journaling and reflection; use of affirmations, garnering social support for well being xii. Any Other	**15**
	Total Hours	30

References:

Alman, B. M., Lambrou, P. (2013). *Self-Hypnosis: The Complete Manual for Health and Self-Change*, Second Edition. United Kingdom: Taylor & Fran.

Angleo, J. (2016). *Spiritual Healing: Energy Medicine for Health & Well-being.* United Kingdom: Pavilion Books.

Art Therapy and Health Care. (2012). United States: Guilford Publications.

Ayurveda: *A Preventive Approach to Lifestyle Diseases*. (2023). (n.p.): Book Bazooka Publication.

Bays, J. C. (2017). *Mindful Eating: A Guide to Rediscovering a Healthy and Joyful Relationship with Food (Revised Edition)*. United Kingdom: Shambhala.

Church, D. (2012). *Soul Medicine: Awakening Your Inner Blueprint for Abundant Health and Energy*. United States: Hay House.

Circadian Clocks: Role in Health and Disease. (2016). United States: Springer New York.

Elkins, G. (2016). *Handbook of Medical and Psychological Hypnosis: Foundations, Applications, and Professional Issues.* United States: Springer Publishing Company.

Freshman, D. B., Rubino, L. G., Reid Chassiakos, D. Y. (2010). *Collaboration Across the Disciplines in Health Care*. United States: Jones & Bartlett Learning.

Heidelbaugh, J. J. (2015). *Pain Management: A Multidisciplinary Approach, 1e (Clinics Collections*). United States: Elsevier Health Sciences.

Henwood, S., Lister, J. (2007). *NLP and Coaching for Health Care Professionals: Developing Expert Practice*. Germany: Wiley.

Huber, T. P. (2023). *Unified Care: Leading Multidisciplinary Teams (Clinical Microsystems) in Healthcare.* (n.p.): Amazon Digital Services LLC - Kdp.

Interprofessional Care and Mental Health: *A Discursive Exploration of Team Meeting Practices*. (2019). Germany: Springer International Publishing.

Jarmey, C., Hearn, G. (2001). *The Book of Meditation: Practical Ways to Health and Healing*. United States: Journey Editions.

Khalsa, S. B., Cohen, L., McCall, T., Telles, S. (2016). *Principles and Practice of Yoga in Health Care.* United Kingdom: Jessica Kingsley Publishers.

Luthra, O. P. (2016). *Healing Without Medicine: Restoring Well-Being with Acupressure.* India: B. Jain Publishers Pvt. Limited.

Nelson JB. (2017). *Mindful Eating: The Art of Presence While You Eat. Diabetes* Spectr. 2017 Aug;30(3):171-174.

Pittler, M. H., Wider, B. (2007). *Complementary Therapies for Pain Management: An Evidence-based Approach.* United Kingdom: Elsevier/Mosby.cis.

Sant R. S. (2012). *Meditation as Medication for the Soul.* India: Radiance Publishers.

Sarris, J., Wardle, J. (2010). *Clinical Naturopathy: An Evidence-based Guide to Practice*. United Kingdom: Elsevier Health Sciences.

Scott Shannon. (2002). *Complementary and Alternative Strategies for Mental Health*. Elsevier Inc.

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

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Debates/Group Discussions/ Role Plays	05
Development of resources to understand a specified multidisciplinary approach for health maintenance and disease management intended for health practitioners, using appropriate review of disease management / completion of an online or in person short term course conducted by a certified practitioner to gain added knowledge in a specific multidisciplinary strategy (completion certificate to be submitted).	10
Preparation of learning resources (videos or posters or brochures) for nursing or dietetic students	10
Total Marks for Internal Assessment	**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	05
TOTAL MARKS FOR SEMESTER END EXAMINATION	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND01C5E2A	**Multidisciplinary Strategies for Health and Disease Management**	**Practical**	**2**

Course Objectives:

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

Course Outcomes (CO)

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

Unit No.	Course Content	No. of Hours
I.	**A. The Multidisciplinary Health Management system:** • The definition, history and rationale of multidisciplinary system for health care • The multidisciplinary team in health care – A study of principles and methods for preventive and therapeutic management of degenerative, lifestyle based and clinical diseases ➢ Medicine and its branches ➢ Nutrition, counseling and psychotherapy ➢ Physiotherapy ➢ Speech language pathology ➢ Specialized surgery (Bariatric surgery) ➢ Exercise physiology and kinesiology ➢ Fitness training ➢ Chiropractice ➢ Other related disciplines	**15**
II.	**Principles of Alternative health and wellness strategies to preserve health, combat diseases, promote emotional and mental wellbeing; and help pain management in conditions with lifestyle based etiologies:** xiii. Meditation, Mindfulness, Matching Circadian Rhythm and Intuitive Eating xiv. Yoga xv. Physical Activity Therapy – Dance therapy, Martial Arts, Exercise Therapy xvi. Ayurveda xvii. Hypnotherapy xviii. Naturopathy and massage therapy xix. Energy healing and laughter therapy xx. Acupuncture / acupressure xxi. Neuro Linguistic Programming xxii. Art Based Therapy xxiii. Spirituality, introspection and self-care – Concept of spirituality, prayer, techniques of visualisation, journaling and reflection; use of affirmations, garnering social support for well being xxiv. Any Other	**15**
	Total Hours	30

References:

Alman, B. M., Lambrou, P. (2013). *Self-Hypnosis: The Complete Manual for Health and Self-Change*, Second Edition. United Kingdom: Taylor & Fran.

Angleo, J. (2016). *Spiritual Healing: Energy Medicine for Health & Well-being*. United Kingdom: Pavilion Books.

Art Therapy and Health Care. (2012). United States: Guilford Publications.

Ayurveda: A Preventive Approach to Lifestyle Diseases. (2023). (n.p.): Book Bazooka Publication.

Bays, J. C. (2017). Mindful Eating: A Guide to Rediscovering a Healthy and Joyful Relationship with Food (Revised Edition). United Kingdom: Shambhala.

Church, D. (2012). *Soul Medicine: Awakening Your Inner Blueprint for Abundant Health and Energy.* United States: Hay House.

Circadian Clocks: Role in Health and Disease. (2016). United States: Springer New York.

Elkins, G. (2016). *Handbook of Medical and Psychological Hypnosis: Foundations, Applications, and Professional Issues.* United States: Springer Publishing Company.

Henwood, S., Lister, J. (2007). NLP and Coaching for Health Care Professionals: Developing Expert Practice. Germany: Wiley.

Jarmey, C., Hearn, G. (2001). The Book of Meditation: Practical Ways to Health and Healing. United States: Journey Editions.

