AC –24/05/2024
Item No. –8.4 (N)

As Per NEP 2020

University of Mumbai

Title of the program

A. U.G. Certificate in **Home Science - Foods Nutrition and Dietetics**

B. U.G. Diploma in **Home Science - Foods Nutrition and Dietetics**

C. B.Sc. (**Home Science - Foods Nutrition and Dietetics)**

D. B.Sc. (Hon.) in **Home Science - Foods Nutrition and Dietetics**

E. B.Sc. (Hons. with Research) in **Home Science - Foods Nutrition and Dietetics**

Syllabus for Semester – Sem I & II
Ref: GR dated 20th April, 2023 for Credit Structure of UG

(With Effect from the Academic Year 2024-2025 Progressively)

University of Mumbai

(As per NEP 2020)

Sr. No.	Heading	Particulars	
1	**Title of program** **O:_____A**	**A**	U.G. Certificate in Home Science - Foods Nutrition and Dietetics
	O:_____B	**B**	U.G. Diploma in Home Science - Foods Nutrition and Dietetics
	O:_____C	**C**	B.Sc. (Home Science - in Foods Nutrition and Dietetics)
	O:_____D	**D**	B.Sc. (Hons.) in Home Science - Foods Nutrition and Dietetics
	O:_____E	**E**	B.Sc. (Hons. with Research) in Home Science - Foods Nutrition and Dietetics
2	**Eligibility** **O:_____A**	**A**	Higher Secondary Education 10+2 OR Passed Equivalent Academic Level 4.0
	O:_____B	**B**	Under Graduate Certificate in Home Science/Science/Arts/any field OR Passed Equivalent Academic Level 4.5
	O:_____C	**C**	Under Graduate Diploma in Home Science/Science/Arts/any allied field OR Passed Equivalent Academic Level 5.0
	O:_____D	**D**	Bachelors of Home Science/Science/Arts/any allied field with minimum CGPA in 7.5 OR Passed Equivalent Academic Level 5.5
	O:_____E	**E**	Bachelors of in Home Science/Science/Arts/any allied field with minimum CGPA in 7.5 OR Passed Equivalent Academic Level 5.5
3	**Duration of program** **R: _____**	**A**	One Year
		B	Two Years
		C	Three Years
		D	Four Years
		E	Four Years
4	**Intake Capacity** **R: _____**	200 in the First Year (Allocation of Seats in Major, Minor and other components will be done into the four specializations of Home Science based on Choice and Merit across the Semesters)	

5	**Scheme of Examination** **R: _____**	NEP • 40% Internal • 60% External, Semester End Examination Individual Passing in Internal and ExternalExamination is mandatory	
6	**R:_____Standards of Passing**	40%	
7	**Credit Structure** **Sem. I - R:_____A** **Sem. II - R:_____B**	Attached herewith	
	Credit Structure **Sem. III - R:_____C** **Sem. IV - R:_____D**		
	Credit Structure **Sem. V - R:_____E** **Sem. VI - R:_____F**		
8	**Semesters**	A	Sem I & II
		B	Sem III & IV
		C	Sem V & VI
		D	Sem VII & VIII
		E	Sem VII & VIII
9	**Program Academic Level**	A	4.5
		B	5.0
		C	5.5
		D	6.0
		E	6.0
10	**Pattern**	Semester	
11	**Status**	New	
12	**To be implemented from Academic Year Progressively**	From Academic Year: 2024-25	

Sign of the BOS Chairperson
Name of the Chairman
Prof. Dr. (Mrs.) Vishaka Ashish Karnad
Name of the BOS Home Science

Sign of the Offg. Associate Dean
Name of the Associate Dean
Name of the Faculty

Sign of theOffg. Dean
Name of the Offg. Dean
Name of the Faculty

Preamble

Introduction:

Home Science is an interdisciplinary science, which offers holistic and socially-relevant educational program. Home Science has emerged as a full-fledged scientific course in which overall improvement in the quality of life of the individual, family, and community is sought. There is a prominent emphasis on professional competence and sensitivity to the needs of society. The degree courses are B.Sc. (Home Science), M.Sc. (Home Science) and Ph.D. (Home Science).

The four major areas of specialization are as follows:

- Foods, Nutrition and Dietetics
- Human Development
- Textile and Fashion Technology
- Community Resource Management

The program offers major and minor courses along with open electives (OE), ability enhancement courses (AEC), IKS, value education (VEC) vocation skill (VSC)based projects, field (FP) and research projects (RP) with due credits along with credits for cocurricular (OC) activities. It is designed in a wholesome manner and structured to impart knowledge, skills and attitudes aiming at personal, professional, career and community growth and enrichment and holistic development of individuals capable of contributing to society for national and global challenges and idiosyncrasy to be considered strongly for sustainability.