Khalsa, S. B., Cohen, L., McCall, T., Telles, S. (2016). Principles and Practice of Yoga in Health Care. United Kingdom:

Jessica Kingsley Publishers.
Luthra, O. P. (2016). Healing Without Medicine: Restoring Well-Being with Accupressure. India: B. Jain Publishers Pvt. Limited.
Nelson JB. (2017). Mindful Eating: The Art of Presence While You Eat. Diabetes Spectr. 2017 Aug;30(3):171-174.
Pittler, M. H., Wider, B. (2007). Complementary Therapies for Pain Management: An Evidence-based Approach. United Kingdom: Elsevier/Mosby.cis.
Sant R. S. (2012). Meditation as Medication for the Soul. India: Radiance Publishers.
Sarris, J., Wardle, J. (2010). Clinical Naturopathy: An Evidence-based Guide to Practice. United Kingdom: Elsevier Health Sciences.
Scott Shannon. (2002). Complementary and Alternative Strategies for Mental Health. Elsevier Inc
Tribole, E., Resch, E. (2020). Intuitive Eating, 4th Edition: A Revolutionary Anti-Diet Approach. United States: St. Martin's Publishing Group.

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION	**MARKS**
Class participation, Plan and organize an information session for the class and the community on a specific multidisciplinary strategy	10
Create info graphs, educational resources as brochures/videos/or other resources for creating community awareness in patients/healthcare workers/community of the benefits of a specific multi-disciplinary approach and presenting one case study.	15
Total Marks for Internal Assessment	**25**
SEMESTER-END EXAMINATION	**MARKS**
All questions are compulsory with internal choice.	
Develop a strategy for multidisciplinary approach for management of the specified health condition.	15
Viva Voce	5
Journal	5
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

Semester I:
Research Methods in Home Science

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Name	Theory/ Practical	Credits
FND01C6	**Research Methods in Home Science**	**Theory**	**4**

Course Objectives:

1. To build students' appreciation for high quality research in their specialization and allied areas.
2. To help students master the knowledge and skills needed in conducting specialization-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:	
CO No.	**Course Outcomes**
CO1	Have heightened appreciation for high quality research in their specialization and allied areas.
CO2	Identify, differentiate between, evaluate, and select different sampling techniques and research designs for research aims.
CO3	Formulate a research proposal on a worthwhile topic in their discipline, as also on interdisciplinary topics.
CO4	Abide with ethical guidelines for research.
CO5	Have the necessary knowledge and skills to contribute to their discipline through conducting primary and original research on socially relevant, green, and high priority topics.

Unit No.	Course Content	No. of Hours
I	**A. Introduction and overview** (i) What is a research? (ii) Importance of research in general, and in each specialization of Home Science and allied areas; illustration of research in each specialization 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) Prioritizing 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 master sheet (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, & case-control studies); developmental research designs (cross-sectional, longitudinal, sequential research designs; additive, mediator & moderator models; cross-lagged panel analyses); survey and market research designs; meta-analysis (iv) Exploratory, descriptive, and explanatory designs (v) 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 (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	**15**
	Total Hours	**60**

References:

American Psychological Association. (2019). *Publication Manual of the American Psychological Association* (7th Ed.)

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

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

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

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

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

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

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

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

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

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

Evaluation:

4 CREDITS COURSE FOR TOTAL MARKS OF 100	
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 specialization; students can opt to work on interdisciplinary research project proposals with team members from more than one specialization of Home Science	30
Total Marks for Internal Assessment	**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 Marks for Semester End Examination	**50**
TOTAL MARKS FOR THE COURSE	**100**

Semester II

Mandatory Courses

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level – 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C1A	**Advances in Nutritional Biochemistry II**	**Theory**	**2**

Course Objectives : To enable students to:

1. Understand nutrient metabolism, gene regulation, fuel and energy utilization by cells and the de-novo synthesis of various molecules of significance in human nutrition.
2. Elucidate biochemical pathways with reference to the role of various nutrients as substrates, enzymes, coenzymes and cofactors and to study the metabolism and detoxification of various pharmacological substances.
3. Study and comparison of the regulations, homeostasis of various biochemical reactions in health and diseases.
4. Plan or interpret clinical research related to nutrition based clinical studies.

CO No.	Course Outcomes On successful completion of the course, the student will be able to:
CO1	Understand fundamental concepts of metabolism, genetics, endocrinology, pharmacokinetics and clinical research.
CO2	Comprehend and summarize the interconnection, regulation and significance of various biochemical reactions in maintaining homeostasis and health.
CO3	Apply the information on various metabolic pathways and the hormones in understanding normal metabolism and to relate any alterations in diagnosis of diseases.
CO4	Compare the nutrient metabolism in health and disease both genetic and chronic degenerative diseases.
CO5	Plan various aspects of clinical research, metabolism, genetics and endocrinology to understand cellular and physiological functions in maintenance of health and prevention and treatment of diseases.
CO6	Interpret the role of drug metabolism and pharmacokinetics in relation to human nutrition and health.

Unit No.	Course Content	No. of Hours
I	A. Lipids: i. Classification, compound Lipids, Fatty acids, MCT's, Cholesterol, Prostanoids. ii. Lipid Metabolism – Knoop's Beta oxidation, Fatty acid biosynthesis, cholesterol biosynthesis, ketogenesis. iii. Lipoprotein metabolism iv. Inborn error of lipid metabolism B. Chemistry and Metabolism of Nucleic acids: i. Structure, properties and functions of DNA replication, RNA Transcription, Translation in prokaryotes. ii. Structure and gene and its organization. Gene regulation. Operon model. iii. Mutation – Types, Physical, chemical and biological agents causing mutations. DNA repair mechanism iv. Recombinant DNA technique. PCR v. Epigenetics: Definition and mechanisms. vi. Nutrigenomics and its application	**15**
II	A. Overview of Endocrinology and Organ Function Tests a. Classification of Hormones, mechanism of action, synthesis of hormones (Over-view)–Pituitary hormones, Thyroxine, adrenal hormones, pancreatic hormones, Gastro-intestinal hormones, male and female sex hormones, adipose tissues hormones. b. Functions and hyper – hypo states of Thyroid, Insulin, Glucagon, Adrenal, medullary and cortical hormones c. Organ function Tests – LFT, RFT, Gastric B. Acid- base balance: Fluid and electrolyte balance C. Pharmacokinetics, Clinical Research and Ethical Issues i. Pharmacokinetics - drug absorption, distribution, metabolism, Detoxification phase I and II. ii. Clinical Trials overview – Stages I to IV, Clinical Research and its significance. iii. Biomedical ethics in clinical trials	**15**

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Lehninger, A.L.; Nelson D.L. and Cox. M.M., *Principles of Biochemistry* 3rd ed. New York. Worth Publishers McMullan Press, 2000.

Puri Dinesh *Textbook of Biochemistry*. A Clinically oriented Approach New Delhi B.I. Churchill Livingstone Pvt. Ltd. 2002.

Rastogi, S. C. Biochemistry. 4th ed. New Age International Publishers, 2019

Satyanarayan U. and Chakrapani U., *Biochemistry* 4th ed. Elsevier 2013

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

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Class test/Quiz (MCQ)/ Open book test	10
Creating summary of biochemical pathways or reactions and highlighting the role of nutrients in it in the form of presentations/ Charts/2D or 3 D models) or creating activities to improve knowledge retention of nutritional implications of biochemistry, pharmacokinetics, diagnosis and clinical research for nutrition professionals.	10
Group discussion	05
Total Marks for Internal Assessment	**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	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

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

(Under NEP)

Level – 6.0

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C1BP	**Clinical Biochemistry and Nutritional Assessment**	**Practical**	**2**

Course Objectives:

1. To equip students with skills to carry out laboratory procedures for the detection of various constituents in blood and urine.
2. To enable the students to interpret normal and abnormal biochemical parameters and study its implication in health and disease.
3. To train the students in techniques used for anthropometry, body composition analysis, and clinical and dietary assessment.

Course Outcomes (CO):

On successful completion of the course, the student will be able to:	
CO No.	**Course Outcomes**
CO1	Define the underlying principles involved in various analytical techniques used in the laboratory.
CO2	Understand the functioning of the equipment used in Clinical Biochemistry and Nutritional Assessment.
CO3	Demonstrate the ability to measure anthropometric, biochemical, clinical and dietary data using standardized methodology.
CO4	Compare the data available from nutritional assessment with reference parameters to determine the nutritional status of the community.
CO5	Interpret the nutritional assessment data and correlate it with health and disease
CO6	Develop protocols for the assessment of nutritional status of the community.

Unit No.	Course Content	No. of Hours
I	**A. Clinical Biochemistry** i. Urine Analysis Renal Function Tests- Urea & Creatinine clearance Urine Report- Abnormal constituents ii. Estimation of Blood Glucose by GOD/POD method Demonstration of glucometer iii. Estimation of Serum Protein by Folin-Lowry method iv. Determination of Serum Lipids- Triglycerides and Total Cholesterol. v. Determination of Vitamin C nutriture- Serum and Urinary Vitamin C vi. Estimation of Serum Iron vii. Estimation of Serum Calcium viii. Estimation of Serum Phosphorus ix. Determination of Total and Direct Bilirubin x. Quantitative detection of TBARS in serum xi. Demonstration on use of lactic acid analyzer xii. Haematology- Demonstration	**15**
II	**A. Anthropometrical assessment of body composition** i. Height, Weight, BMI ii. Circumference measurements: Head circumference, Chest Circumference, Mid Upper Arm Circumference, Waist circumference, Hip circumference, Waist to Hip ratio **B. Assessment of Body Composition** i. Skinfold measurements: Biceps, Triceps, Subscapular, Suprailiac, midthigh, midcalf, and abdomen ii. Bioelectrical Impedance Analysis using body composition analyzer iii. DEXA, BMD (Visit) **C. Clinical signs and symptoms of nutritional deficiency disorders and other diseases.** **D. Dietary Assessment** i. Qualitative- Food Frequency Questionnaire and Diet history ii. Quantitative- 24 hour diet recall, Food record iii. Diet survey- national and household food consumption data/ Food Balance Sheet	**15**

References:

Dandekar, S. P., Rane S. A. (2004). Practicals & Viva in Medical Biochemistry, New Delhi: Elsevier/Reed Elsevier India Pvt Ltd.

Godkar, P. B. (2003). Textbook of Medical Laboratory Technology 2nd Ed. Mumbai. Bhalani Publishing House.

Jayaram J., (1981). Laboratory Manual in Biochemistry, New Delhi: Wiley Eastern Ltd.

Plummer, D. T. (1979). Introduction to Practical Biochemistry. Bombay: Tata McGraw Hill Pub. Co. Ltd.

S. Sadasivan and A. Manickam, (2003). Biochemical Methods, 2nd ed. New Age International (P) Ltd. Publishers.

Lee R., Nieman D. (2012). Nutritional Assessment McGraw-Hill Us Higher Ed.

Gibson, S. (2005). Principles of Nutritional Assessment. 2nd Edition. Oxford University Press, New York.

Evaluation:

2 CREDITS FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Quiz (Objective type)	10
Group project or MOOCs (with course completion certificate and completed in the same semester)	10
Journal	5
Total Marks for Internal Assessment	**25**
SEMESTER-END EXAMINATION	**MARKS**
All questions are compulsory with internal choice.	
Question 1 Performing an experiment in clinical biochemistry	10
Question 2 demonstration of skills in nutritional assessment, its interpretation and analysis	10
Question 3 Viva	05
Total for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

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

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Level – 6.0

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C2	**Nutrition Across the Life Cycle**	**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 and be able to create nutrition education content.

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 and Lactation** A. Pregnancy: ● Physiology of pregnancy ● Effect of Nutritional Status on pregnancy outcome ● Factors affecting fertility ● Nutritional requirements and dietary guidelines (Macro and micro) ● Nutrition related complications ● Role of dietary supplements and physical activity B. Lactation: ● Physiology of Lactation- Mammary gland development, Lactogenesis, Let-down reflex ● Human milk composition ● Benefits of Breastfeeding ● Complications of breastfeeding ● Nutritional requirements & dietary guidelines for lactating mothers ● Supplements and maternal medications	**15**
II	**Nutrition in infancy and childhood** A. Nutrition in Infancy: ● Overview of breastfeeding ● Complementary feeding stages (7-12 months) ● Nutrition for Preterm babies, LBW, VLBW B. Nutrition in Toddlerhood & Early childhood (4-6 years) ● Physiological changes ● Nutritional requirements ● Nutrition education C. Nutrition in Middle (6-8 years) & Late childhood (9-12 years) ● Physiological changes ● Nutritional requirements ● Nutrition education ● Growth monitoring	**15**
III	**Nutrition in the Adolescence and adulthood** A. Nutrition in Adolescence ● Physiological and Psychosocial changes ● Growth and Sexual Maturity ● Nutritional and lifestyle requirements ● Concerns B. Nutrition in Adults ● Physiological and Psychosocial changes ● Nutritional requirements of adults (Early and Middle adulthood) ● Concerns	**15**

IV	**Nutrition for Geriatrics** ● Theories of Aging, Physiological and Psychosocial changes in the elderly ● The Aging Process ● Stages of aging ● Nutritional requirements of the Elderly ● Common nutritional concerns- Sarcopenia, Osteoporosis , Osteoarthritis, fractures, falls, injuries, Dementia, Metabolic syndrome, Respiratory problems – COPD, Pneumonia, tuberculosis and lung cancer. ● Nutrition care process for elderly- assessment, consultation ● Food, medicines and nutraceutical interactions.	**15**
	Total 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. New York: The New York Academy of Science.