Objectives of the Program:

The objectives of the Home Science curriculum are as follows:

PO No.	After completing the program, the student should have	Graduate Attribute
PO1	the capability of demonstrating comprehensive knowledge and understanding of Home Science	Disciplinary knowledge
PO2	good language skills and the ability to express thoughts and ideas verbally as well in writing and effectively communicate the same using appropriate media suitable for different target groups	Communication Skills
PO3	competence of applying disciplinary knowledge and the ability to critically analyze and evaluate data, practices, policies and theories for knowledge development	Critical thinking
PO4	skill to identify problems and to apply disciplinary knowledge to tide over real life situations	Problem solving
PO5	aptitude to evaluate the reliability and relevance of a knowledge body, identify lacunae, analyze and draw valid conclusions	Analytical reasoning
PO6	develop a sense of enquiry and the capability for asking relevant questions for scientific understanding, along with the ability to recognize cause-and-effect relationships, define problems and plan, execute and report the results of an experiment	Research-related skills Scientific reasoning
PO7	ability to work effectively with diverse teams facilitating cooperative effort	Cooperation/Team work
PO8	ability to apply the skills, knowledge and competencies learned in through laboratory training at the personal, household, community and professional level	Reflective thinking
PO9	skill to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data and its application for different purposes	nformation/digital literacy
PO10	ability to work independently, identify appropriate resources required for a project, and manage a project through completion.	Self-directed learning
PO11	awareness of the values and beliefs of multiple cultures and the ability to interact and reflect appropriately with diverse groups with respect.	Multicultural competence
PO12	capacity to imbibe moral and ethical values and do away with falsification and plagiarism in personal and professional life. Also, the ability to identify ethical issues related to environmental and sustainability thereby developing the skill to practice unbiased actions in all aspects.	Moral and ethical awareness/reasoning
PO13	capability of planning, organizing, executing and controlling various activities with a sense of responsibility and commitment along with the skill to motivate, inspire and encourage team work in an efficient way.	Leadership readiness/qualities

1. To impart knowledge and facilitate the development of skills and techniques in the basic area of Home Science required for personal, professional and community advancement.

PO14	the competencies and acquire openness for participating in learning activities throughout life, through self-paced and self-directed learning, focusing at personal development to meet economic, social and cultural objectives and the changing trends and demands of the industry and society.	Lifelong learning

2. To inculcate in students, values and attitudes that enhance personal, life skills and family growth and to sensitize them to various social issues for the development of a humane society.
3. To promote in students a scientific temper and competencies in research to enable contributions to the national and international knowledge base in Home Science and allied fields.
4. In sum, to empower our students such that they can effect positive changes at multiple levels.

1) **Credit Structure of the Program (Sem I, II, III, IV, V & VI)**
2) **Under Graduate Certificate Home Science – Foods, Nutrition and Dietetics**

Credit Structure (Semester I & II)

R: _____A

Level	Semester	Major		Minor	OE	VSC, SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Cum. Cr./ Sem.	Degree/ Cum. Cr.
		Mandatory	Electives							
4.5	I	**6 Fundamentals of Human Nutrition I** (Theory) (2 cr) **Basic Principles of Human Physiology** (Theory) (2 cr) **Food Analysis and Nutritional Assessment** (Practical) (2 cr)		-	2+2	**VSC:2 + SEC:2 Food Analysis and Nutritional Assessment**	**AEC:2, VEC:2 IKS:2**	**CC:2**	**22**	**UG Certificate 44 Credits**
	R: _____B									
	II	**6 Fundamentals of Human Nutrition II** (Theory) (2cr) **Principles of Food Science** (Theory) (2 cr) **Applications of Food Science** (Practical) (2 cr)		**2**	**2+2**	**VSC:2 + SEC:2 Applications of Food Science**	**AEC:2, VEC:2**	**CC:2**	**22**	
	Cum Cr.	**12**	**-**	**2**	**8**	**4+4**	**4+4+2**	**4**	**44**	

***Note: It is important to opt for these Vocation Skill Course VSC /Skill Enhancement Course SEC from core subjects other than the Major/Minor Streams and other than the courses previously covered across as allocated in Semesters I, II, III, IV. The ratios for groups formed for the major, minor streams and optional elective courses along with the VSC/SEC will be decided on an equitable basis considering the teaching and learning workload. The number of seats for a VSC/SEC will be decided by the admission committee.**

Exit option: Award of UG Certificate in Major with 40-44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor

Under Graduate Diploma Home Science – Foods Nutrition and Dietetics
Credit Structure (Semester III & IV)

		R:_____C								
Level	**Semester**	**Major**		**Minor**	**OE**	**VSC, SEC (VSEC)**	**AEC, VEC, IKS**	**OJT, FP, CEP, CC, RP**	**Cum. Cr. / Sem.**	**Degree/ Cum. Cr.**
		Mandatory	**Electives**							
5.0	**III**	**8** Nutritional Biochemistry I (Theory) (2 cr) Food Microbiology (Theory) (2 cr) Nutrition in Adulthood, Pregnancy and Lactation (Theory) (2 cr) Meal Planning for Health (Practical) (2 cr)		**4**	**2**	**VSC:2**	**AEC:2**	**FP: 2** **CC:2**	**22**	**UG Diploma** **88 Credits**
	R:_____D									
	IV	**8** Nutritional Biochemistry II (Theory) (2 cr) Food Preservation (Theory) (2cr) Childhood, Adolescent and Geriatric Nutrition (Theory) (2cr) Meal Planning for Disease Management (Practical) (2 cr)		**4**	**2**	**SEC:2**	**AEC:2**	**CEP: 2** **CC:2**	**22**	
	Cum Cr.	**28**	**-**	**10**	**12**	**6+6**	**8+4+2**	**8+4**	**88**	

***Note: It is important to opt for these Vocation Skill Course VSC /Skill Enhancement Course SEC from core subjects other than the Major/Minor Streams and other than the courses previously covered across as allocated in Semesters I, II, III, IV. The ratios for groups formed for the major, minor streams and optional elective courses along with the VSC/SEC will be decided on an equitable basis considering the teaching and learning workload. The number of seats for a VSC/SEC will be decided by the admission committee.**