Evaluation:

4 CREDITS COURSE FOR TOTAL MARKS OF 100	
CONTINUOUS INTERNAL EVALUATION	**MARKS**
Class participation, Written and oral presentations on assigned topic / Literature review with class discussion	20
Class test/ Quiz/ Group Discussion	20
Creating learning resources (videos or posters or brochures)	10
Total Marks for Internal Assessment	**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 Marks for Semester End Examination	**50**
TOTAL MARKS FOR THE COURSE	**100**

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

(Under NEP)

Level – 6.0

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C3A	**Nutritional Management of Chronic Degenerative Diseases**	**Theory**	**2**

Course Objectives:
To enable students to:

1. Develop a knowledge base to understand the principles of the Nutrition Care Process in patient care.
2. Gain a deep understanding of the etiological factors and physiological changes associated with chronic degenerative diseases.
3. Acquire skills required to diagnose and assess patients of chronic degenerative diseases.
4. Develop an insight into the pharmaceutical and surgical management of chronic degenerative diseases.
5. Gain proficiency in preventive and therapeutic dietary and lifestyle strategies, medical nutrition therapy and holistic lifestyle management strategies for chronic degenerative diseases.
6. Apply concepts of preventive and therapeutic dietetics in community/ clinical settings.

Course Outcomes (CO):

On successful completion of the course, the student will be able to:	
CO No.	**Course Outcomes**
CO1	Understand and apply the principles of Nutritional Care Process in Clinical Settings
CO2	Understand, analyze and justify the risk factors, etiology and pathophysiology of chronic degenerative diseases
CO3	Interpret screening guidelines, diagnostic tests and assessment protocols for chronic degenerative diseases.
CO4	Compare and contrast the effectiveness of different management strategies for specific diseases.
CO5	Design comprehensive preventive and therapeutic dietary and lifestyle strategies as well as medical nutrition therapy for specific target populations.
CO6	Design therapeutic diets according to the principles of nutrition care process

Unit No.	Course Content	No. of Hours
I.	**A. Nutritional Care Process and Counseling Strategies:** i. The Nutrition Care process: a detailed study of nutritional assessment, diagnosis, planning and goal setting, intervention, follow-up and documentation. ii. Role and skills of a Dietitian. iii. Modifications of the Normal Diet. iv. Hospital inpatient nutritional care. v. Relevance of research for a Nutritionist/Dietitian. vi. Detailed study of Nutrition Counseling theories and strategies. **B. A. Weight Management** **i. Obesity and overweight** ● Genetic regulation of body weight. ● Etiology, pathophysiology, classification, causes and assessment techniques, metabolic effects of obesity with special reference to obesity as an inflammatory disease. ● Medical, surgical, nutritional, lifestyle and behavior modification strategies for prevention and management of obesity. ● Management of obesity in pregnancy, lactation and childhood and presenting with co morbidities like hypothyroidism, PCOS, elevated cortisol and osteoarthritis. **ii. Underweight and eating disorders** ● Underweight: Etiology, metabolic consequences of starvation and management strategies. ● Eating Disorders: Anorexia Nervosa, Bulimia Nervosa, Binge eating disorder, eating disorder not otherwise specified. ● Nutritional deficiencies in underweight and managing comorbidities.	15
II.	**A. Diabetes Mellitus** i. Etiology, pathophysiology, assessment and complications (Acute and chronic) of Prediabetes, Type 1, Type 2 Diabetes Mellitus and gestational diabetes mellitus. ii. Medical (OHA and insulin), nutritional and lifestyle management strategies for Prediabetes, Type 1, Type 2 Diabetes Mellitus and gestational diabetes mellitus. **B. Metabolic Syndrome -** Criteria, Diagnosis, prevention and management. **C. Cardiovascular Diseases** ● Etiology, pathophysiology, diagnosis, assessment, overview of medical management, drug nutrient interactions, preventive as well as therapeutic medical nutrition therapy and lifestyle management of: ➢ Atherosclerosis, arteriosclerosis and endothelial dysfunction ➢ Hypertension ➢ Hyperlipidemias ➢ Angina Pectoris ➢ Myocardial Infarction ➢ Cardiac Failure ● Overview of ➢ Surgical management of cardiovascular diseases ➢ Rheumatic Heart Disease	15
	Total Hours	**30**

References:

Barrer. K. (2007) Basic Nutrition Counselling Skill Development. Wadsworth Pub

Bendich, A., & Deckelbaum, R. J. (Eds.). (2006). Preventive Nutrition: The Comprehensive Guide for Health Professionals. Springer.

Bendich, A., & Deckelbaum, R. J. (Eds.). (2016). Preventive Nutrition: The Comprehensive Guide for Health Professionals. Humana Press.

Blake, J. S. (2018). Nutrition: From Science to You. Pearson.

Blake, J. S. (2020). Nutrition and You: Core Concepts for Good Health. Pearson.

Brown, J. E. (2019). Nutrition Through the Life Cycle. Cengage Learning.
Lutz, C. A., Przytulski, K. R., & Rutherford, K. L. (2015). Nutrition and Diet Therapy. F.A. Davis Company.
Mahan, L. K., & Raymond, J. L. (2021). Krause's Food & the Nutrition Care Process. 15th edition. Elsevier.
Pope, J., & Berman, M. (2017). Nutrition for a Changing World. Wadsworth Publishing.
Shills. M. (2006). Modern Nutrition in Health and Disease.10th ed. Lippincot William and Wilkins.
Sizer, F., & Whitney, E. (2020). Nutrition: Concepts and Controversies. Cengage Learning.
Smolin, L. A., & Grosvenor, M. B. (2018). Nutrition: Science and Applications. Wiley.