Exit option: Award of UG Diploma in Major and Minor with 80-88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor

Under Graduate B.Sc. Home Science – Foods Nutrition and Dietetics
Credit Structure (Semester V & VI)

Level	Semester	Major		Minor	OE	VSC, SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC, RP	Cum. Cr. /Sem.	Degree/ Cum. Cr.
		Mandatory	Electives							
		R: _____E								
5.5	V	**10** **Clinical Nutrition and Diet Therapy - I** (Theory) (4 cr) **Advanced Concepts in Human Nutrition – I** (Theory) (2 cr) **Food Analysis and Food Microbiology** (Practical) (2 cr) **Diet Therapy** (Practical) (2 cr)	**4** **Elective 1** **Food Psychology and Nutrition Counselling** (Theory) (2 cr) **Food Psychology and Nutrition Counselling** (Practical) (2 cr) **Elective 2** **Food Styling and Content Creation** (Theory) (2 cr) **Food Styling and Content Creation** (Practical) (2 cr)	**4**		**VSC: 2**		**FP/CEP: 2**	**22**	**UG Degree 132 Credits**
		R: _____F								
	VI	**10** **Clinical Nutrition and Diet Therapy II** (Theory) (2 cr) **Advanced Concepts in Human Nutrition II** (Theory) (2 cr) **Food Processing** (Theory) (2 cr) **Food Analysis and Nutritional Biochemistry** (Practical) (2 cr) **Diet Therapy** (Practical) (2 cr)	**4** **Elective 1** **Entrepreneurship in Food Production and Services** (Theory) (2 cr) **Entrepreneurship in Food Production and Services** (Practical) (2 cr) **Elective 2** **Entrepreneurship in Dietetic Services** (Theory) (2 cr) **Entrepreneurship in Dietetic Services** (Practical) (2 cr)	**4**				**OJT: 4**	**22**	
	Cum Cr.	**48**	**8**	**18**	**12**	**8+6**	**8+4+2**	**8+6+4**	**132**	

***Note: It is important to opt for these Vocation Skill Course VSC /Skill Enhancement Course SEC from core subjects other than the Major/Minor Streams and other than the courses previously covered across as allocated in Semesters I, II, III, IV. The ratios for groups formed for the major, minor streams and optional elective courses along with the VSC/SEC will be decided on an equitable basis considering the teaching and learning workload. The number of seats for a VSC/SEC will be decided by the admission committee.**

Exit option: Award of UG Degree in Major with 132 credits OR Continue with Major and Minor

[Abbreviation - OE – Open Electives, VSC – Vocation Skill Course, SEC – Skill Enhancement Course, (VSEC), AEC – Ability Enhancement Course, VEC – Value Education Course, IKS – Indian Knowledge System, OJT – on Job Training, FP – Field Project, CEP – Continuing Education Program, CC – Co-Curricular, RP – Research Project]

Semester - I

Under Graduate Certificate in Home Science

B.Sc. Home Science - Foods Nutrition and Dietetics

Credit Structure (Semester I)

Syllabus
B.Sc. Home Science – Foods, Nutrition and Dietetics
(Semester - I)
MAJOR

Course Code	Course Title	Theory/ Practical	Hours	Credits
	Fundamentals of Human Nutrition I	**Theory**	**30**	**2**

Course Objectives:

The course enables learners to:

- Understand the process of digestion, absorption and metabolism of Macronutrients.
- Comprehend the process of obtaining macronutrients from various food sources for optimum utilization to maintain overall health and prevent deficiency disorders
- Grasp and apply the nutrient requirements, functions and effects of deficiency of macronutrients for health
- Identify signs, symptoms and effects of nutritional deficiency or nutrient excess
- Recommend food sources of the macronutrients in the right proportion for maintaining optimal health

Course Outcomes	
At the successful completion of the course, students will be able to:	
CO1	Understand fundamental concepts of nutrition, nutrient metabolism, balanced diet, role of macronutrient in energy balance and other essential functions of human nutrition
CO2	Comprehend and summarize the various types of macronutrients (their classification), their sources, their distinct characteristics and specific role in human nutrition
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 effects of optimal nutrient intake, nutrient deficiency and excess and identify common reasons for deficiency disorders or excess.
CO5	Plan various solutions in terms of food combinations and food processing techniques to obtain desired nutritional status.
CO6	Interpret the role of food consumption, balanced diet in relation to human nutrition and health.