Evaluation:

2 credits (Total marks 50)

Continuous Internal Evaluation:	**Marks**
Class participation, Create a brand (blog/website/ and logo), create a nutrition care process model and use social media for nutrition education/ Design a preventive module for community on a chosen topic using oral, written and social media communication	10
Develop a nutrition education resource on nutrition guidelines for nurses/ doctors/ dietitians	10
Quiz/ Debate/ Class discussion/ Debate	5
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 multiple units	5
Total	**25**

M.Sc. in Home Science – Foods, Nutrition and Dietetics
Level – 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C3BP	Diet Planning for Chronic Degenerative Diseases	Practical	2

Course Objectives:

1. To provide a detailed practical aspect to the clinical conditions studied in theory.
2. To enable students to:
   - Do a detailed study of Medical Nutrition Therapy with appropriate literature review.
   - Analyze the given case.
   - Make a nutritional diagnosis with problem, etiology and symptom (PES) Statement and outline the goals of therapy.
   - Study of medical and surgical interventions which require nutritional management.
   - Propose a nutrition plan for the patient – with suggested outline of medical nutrition therapy with appropriate literature review, diet plan with detailed calculations and suggested supplements and adjuncts.
   - Prepare the selected meal.
   - Evaluate the suggested diet plans.
   - Prepare patient education resources.

Course Outcomes (CO):

On successful completion of the course, the student will be able to:	
CO No.	**Course Outcomes**
CO1	Recall key principles of therapeutic dietetics and their application in clinical settings.
CO2	Explain the rationale behind different therapeutic diets and their effects on health.
CO3	Apply knowledge of dietary modifications to create personalized meal plans for different medical conditions.
CO4	Demonstrate the ability to calculate nutrient content in therapeutic diets.
CO5	Compare and contrast various dietary approaches for managing similar health conditions.
CO6	Judge the suitability of therapeutic diets for patients with comorbidities or special dietary requirements.
CO7	Design comprehensive dietary plans that integrate therapeutic requirements, patient preferences, cultural and socio economic considerations.

Unit No.	Course Content	No. of Hours
I	**A. Planning of Diets for obesity, metabolic syndrome and eating disorders** i. Planning diets using Medical Nutrition Therapy with allocation of macronutrients ii. Menu Planning. iii. Detailed calculation to understand the efficacy of the plan. iv. Meal replacers and Supplement prescription. v. Outline recommendations in easily understood format. vi. Planning for the following conditions: ● Obesity - Juvenile and adult-onset obesity, bariatric surgery, VLCD, obesity associated with PCOS, hypothyroidism and elevated cortisol levels. ● Metabolic Syndrome ● Eating Disorders. **B. Preparation of the prescribed therapeutic foods with respect to the above cases.** **C. Understanding the role of supplements and nutraceuticals (Review).**	**30**
II	**A. Planning of Diets Diabetes Mellitus and Cardiovascular Diseases:** i. Planning diets using Medical Nutrition Therapy with allocation of macronutrients. ii. Menu Planning. iii. Detailed calculation to understand the efficacy of the plan. iv. Supplement usage. v. Outline recommendations in easily understood format. vi. Planning for the following conditions: ● Type 1 Diabetes Mellitus ● Cardiovascular Diseases: ● Diets to prevent risk, incidence and progression of Atherosclerosis, Hyperlipidemias, Hypertension ● Myocardial Infarction ● Compensated and decompensated cardiac failure **B. Preparation of the prescribed therapeutic foods with respect to the above cases.**	
	Total Hours	**60**

References:

Bendich, A (1997). Preventive Nutrition Humana Press.

Brown, J. (2002). Nutrition through the Lifecycle. Wadsworth Pub Co.

Garrow, J.S (1993). Human Nutrition and Dietetics 9th ed. Churchill Livingstone Pub.

Gibney, J.M., (2005). Clinical Nutrition Blackwell Publishing House.

Gopalan. (2000). Nutritive Value of Indian Foods. NIN ICMR Pub.

Jamison, J. (2003). Clinical Guide to Nutrition and Dietary Supplements in Disease Management Churchill – Livingstone Pub.

Jeejeebhoy, et al (1988). Nutrition and Metabolism in Patient Care.

King, K. (2003). Nutrition Therapy 2nd ed. Helm Publishing, Texas.

Kathryn Pinna (Author), Sharon Rady Rolfes, Ellie Whitney: Understanding Normal and Clinical Nutrition, 12th Edition. (2020), Brooks/Cole publishers.

L. Kathleen Mahan: Krause's Food & the Nutrition Care Process, 15th Edition, (2021), Saunders Publishers.

Peckenpaugh, N (2003). Nutrition Essentials and Diet Therapy. 9th ed.

Sauberlich. H (1999) Laboratory Tests for the Assessment of Nutritional Status 2nd ed. CRC Press.

Saunders Pub Co. Blackwell Scientific Publication (1994). Manual of Dietetic Practice.2nd ed.

Shills, M. (2006). Modern Nutrition in Health and Disease.10th Ed. Lippincot.

W. B. Saunders CO. Lee, R.D. (2003). Nutritional Assessment 3rd ed. Mc Graw Hill Pub.

Whitney. (2006) Understanding Normal and Clinical Nutrition. Wadsworth publication.

William and Wilkins ICMR Pub. (2020). Nutrient Requirement and Recommended Dietary Allowances for Indians.

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Journal	5
Continuous evaluation of diet planning cases	20
Total	**25**
SEMESTER-END EXAMINATION:	**MARKS**
Construction of a case specific diet plan	20
Viva Voce	05
Total	**25**
TOTALMARKS FOR THE COURSE	**50**

M.Sc. in Home Science – Foods, Nutrition and Dietetics
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Semester- II **Major (Mandatory Course)**

Course Code	Course Title	Theory/ Practical	Credits
FND02C4	Advanced Statistics in Home Science	Theory	2

Course Objectives:

1. To help students value the crucial role of advanced/inferential statistics in quantitative research.
2. To help students 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:

On successful completion of the course:	
CO No.	**Course Outcomes**
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.

Unit No.	Course Content	Hours
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 **B. Using an advanced statistical method** (steps in using an advanced statistical method)	**15**
II	**A. To study statistics that allows us to contrast phenomena** (a) Univariate chi-square test (b) Bivariate chi-square test	**15**

	(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 & conceptualizing 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 & conceptualizing 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)	

References:

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

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

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

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

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

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

Wheelan, C. J. (2014). *Naked statistics: Stripping the dread from the data.* W.W. Norton.

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
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 Marks for Internal Assessment	**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 Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

Semester II
Elective Courses

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

Level- 6.0

(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C5E1A	**Lactation Management and Complementary Feeding**	**Theory**	**2**

Course Objectives:

1. To introduce the learner to the field of infant feeding practices more specifically to breastfeeding and complementary feeding.
2. To equip learners with experiences in the classroom and in the clinical areas that result in development of basic competencies required for lactation counseling.
3. To enable the learner to apply the competencies learned for better counselling in maternal and infant care.