S. No.	Course Content	Hours
1.	**1. Introductory Nutrition:** Important terminologies and concepts in Nutrition such as: · Nutrient (Macro & Micro nutrient), Nutrition · Balanced diet · Food groups and Food guide · Food pyramid and food plate concept · Malnutrition **2. Energy:** · Estimation of food energy and human energy requirements · Components of energy expenditure (BMR, AIT/Physical activity & TEF) · Energy excess and deficiency · Factors influencing & Requirements of energy expenditure **3. Nutrient Requirements and various terminologies** (EAR, RDA, ANR, TUL, etc.) · Reference Indian Man and Woman · RDA/EAR – Limitations and Uses **4. Carbohydrate:** Classification of carbohydrate and dietary fibre classification, food sources · Digestion and absorption of carbohydrates · Functions of digestible carbohydrate · Functions of dietary fibre · Carbohydrate requirements · Carbohydrate deficiency and excess	**15**
2.	**1. Protein:** · Structure of protein, amino acid classification based on nutrition essentiality, methods for assessing food protein quality and improving protein quality of diet · Digestion and absorption of protein · Functions of Protein · Protein requirements · Protein deficiency and excess **2. Fats:** · Structure of fats · Classification of fats and fatty acids (chain length, degree of saturation, cis and trans fats) · Sources of fats and fatty acids · Essential fatty acids · Fat digestion and absorption (Lipoprotein metabolism in brief) · Functions of lipids, Cholesterol and prostaglandins (Functions) · Requirements of fats and fatty acids · Fat Deficiency and excess **3. Water** · Distribution of water in human body (ICF &ECF) · Functions · Water intake and hydration (with special reference to infants, sports person and elderly) · Dehydration and Water toxicity · Oral rehydration solution	**15**

References:

Bamji, M. S. (2019). Textbook of Human Nutrition. India: Oxford & IBH Publishing Company Private, Limited.

Gopalan, C et al (2004). Nutritive value of Indian Foods, NIN, ICMR, Hyderabad

Nutrient Requirements and Recommended Dietary Allowances for Indians: A Report of the Expert Group of the Indian Council of Medical Research, (2010). India: Indian Council of Medical Research.

Nutrient Requirements for Indians, A report of the expert group (2020). Indian council of Medical Research, National Institute of Nutrition

Srilakshmi, B., (2003), Nutrition Science, New Age International Ltd.

Syllabus
B.Sc. Home Science – Foods, Nutrition and Dietetics
(Semester - I)
MAJOR

Course Code	Course Title	Theory/ Practical	Hours	Credits
	Basic Principles of Human Physiology	**Theory**	**30**	**2**

Course Objectives:

The course enables learners to:

- Understand the basics of human anatomy and physiology; and the structure and functions of various organs of the body.
- Comprehend newer and applied concepts of human physiology.
- Develop the skills of application of the principles of physiology in health and disease management.

Course Outcomes

At the successful completion of the course, students will:	
CO1	Gain the basic knowledge of human anatomy and physiology.
CO2	Understand the various interactions between physiological processes in the body.
CO3	Be able to define, explain and relate the structure and functions of cells, tissues and organ systems of the human body.
CO4	Have the skills to apply the concepts of physiology to health.

S. No.	Course content	Hours
1.	**Introduction to Human Body** · Organs, tissue and cells, cell structure, organelles and their functions. **Cardiovascular System** · Blood Composition, functions, blood groups · Heart – Structure, blood vessels, cardiac cycle · Circulation of blood, blood pressure, hypertension and heart attack. **Lymphatic System** · Structure and function of lymph, lymph vessels and nodes. · Role of lymphatic system in disease and immunity. **Digestive System** · Structure and functions of parts of digestive system – stomach, liver, gall bladder, pancreas · Digestion and absorption of proteins, fats and carbohydrates. · Endocrine System · Overview of endocrine glands and their functions	**15**

2.	**Nervous System** · Structure and function of neurons, brain and spinal cord. · Hypothalamus and its functions. **Skeletal System** · Structure, formation and types of bones. **Respiratory System** · Structure and functions of respiratory organs. · Role of lungs in exchange of gases. **Renal and Urinary System** · Structure and function of kidney · Factors affecting urine formation and excretion. **Reproductive System** · Overview of structure and function of male and female reproductive system.	**15**

References:

Vaz, M., Raj, T. (2016). Guyton & Hall Textbook of Medical Physiology - E-Book: A South Asian Edition. India: Elsevier Health Sciences.

Hall, J. E. (2015). Guyton and Hall Textbook of Medical Physiology E-Book. United Kingdom: Elsevier Health Sciences

Makari, H. K., Gurumurthy, H., Sowmya, S. V. (2009). A Textbook of Human Physiology. India: I.K. International Publishing House Pvt. Limited.

Basics of Medical Physiology for Nursing Students. (2019). India: Repro India Limited.

Fundamentals of Anatomy and Physiology: For Nursing and Healthcare Students. (2020). United Kingdom: Wiley.

Shankar, N. D., Vaz, M. (2017). Textbook of Anatomy and Physiology for Nurses - E-Book. India: Elsevier Health Sciences

Syllabus
B.Sc. Home Science – Foods, Nutrition and Dietetics
(Semester - I)

VSC/SEC

***Note: It is important to opt for these Vocation Skill Course VSC /Skill Enhancement Course SEC from core subjects other than the Major/Minor Streams and other than the courses previously covered across as allocated in Semesters I, II, III, IV. The ratios for groups formed for the major, minor streams and optional elective courses along with the VSC/SEC will be decided on an equitable basis considering the teaching and learning workload. The number of seats for a VSC/SEC will be decided by the admission committee.**

Course Code	Course Title	Theory/ Practical	Hours	Credits
	Food Analysis and Nutritional Assessment	**Practical**	**60**	**2**

Course Objectives:

The course enables learners to:

- Understand the basic techniques of food analysis and biochemistry.
- Use various techniques to identify food adulteration.
- Apply fundamental nutritional assessment protocols for determination of nutritional status.