Course Outcomes (CO)

On successful completion of the course student will be able to:	
CO1	Develop communication and guidance skills in the area of breast feeding practices.
CO2	Communicate the advantages and benefits of breastfeeding and the correct complimentary feeding strategies for both mother and baby.
CO3	Demonstrate how to breastfeed a baby, including positioning and attachment.
CO4	Assess actual and potential difficulties with regards to breastfeeding and complimentary feeding and how to work with women on ways to overcome them.
CO5	Apply the knowledge gained to prepare cost effective complementary feeds

Unit No.	Course Content	Hours
I	● **Anatomy and Physiology of Mammary Glands** ● Anatomy and physiology of mammary glands, process of Lactogenesis ● Nutrition requirements of a lactating mother, use of galactogogues ● Human milk composition, Benefits of breastfeeding to mother and baby; Breastfeeding vs Formula feeding – A critical analysis ● **Process of Breastfeeding** ● Breast examination and different positions for effective breastfeeding. ● Infant Oral Anatomy, Latching positions ● Breastfeeding older infants and toddlers. ● Expression of breast milk - manual and mechanical, Storage of expressed milk and feeding techniques of expressed milk ● **Challenges in Breastfeeding** ● Breast Feeding challenges – Common conditions e.g. Let-down failure, engorgement, sore nipples, mastitis ● Breastfeeding in medical conditions – Allergies in infants, Slow weight gain, maternal infections and Cleft Palate, ● Contraindications to breastfeeding -HIV/AIDS - Herpes Simplex, Galactosemia, Hepatitis, Toxemia, Epilepsy, Psychiatric problems, Diabetes Mellitus and any others. ● **Support for Breastfeeding** ● Support from spouse, family, Community support - local customs, myths related to breastfeeding. ● Organization and mass media support - WABA, Baby friendly hospital initiatives, local organizations ● Workplace support, Laws supporting breastfeeding promotions ● Milk Banks ● Sustaining breastfeeding	15
Unit II	**Complementary Feeding** ● Complementary Feeding, home feeding techniques, Use of indigenous foods from Months 7-8, 9 and 10, 11 - 12, 15 - 18, 18 - 24 and overview for 24 - 36 months ● Local customs and practices during pregnancy, childbirth, lactation and child feeding practices. Common myths ● Infant & Young Child Feeding (IYCF) Practices, identifying hunger and satiety, feeding frequency, Nutrient requirement in infancy, Immunization ● Assessment of infant growth and its importance. ● Family planning – spacing	15

References:

Armstrong, H. C. (1992). Training Guide in Lactation Management. United States: IBFAN/UNICEF.

Riordan, J. (2005). Breastfeeding and Human Lactation. Nigeria: Jones and Bartlett.

Barber, K. (2016). Lactation Management: Strategies for Working with African-American Moms. United States: Praeclarus Press.

Dann, M. H. (2007). Lactation Management: Techniques, Tips, and Tools for the Health Care Provider. United States: Maureen Hoag Dann.

World Health Organization. (2015). Pregnancy, Childbirth, Postpartum and Newborn Care: A Guide for Essential Practice. Philippines: World Health Organization.

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Seminar on newer trends in breastfeeding, case study presentation, Quiz, Test	15
Making education material such as Digital poster, brochure, etc.	10
Total Marks for Internal Assessment	**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	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
Level- 6.0
(Under NEP)

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C5E1BP	**Lactation Management and Complementary Feeding**	**Practical**	**2**

Course Objectives:

1. To introduce the learner to the field of infant feeding practices more specifically to breastfeeding.
2. To provide learners with experiences in the classroom and in the clinical areas that result in development of basic competencies required for lactation counseling
3. To provide the learner with competencies that are prerequisite to maternal and child care.

Course Outcomes (CO)

At the end of the course student will be able to:	
CO1	Provide counseling to antenatal and postnatal mothers on optimal breastfeeding and complementary feeding practices.
CO2	Communicate the advantages and benefits of breastfeeding and the correct methods of complementary feeding.
CO3	Demonstrate how to breastfeed a baby, including positioning and attachment as well as designing and preparation of correct complementary feeding menus and recipes.
CO4	Assess actual and potential difficulties in breastfeeding and complementary feeding practices and how to work with women on ways to overcome them.
CO5	Explain the opportunities for HIV-infected mothers to breast feed and improve HIV free survival of their baby.

Unit No.	Course Content	Periods
I	**I. Lactation Management** ● **Demonstration** using print resources, videos and models on: Breast examination, Newborn examination Breast Milk expression • **Assessment of growth** – weighing the baby, plotting growth charts. ● **Develop print and digital resources** on techniques of effective breastfeeding and growth monitoring in local languages • Develop roles, skits, street plays emphasizing benefits of breastfeeding, common problems relating to breastfeeding • Counseling sessions on effective breastfeeding and conducting nutrition education sessions across diverse socio-cultural and economic groups on optimal strategies of breast feeding. • Recipe design with inclusion of galactagogues • Visit to Breast milk bank, Lactation Management Centre.	**15**

II	**Complementary Feeding** ● Developing resource material in local languages for effective Complementary feeding practices ● Recipe development and standardization and compilation of a recipe booklet for various stages of complementary feeding. ● Conducting nutrition education sessions across diverse socio-cultural and economic groups on optimal strategies of complementary feeding.	**15**

References:

Armstrong, H. C. (1992). Training Guide in Lactation Management. United States: IBFAN/UNICEF.

Riordan, J. (2005). Breastfeeding and Human Lactation. Nigeria: Jones and Bartlett.

Barber, K. (2016). Lactation Management: Strategies for Working with African-American Moms. United States: Praeclarus Press.

Dann, M. H. (2007). Lactation Management: Techniques, Tips, and Tools for the Health Care Provider. United States: Maureen Hoag Dann.

World Health Organization. (2015). Pregnancy, Childbirth, Postpartum and Newborn Care: A Guide for Essential Practice. Philippines: World Health Organization

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Development of a new complementary feeds using indigenous ingredients	25
Total Marks for Internal Assessment	**25**
SEMESTER-END EXAMINATION	**MARKS**
All questions are compulsory with internal choice.	
Question 1 Product designing	10
Question 2 Labelling and packaging	10
Question 3 Viva	05
Total for the Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
(Under NEP)
Level – 6.0

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C5E2A	**Nutrition Communication for Health Sustainability**	Theory	2

Course Objectives:

1. To familiarize students with the fundamentals of nutrition communication.
2. To enable students with skills to translate and communicate scientific content in field settings.
3. To facilitate students to design strategies for effective nutrition communication and health sustainability.