Course Outcomes:

At the successful completion of the course, the student will be enabled to:	
CO1	Describe the principles that are involved in various analytical techniques used in the laboratory.
CO2	Understand the functioning of different laboratory equipment.
CO3	Apply the knowledge of concepts in human nutrition to select appropriate techniques of determination in the laboratory.
CO4	Analyze the quality of different foods.
CO5	Be able to develop protocols for rapid assessment of nutritional status of individuals.
CO6	Evaluate the nutritional status of individuals using basic tests of assessment.

S.No.	Course Content	Hours
1.	**A. Standardization of solutions** i. Acid-base titrations ii. Redox titration **B. Carbohydrates:** i. Qualitative analysis of carbohydrates- Identification of sugars. ii. Estimation of reducing sugars in fruit juice by Cole's Method. iii. Estimation of Lactose in milk by Cole's method. iv. Analysis of crude fibre in food. **C. Proteins:** Qualitative analysis of Protein in food i. Color reactions of amino acids ii. Precipitation reactions of proteins **D. Lipids:** i. Qualitative tests for lipids. ii. Determination of Acid value of fats and oils.	**30**

2.	**A. Vitamins:** Estimation of Vitamin C in fruits and vegetables by 2,6- dichlorophenol indophenol dye method. **B. Minerals:** i. Preparation of ash from food samples. ii. Qualitative analysis of minerals (Calcium, Iron and Phosphorus). **C. Determination of adulteration in common foods.** **D. Nutritional Assessment** i. Weight and height measurement for infants, children and adults. ii. Assessment of clinical signs and symptoms of different macronutrient and micronutrient deficiencies.	**30**

References:

Gibson, R. S. (2005). Principles of Nutritional Assessment. United Kingdom: Oxford University Press.

Food Safety and Standards Authority of India (FSSAI). Detect Adulteration with Rapid Test (DART) Handbook. Common Quick tests for detection of some adulterants at household.

Nielsen S. (2003). Food Analysis. India: Springer US.

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

Semester - II

Under Graduate Certificate in Home Science

B.Sc. Home Science - Foods Nutrition and Dietetics

Credit Structure (Semester II)

Syllabus
B.Sc. Home Science – Foods, Nutrition and Dietetics
(Semester - II)
MAJOR

Course Code	Course Title	Theory/ Practical	Hours	Credits
	Fundamentals of Human Nutrition II	**Theory**	**30**	**2**

Course Objectives:

The course enables learners to:

- Understand the process of digestion, absorption and metabolism of Micronutrients.
- Comprehend the process of obtaining micronutrients from various food sources for optimum utilization to maintain overall health and prevent deficiency disorder
- Grasp and apply the nutrient requirements, functions and effects of deficiency of micronutrients for health.
- To help students identify signs, symptoms and effects of nutritional deficiency or nutrient excess.
- Recommend food sources of the micronutrients in the right amounts for maintaining optimal health

Course Outcomes	
At the successful completion of the course, students will be able to:	
CO. No.	**Course Outcomes**
CO1	Understand fundamental concepts of the role of vitamins and minerals in human nutrition
CO2	Comprehend and summarize the occurrence, availability and stability of micronutrients in food in terms of serving size and cooking methods
CO3	Apply the information on functions of micronutrients and their food sources in understanding the prevalence of deficiency disorders
CO4	Compare the effects of optimal micronutrient intake, nutrient deficiency and excess and identify common reasons for deficiency disorders or excess.
CO5	Plan various solutions in terms of food combinations and food cooking and processing techniques to meet the micronutrient requirements.
CO6	Interpret the inter-relationship of various nutrients both positive and negative so as to workout ideal food combination to improve micronutrient status.

S.No.	Course Content	Hours
1.	**Vitamins:** Basic structures, forms and their stability, food sources, digestion, absorption and metabolism, functions, deficiency (causes, signs and symptoms), toxicity and requirements Vitamins – Fat soluble vitamins · Vitamin A · Vitamin D · Vitamin E · Vitamin K Vitamins – Water soluble vitamins · Vitamin B Complex · Vitamin C	15
2.	**Minerals:** Occurrence and their stability, food sources, digestion, absorption and metabolism, functions, deficiency (causes, signs and symptoms), toxicity and requirements **Macro-minerals:** Calcium, Phosphorus, Sodium, Potassium, Magnesium, Chloride and Sulphur **Micro minerals:** Iron, Copper, Zinc, Manganese, Iodine, Fluorine **Trace Minerals:** Selenium and Chromium	15

References:

Bamji, M. S. (2019). Textbook of Human Nutrition. India: Oxford & IBH Publishing Company Private, Limited.

Gopalan, C et al (2004), Nutritive value of Indian Foods, NIN, ICMR, Hyderabad

Nutrient Requirements and Recommended Dietary Allowances for Indians: A Report of the Expert Group of the Indian Council of Medical Research. (2010). India: Indian Council of Medical Research.

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Srilakshmi, B., (2003), Nutrition Science, New Age International Ltd.

Swaminathan, M., (1998), Essentials of Food and Nutrition.2nd edition, volume I&II, Printing & Publishing, Bangalore

Guthrie, H., (1986), Introductory Nutrition,6th edition Times Mirror/Mosby college Publication.

Dietary Guidelines for Indians: A Manual. 2nd Edition (2011). India: National Institute of Nutrition.

Longvah, T., Ananthan, I., Bhaskarachary, K., Venkaiah, K. (2017). Indian Food Composition Tables. India: National Institute of Nutrition, Indian Council of Medical Research.