Course Outcomes (CO):

On successful completion of the course, the student will be able to:	
CO No.	**Course Outcomes**
CO1	Describe the importance of nutrition communication for health sustainability.
CO2	Understand the health indicators required for health sustainability.
CO3	Apply the knowledge of nutrition communication to overcome barriers in dissemination of information.
CO4	Analyze available scientific content and translate it for application in field settings.
CO5	Assess nutrition content for misinformation.
CO6	Devise strategies for effective communication of nutrition knowledge for sustainable health.

Unit No.	Course Content	No. of Hours
I	**A. Principles of Nutrition Communication for Sustainable Health** a. The importance of nutrition communication in health promotion b. Role of translational research in nutrition communication c. Sustainable Development Goals: Indicators on Health d. The interrelationship of nutrition and sustainable health e. The environmental impact of food choices f. Case studies on sustainable nutrition initiatives **B. Theories and models of communication and its application in nutrition** a. Health behavior change models b. Principles of effective nutrition communication c. Tailoring messages for different audiences/ target groups (Individual, group and mass approach) d. Framing and messaging strategies e. Health literacy and its impact on nutrition communication f. Promotion of Health Literacy **C. Sustainability** Overview of definition, concept and applications with special emphasis on sustainability and nutrition; food systems and sustainability; sustainable food production; food waste reduction; climate change and food systems; and community nutrition Sustainable Development Goals – with special emphasis on Nutrition related sustainable development goals **D. Facilitators and Barriers in nutrition communication** a. Cultural considerations in dietary choices and strategies for culturally sensitive communication b. Ethical issues in nutrition communication c. Responsible advertisements d. Handling controversies and misinformation and strategies for countering misinformation e. Tools and resources for assessing the credibility of nutrition messages	**15**

II	**Methods of Nutrition Communication for Sustainable Health** Nutrition Communication Strategies in terms of impact, effectiveness and sustained change using examples, case studies, role of media in shaping campaigns and thought change; and an exploration of newer trends. **a. Print media for Nutrition Communication and health sustainability in the areas of:** -Food Science and Processing -Clinical Dietetics and Sports Nutrition -Public Health Nutrition **b. Digital and Social media for Nutrition Communication and health sustainability in the areas of:** -Food Science and Processing -Clinical Dietetics and Sports Nutrition -Public Health Nutrition **c. Interpersonal communication skills in nutrition counselling and education** **d. Role of government in nutrition communication** Policy making and advocacy for sustainability health through Nutrition communication – to address food security and nutrition related disparities; and to promote sustainable food production and consumption The Information Education and Communication initiative of the GOI	**15**

References:

Marinescu V. (2020). Food, Nutrition and the Media. Springer Nature

Barbara J. Mayfield (2020). Communicating Nutrition- The Authoritative Guide (2020). Academy of Nutrition and Dietetics.

Adam Drewnowski, Hans Konrad Biesalski, JJ Strain, Johanna T. Dwyer, Manfred Eggersdorfer, Peter Weber (2017). Germany: Springer International Publishing.

Simona De Iulio, Susan Kovac (2022). Food Information, Communication and Education: Eating Knowledge. India: Bloomsbury Publishing.

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Group Discussion/debate	05
Case study of nutrition communication in print media	10
Case study of nutrition communication in the digital/ social media	10
Total Marks for Internal Assessment	**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	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

M.Sc. (Home Science – Foods, Nutrition and Dietetics)
(Under NEP)
Level – 6.0

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

Course Code	Course Title	Theory/ Practical	Credits
FND02C5E2BP	**Nutrition Communication for Health Sustainability**	Practical	2

Course Objectives:

1. To assist students in identifying issues having public health significance.
2. To equip the students with skills needed for designing print and digital media.
3. To help students develop nutrition communication campaigns using print and social media.

Course Outcomes (CO):

On successful completion of the course, the student will be able to:	
CO No.	**Course Outcomes**
CO1	Describe various contemporary strategies used in nutrition communication.
CO2	Understand the importance of nutrition communication for sustainable health of the community.
CO3	Apply the knowledge of fundamentals of nutrition communication for design of campaigns.
CO4	Compare several techniques of communication and select the most effective one based on the target audience.
CO5	Design nutrition communication campaigns for various strata of the population
CO6	Assess the efficacy of the designed campaigns.

Unit No.	Course Content	No. of Hours
I	**Creation of a Nutrition Communication campaign for Sustainable change using print media** It should involve the following aspects: a. Market Research b. Problem identification c. Goal setting d. Strategy and Target group identification e. Planning the campaign f. Running the campaign g. Measurement of the efficacy of the campaign (Any area of nutrition can be chosen)	**30**

II	**Creation of a Nutrition Communication campaign for Sustainable change using digital/ social media** It should involve the following aspects: a. Market Research b. Problem identification c. Goal setting d. Strategy and Target group identification e. Planning the campaign f. Running the campaign g. Measurement of the efficacy of the campaign (Any area of nutrition can be chosen)	**30**

References:

Rice, R. E., Atkin, C. K. (2001). Public Communication Campaigns. United Kingdom: Sage Publications.

Contento, I. R. (2016). Nutrition Education: Linking Research, Theory, and Practice. United States: Jones & Bartlett Learning.

Sustainable Health Through Food, Nutrition, and Lifestyle. (2023). Germany: Springer Nature Singapore.

Evaluation:

2 CREDITS COURSE FOR TOTAL MARKS OF 50	
CONTINUOUS INTERNAL EVALUATION:	**MARKS**
Class participation, Process of development of the campaign	15
Evaluation of the campaign as a presentation	10
Total Marks for Internal Assessment	**25**
SEMESTER-END EXAMINATION	**MARKS**
All questions are compulsory with internal choice.	
Question 1	10
Question 2	10
Question 3 Viva	05
Total Marks for Semester End Examination	**25**
TOTAL MARKS FOR THE COURSE	**50**

Course 6
On the Job Training

MSc (Home Science – Foods, Nutrition and Dietetics)
(Under NEP)

Level: 6.0

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

Course Code	Course Name	Th/ Practical	Credits	Hours
FND02C6	**On Job Training/Field Project**	**Practical**	**4**	**120**

Course Objectives:
The course aims to:

1. Introduce students to Foods, Nutrition and Dietetics related agency/organization and understand the nature of work offered.
2. Enhance subject related knowledge base development and learn to apply theoretical learnings on field.
3. Develop ethics and skill-sets required to be a Foods, Nutrition and Dietetics professional.
4. Develop a creative/innovative and entrepreneurial mind-set through working in and observing the organisation.
5. 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 No.	Course Outcome
CO1	Identify different agencies/organizations related to Foods, Nutrition and Dietetics catering to people with different ages and needs.
CO2	Enhance knowledge of the subject and be able to apply theories of Foods, Nutrition and Dietetics in the professional space
CO3	Develop and demonstrate skill-sets and ethics expected out of a Foods, Nutrition and Dietetics professional.
CO4	Apply creative, innovative and /or entrepreneurial concepts into professional practical settings
CO5	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 Foods, Nutrition, and Dietetics Department.