Syllabus
B.Sc. Home Science – Foods, Nutrition and Dietetics
(Semester - II)
MAJOR

Course Code	Course Title	Theory/ Practical	Hours	Credits
	Food Science	**Theory**	**30**	**2**

Course Objectives:

The course enables learners to:

- Acquire knowledge of various fundamental concepts in Food Science, its facts and principles.
- Study the different methods of heat transfer involved in different cooking methods.
- Understand nutritional importance of various food groups.
- Develop the ability to select and apply the principles of Food Science to practical situations.

Course Outcomes	
At the successful completion of the course, the student will be able to:	
CO1	Understand fundamental concepts in food science
CO2	Describe the underlying principles involved in various methods of heat transfer
CO3	Differentiate between different methods of cooking
CO4	Analyze the changes occurring in food with storage and basic processing
CO5	Have the necessary skills to design nutritious recipes
CO6	Evaluate, select and use the best cooking method suitable to a particular food

S.No.	Course Content	Hours
1.	**A. Concept of Food Science** **B. Cooking** i. Reasons for cooking foods ii. Methods of heat transfer- Conduction, convection and radiation iii. Cooking Methods Moist heat methods, Dry heat methods & Combination methods Brief Introduction to principles of solar cooking, microwave cooking and induction cooking. **C. Introduction to various food groups** Classification, structure, nutritive value, selection, storage and elementary principles of cooking involved in the following food groups: **i. Cereals and millets** · Difference between cereals and millets · Structure of a cereal grain · Nutritive value of cereals · Gelatinization and dextrinization · Gluten formation in dough **ii. Pulses and Legumes** · Nutritive value of pulses and legumes · Anti-nutritional factors in pulses · Elementary Principles of cooking · Role in pulses in cookery **iii. Nuts and Oilseeds** · Classification · Nutritional significance · Role in cookery **iv. Fats and oils** · Visible and invisible fat in food · Nutritional significance · Smoke point, flash point and fire point of fats and oils · Hydrolytic and oxidative rancidity in fats and oils · Oil extraction- Pressing method and rendering · Hydrogenation process · Role in cookery · Emulsions: Temporary and permanent	**15**

2.	**A. Introduction to various food groups** Classification, structure, nutritive value, selection, storage and elementary principles of cooking involved in the following food groups: **i. Sugar, Jaggery and related products** · Production of sugar and Jaggery · Properties of sugar · Role in cookery · Brief introduction to other sugar based products- Honey, molasses, corn syrup, high fructose corn syrup, maple syrup and low caloric/ non caloric sweeteners. **ii. Vegetables & Fruits** · Classification · Composition and nutritive value · Selection and storage · Ripening of fruits · Enzymatic browning · Changes during cooking and Conservation of nutrient loss during cooking · Pectic substances in fruits and gel formation · Fruit and vegetable pigments **iii. Milk** · Composition and nutritive value of milk · Milk cookery- Effect of acid, enzyme and heat on milk · Milk processing- Clarification, Pasteurization and homogenization. · Brief introduction to fermented and non-fermented products made from milk. **iv. Meat** · Types/ classes of meat · Structure of muscle · Composition and nutritive value · Post mortem changes in meat · Tenderization of meat **v. Fish** · Classification · Nutritive value · Selection · Spoilage of fish **vi. Poultry (Chicken and eggs)** · Structure of eggs · Composition and Nutritive value · Evaluation of egg quality · Physical and chemical changes during storage · Role of eggs in cookery · Classification of poultry · Composition and nutritive value · Processing of poultry **vii. Spices, Condiments and herbs** · i. Active ingredients · ii. Role in cookery	**15**

References:

Arora K. (2008). Theory of Cookery. New Delhi: Frank Bros. and Co. Ltd.

Bennion, M. and Scheule B. (2015). Introductory Foods. Pearson

Manay, S. N. and Shadaksharaswamy M. (2020). Food Facts and Principles. New Delhi: New Age International Publishers

MacWilliam M. (2013). Food Fundamentals. Pearson Education.

Srilakshmi. B. (2023) Food Science. New Delhi: New Age International Publishers.

Swaminathan, M. (1991). Food Science & Experimental Foods. Madras: Ganesh & Co.

Syllabus
B.Sc. Home Science – Foods, Nutrition and Dietetics
(Semester - II)
VSC/SEC

***Note: It is important to opt for these Vocation Skill Course VSC /Skill Enhancement Course SEC from core subjects other than the Major/Minor Streams and other than the courses previously covered across as allocated in Semesters I, II, III, IV. The ratios for groups formed for the major, minor streams and optional elective courses along with the VSC/SEC will be decided on an equitable basis considering the teaching and learning workload. The number of seats for a VSC/SEC will be decided by the admission committee.**

Course Code	Course Title	Theory/ Practical	Hours	Credits
	Applications of Food Science	**Practical**	**60**	**2**

Course Objectives:

The course enables learners to:

- Understand principles of food safety and hygiene essential in a food laboratory.
- Become familiar with common ingredients, devices and equipment used in food preparation.
- Become skilled at different cooking methods and techniques used in food preparation.
- Apply the principles that are involved in the preparation of different foods into recipe preparation
- Be able to evaluate food products using techniques of sensory evaluation