- Acquaintance with Human Resource and Resource Management Policies (specifically with Food and Nutrition) 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 field of Foods, Nutrition and Dietetics/Applied Nutrition/ Food Processing and Preservation/ Dietetics/Public Health and Nutrition/Sports and Fitness Nutrition.**
    - Food Industry: Gain theoretical and practical insights into food production, quality control, and adherence to industry standards.
    - Clinical Internship: Gain theoretical and practical insights in clinical settings, understanding patient nutrition requirements and therapeutic diets.
    - Sports and Fitness Nutrition Internship: Gain theoretical and practical insights of nutrition principles in sports and fitness settings.
    - Public Health Nutrition and Applied Nutrition: Gain theoretical and practical insights of issues in public health and public nutrition and identify methods to resolve it.

3. **Hands-On Training and Skill Development**

- Equipment Use: Gain hands-on experience with equipment and tools related to the area of Foods, Nutrition and Dietetics – Food production, processing and preservation; quality assessment and control, sensory evaluation; nutritional assessment and anthropometry; assessment, workflow process and counselling software.
- Digital Media, Communication & Technology Application (if applicable in the in the particular set up): Understand the application of technology – mechanical/AI/Robotics in food production, preservation and processing, nutritional assessment and diagnosis; utilizing relevant tools, equipment, and interpretation software.
- Hands-On Projects and Case Studies: (One or more as applicable)
    - ❖ Product quality control and product development
    - ❖ Diet Planning and Management: Apply tools and methods for diet assessment, planning and managing food production and service in real-world scenarios.
    - ❖ Counselling Experience: Engage in counselling sessions in both in-patient (IPD) and out-patient (OPD) settings.
    - ❖ Action research in: Food Industry/Sports and Fitness/Dietetics/Nutrition Communication/Public Health Nutrition
    - ❖ Content Development for consumer/patient 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 Foods, Nutrition, and Dietetics.
5. **Inculcation of a mind-set of Research, Creativity, Innovation, and Entrepreneurship (One or more as applicable)**
    - Make a study of the organisation'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.
- Nutrition Communication Resources: Create communication resources, prototypes, or models to convey nutritional 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 and nutrition regulatory bodies
- Foods and nutrition organizations working with sustainability concepts
- Governmental and non-governmental organizations pertaining to food, nutrition/sports/fitness/dietetics and /or public health and nutrition
- Diet departments in hospitals
- Nutrition Clinics
- Sports and fitness industry, centers or entrepreneurs
- Global online internship programmes
- Foods, Nutrition, Dietetics and /or Sports and fitness startups
- Quantity meal production and service units, cloud kitchens
- Organizations working with regulatory affairs in Foods, Nutrition and Dietetics

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 fulfils 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 1-3 hours.

Evaluation of On-Job-Training Course (4 Credit Course)

4 CREDITS COURSE FOR TOTAL MARKS OF 100	
INTERNAL EVALUATION	
• Online diary	25
• Mid-term interaction and case study presentation	25
Total Marks for Internal Assessment	**50**
EXTERNAL EVALUATION	
• OJT Documentation & Report	25
• Case Study/ Project Presentation	10
• OJT Viva	15
Total Marks for External Evaluation	**50**
TOTAL MARKS FOR THE OJT COURSE	**100**

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	Sign
Prof. Dr. Vishaka Ashish Karnad (Professor, I/C Principal & Chairperson Board of Studies in Home Science)	College of Home Science Nirmala Niketan	
Ms. Vibha Hasija Assistant Professor Head of Department & Member of the Board of Studies in Home Science	College of Home Science Nirmala Niketan	
Ms. Fatima Aziz Kader Assistant Professor	College of Home Science Nirmala Niketan	
Dr. Sheetal Joshi Assistant Professor	College of Home Science Nirmala Niketan	
Dr. Minelly Rodrigues Assistant Professor	College of Home Science Nirmala Niketan	

Sign of Head of the Institute

Sign of Dean

Name of the Head of the Institute
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 – Foods, Nutrition and Dietetics)

1.	Necessity for starting the course:	The M.Sc. programme in Foods, Nutrition and Dietetics has been thoughtfully designed to ensure that all aspects of the National Education Policy (NEP) has been translated into the teaching learning framework. The programme provides detailed and deep knowledge about fundamental concepts of the science of Foods, Nutrition and Dietetics along with provision of advanced concepts of the subject, taking into cognizance the dynamic nature of the field. There is adequate inclusion of recent research applications, translational research concepts, evidence based practices and current and emerging trends in the field. The programme places a strong emphasis on fostering essential skills, inter and multidisciplinary thinking and practices, ability to be suited to the industry for employability and entrepreneurship, intellectual curiosity, scientific attitude, creativity, and a spirit of service. It offers a well-balanced blend of academic knowledge and hands-on application, ensuring students receive thorough disciplinary training while also encouraging a cross-disciplinary approach.
2.	Whether the UGC has recommended the course:	YES
3.	Whether all the courses have commenced from the academic year 2023-2024:	Master's Course (Home Science – Foods, Nutrition and Dietetics) 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 NOT Self-Financed. Adequate number of eligible permanent faculties are NOT recruited. Sanctioned Faculty Positions: 8 Currently filled faculty positions are '4' and awaiting NOCs for '4' sanctioned post. In the meanwhile visiting faculty are recruited.
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: 10 Number of admissions given in the current academic year: 10
7.	Opportunities of Employability/ Employment available after undertaking these courses:	Over the past several years, our students have found successful positions in various sectors such as food industry, NGOs, hospitals, and academia. Many have established their own businesses as Food Entrepreneurs and Dietetic and Public Health consultants. Furthermore, a substantial number of students opt to pursue higher education at international universities. This syllabus restructuring in accordance with the goals of NEP 2020 will continue to provide high levels of employment opportunities. The course provides knowledge and skills of advanced concepts in all areas of Foods, Nutrition and Dietetics as well as emphasis on practical skills and applications significantly, both in accordance to industry needs. New trends and multidisciplinary approaches to health management have been included. This will make our students highly employable. Innovation and Entrepreneurship has been included in the programme to provide the students with the mind-set and skills to start their venture in the field.

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