Course Outcomes	
At the successful completion of the course, the student will be able to:	
CO1	Understand food safety and hygiene principles essential when handling food
CO2	Identify and use common ingredients and equipment in food preparation
CO3	Apply the knowledge of concepts in food science to prepare foods
CO4	Analyze the changes occurring when cooking food
CO5	Have necessary skills to standardize and develop nutritious recipes
CO6	Evaluate the sensory quality of foods

S.No.	Course Content	Hours

1.	**A. Introduction to Food Science** i. Introduction to Food safety and hygiene principles in the food laboratory. ii. Introduction to food laboratory equipment. iii. Commonly used ingredients in cooking (English and regional names). iv. Weight and volume equivalents v. Temperature conversions vi. Edible portion- Determination of edible portion of foods vii. Measuring Techniques- Use of standard weights and measures. viii. Pre- preparation of food- Techniques used **B. Standardization of recipes, preparation and presentation with respect to the following food science principles in various food groups** **Cereals and millets:** i. Gelatinization and factors affecting gelatinization ii. Dextrinization iii. Gluten Formation- Testing of gluten dough formation in different flours and factors affecting gluten formation. **Pulses and legumes:** i. Germination and fermentation of pulses ii. Use of Texturized Vegetable Proteins (TVPs) in Cooking **Fats and oils:** i. Shallow fat frying and deep fat frying ii. Factors affecting fat absorption during frying.	**30**
2.	**A. Sugar Cookery:** i. Stages of Sugar cookery- Thread, soft ball, firm ball, hard ball, soft crack, hard crack and caramelization. ii. Crystalline and amorphous candies **B. Fruits and vegetables:** i. Prevention of enzymatic browning in fruits and vegetables. ii. Solubility and effect of acid, alkali and heat on vegetable and fruit pigments. **C. Gel formation:** i. Pectin gel formation ii. Gelatin/ agar gel formation **D. Milk:** i. Effect of acid, enzyme and heat on milk proteins- Denaturation and coagulation ii. Maillard browning **E. Eggs:** i. Use of eggs as binding and coating agents ii. Stages of foam formation **F. Emulsions:** i. Temporary and permanent emulsions **G. Introduction to sensory evaluation of food**	**30**

References:

Jamesen, K. (1998). Food Science laboratory manual New Jersey. Prentice Hall. Inc.

McWilliams, M. (2017). Foods experimental perspective. Pearson

Potter, N. N., Hotchkiss, J. H. (2012). Food Science: Fifth Edition. Netherlands: Springer US.

Sethi, M and Rao, S.E. (2001). Food science experiments and applications. New Delhi. CBS Publishers and Distributors.

Srilakshmi. B. (2023) Food Science. New Delhi: New Age International Publishers.

QUESTION PAPER PATTERN

(External and Internal)

B.Sc. SEMESTER I/II/III/IV/V/VI

Evaluation for Theory (4 Credits for 100 Marks)

CONTINUOUS INTERNAL EVALUATION (planned as per the need of the course)	**Marks**
Class participation/Quiz/Review of literature and guided discussions/Q&A sessions	20
Class tests/PPT Presentations and relevant planned assignments	20
Total Marks for Internal Assessment	**40**
SEMESTER-END THEORY EXAMINATION	
All questions are compulsory with internal choice.	
Question 1 – Unit 1	12
Question 2 – Unit 2	12
Question 3 – Unit 3	12
Question 4 – Unit 4	12
Question 5 – From Multiple Units	12
Total Marks for Semester End Examination	**60**

Evaluation for Theory (2 Credits for 50 Marks)

CONTINUOUS INTERNAL EVALUATION (planned as per the need of the course)	**Marks**
Class participation/Quiz/Review of literature and guided discussions/Q&A sessions	10
Class tests/PPT Presentations and relevant planned assignments	10
Total Marks for Internal Assessment	**20**
SEMESTER-END THEORY EXAMINATION	
All questions are compulsory with internal choice.	
Question 1 – Unit 1	10
Question 2 – Unit 2	10
Question 3 – From Multiple Units	10
Total Marks for Semester End Examination	**30**

Evaluation for Practical (2 Credits for 50 Marks)

CONTINUOUS INTERNAL EVALUATION (planned as per the need of the course)	**Marks**
Class Participation/Internal Assessment during laboratory work/experiments/practical tasks	10
Journal/Portfolio/Presentation/Reports/Case papers/Assignments	10
Total Marks for Internal Assessment	**20**
SEMESTER-END PRACTICAL EXAMINATION	
All questions are compulsory with internal choice.	
Question 1 - Unit 1	10
Question 2 - Unit 2	10
Journal/Portfolio/Report/Viva-Voce	10
Total Marks for Semester End Examination	**30**

Question Paper Pattern (NEP Syllabus)

THEORY EXAMINATION

Marks: 30	**1 Hour**
Upto 50% choice to be given within each Question. **Questions may be divided into sub questions as a, b, c….** **Allocation of marks depends on the weightage of the topics in the units; no sub-question should be of 1 mark or less**	
Q1 Unit 1	10 marks
Q2 Unit 2	10 marks
Q3 Mix of Unit 1 and 2	10 marks
TOTAL	**30 Marks**

Marks: 60	**2 Hours**
Up to 50% choice to be given within each Question. **Questions may be divided into sub questions as a, b, c….** **Allocation of marks depends on the weightage of the topics in the units; no sub-question should be of 2 marks or less**	
Q1 Unit 1	12 marks
Q2 Unit 2	12 marks
Q3 Unit 3	12 marks
Q4 Unit 4	12 marks
Q5 Mix of all units	12 marks
TOTAL	**60 Marks**

PRACTICAL EXAMINATION

Marks: 30	**2 Hours**
Q1 Unit 1	10 Marks
Q2 Unit 2	10 Marks
Journal/Portfolio/Report/Viva-Voce	10 Marks
TOTAL	**30 Marks**

Letter Grades and Grade Points

Semester GPA/ Program CGPA Semester/ Program	% of Marks	Alpha-Sign/ Letter Grade Result	Grading Point
9.00 - 10.00	90.0 – 100	O (Outstanding)	10
8.00 - < 9.00	80.0 - < 90.0	A+ (Excellent)	9
7.00 - < 8.00	70.0 - < 80.0	A (Very Good)	8
6.00 - < 7.00	60.0 - < 70.0	B+ (Good)	7
5.50 - < 6.00	55.0 - < 60.0	B (Above Average)	6
5.00 - < 5.50	50.0 - < 55.0	C (Average)	5
4.00 - < 5.00	40.0 - < 50.0	P (Pass)	4
Below 4.00	Below 40.0	F (Fail)	0
Ab (Absent)	-	Ab (Absent)	0

Appendix B

Justification for B.Sc. Home Science – Foods, Nutrition and Dietetics

1.	I	The syllabus for B.Sc. (Home Science – Foods Nutrition and Dietetics formulated with great care in accordance with the National Education Policy (NEP 2020). The program aims at imparting technical knowledge and hands-on skills. It enables learners to acquire fundamental knowledge and skills that are life-oriented, career-oriented and community- oriented, towards building a profession for self-growth and societal welfare. As the specialized fields of industry and education is continuously evolving and the Indian market can expand nationally and globally, this program will empower students through skill-building and knowledge enhancement to meet our nations and global needs. This course has been planned with a foresight into the increasing demand for practical knowledge and skills required in the specific industry of expertise and specialization. It will provide gainful employment opportunities in the ever-expanding technology-driven industry. It is an excellent blend of theory and practical and it has special relevance to specific industries with fundamental knowledge and experience in entrepreneurship skills, fieldwork, rural camp, internship, industrial visits, computer-aided technologies, marketing and skills in the areas of Home Science. Value Education is integral to the curriculum rooting some basic concepts of subjects into Indian Knowledge System (IKS). There are core areas that include theoretical knowledge and practical skill sets training along with vocation based skills with ample opportunities for ability and skill enhancement. It aims at building and nurturing learner's personality as responsible citizens competent with language and intuitive, proactive, positive attitudes, who can bring about a change in society. The program is designed to train students with job relevant skills through laboratory work, on-the-job training and apprenticeship in sustainable start-ups and entrepreneurial ventures, it enables the students to find career paths in the relevant industries research centers NGOs, schools, hospitals, hotels etc. The curriculum is supplemented with extension work and educational trips for experiential learning. The curriculum addresses an understanding of Indian Knowledge System pertaining to traditional culture and heritage and its relation to traditional concepts and practices. It fosters appreciation through multicultural sensitivity. Research and field projects is included as an essential component of the program to develop an innovative and scientific temper. In addition to this, students are encouraged to undertake industry- and socially-relevant field projects and research projects. They are also motivated to participate in research competitions at various levels, publish research findings and engage in networking and collaboration.
2.	Whether the UGC has recommended the course:	Yes
3.	Whether all the courses have commenced from the academic year 2023-24	No
4.	The courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available?	Aided Affiliated to the University of Mumbai Adequate eligible permanent faculty and CHB/visiting faculty appointed for vacant posts till posts sanctioned
5.	To give details regarding the duration of the Course and is it possible to compress the course?	No

6.	The intake capacity of each course and no. of admissions given in the current academic year:	200
7.	Opportunities of Employability/ Employment available after undertaking these courses	The program has multi-faceted dimensions of design and technical aspects of Home Science. Students have ample employment and entrepreneurial opportunities on successful completion and graduation from **B.Sc. Home Science - Foods Nutrition and Dietetics)** 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 volunteers and consultants. Furthermore, a substantial number of students opt to pursue higher education at Indian and international universities. This syllabus restructuring in accordance with the goals of NEP 2020 will continue to provide considerable levels of employment opportunities. The course provides knowledge and skills of fundamental 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. Research, Innovation and Entrepreneurship has been included in the program to provide the students with the professional mind-set and skills to start their venture in the field. On successful completion of the program students can acquire gainful employment opportunities as Clinical Dietician/Community Nutrition Specialist/Food Product Developer/Food Auditor and Food Quality Control Consultant/ Food and Dietetic Entrepreneur/Nutrition Research and Education/ Sports Nutritionist. The heightened interest level, knowledge and skill sets acquired and expertise gained through the successful completion of graduation in the selected specialization, will open diverse opportunities of employment in various fields of industries and education sectors. The foundation levels of knowledge and training through value education, ability enhancement, skill-enhancement, vocation-based skill training, field projects, continuing education programs, research projects and on job training at graduation will develop invigorating industry- ready students also seeking opportunities for super-specializations with higher studies.

Sign of the BOS Chairperson
Name of the Chairperson:
Prof. Dr. Vishaka Ashish Karnad

Sign of the Offg. Associate Dean
Name of the AssociateDean
Name of the Faculty

Sign of the Offg. Dean
Name of the Offg. Dean
Name of the Faculty