P.G. Course Structure for

Home Science

Food Science and Nutrition

(MHSF)

Session 2025 onwards

As per NEP: 2020 Guidelines

Course Structure for PG in

Home Science: Food Science and Nutrition (MHSF)

Semester	Course Title & Code	T	P	Other	Credits per course	Total Credits
1st	Applied Physiology **MHSFCAP125**	3	1	-	04	20
	Food Chemistry **MHSFCFC125**	3	1	-	04	
	Assessment of Nutritional Status **MHSFCNA125**	2	2	-	04	
	Community Health and Nutrition **MHSFCCN125**	2	2	-	04	
	Research Methods and Statistics (Common Paper) MHSCCRM125	**4**		**-**	**04**	
2nd	Maternal and Child Nutrition **MHSFCMN225**	3	1	-	04	**20**
	Clinical and Therapeutic Nutrition **MHSFCTN225**	3	1	-	04	
	Advanced Nutrition **MHSFCAN225**	4		-	04	
	Principles of Food Science **MHSFCPF225**	2	2	-	04	
	INTERNSHIP (Common) MHSCIFN225		**-**	**4 (I)**	**04**	

Exit Option for Post Graduate Diploma in Food Science and Nutrition
OR

Entry to One year PG with Course Work (CW+CW)
OR
Entry to One year PG with Course Work and Research (CW+R)

	Food Processing and Technology **MHSFCFP325**	3	1		04	
	Food Safety and Quality Control **MHSFCFS325**	3	1		04	
	Women Nutrition and Health **MHSFCWN325**	3	1		04	**20**
3rd	Applied Microbiology **MHSFCAM325**	3	1		04	
	Artificial Intelligence and Digital Technology for Home Science (Common Paper) **MHSCCAI325**	**4**			**04**	
	Post Graduate Degree in Food Science and Nutrition with Course Work (CW+CW) **OR** **Post Graduate Degree in Food Science and Nutrition with Research Work (CW+R)**					
	Sports Nutrition and Fitness **MHSFCSN425**	3	1		04	
	Policies and Programmes in Public Health Nutrition **MHSFCPN425**	3	1		04	
4th	Current and Emerging Concepts in Human Nutrition **MHSFCEC425**	4			04	**20**
	Nutrition in Emergency and Disaster **MHSFCNE425**	3	1		04	
	Dissertation **MHSFPDI425**	**-**	**-**	**4 (P)**	**04**	
	Post Graduate Degree in Food Science and Nutrition with Course Work (CW+CW)					

4th	Research Methods and Statistics **MHSCCRM425**	4			4	20
	Dissertation in Food Science and Nutrition (Project Work) **MHSCPDI425**			16 **(P)**	16	
	Post Graduate Degree in Food Science and Nutrition with Course Work and Research Work (CW+ R)					

Programme Learning Outcomes (PLOs)

Home Science: Food Science and Nutrition

(MHSF)

PLOs	**PG in Home Science - Food Science and Nutrition**	
After completion of M.Sc Home Science in Food Science and Nutrition the student should be able to:		
PLO-1	Knowledge and understanding	Demonstrate in-depth understanding of Food Science, human nutrition, malnutrition in emergency affected populations, disaster management, sports nutrition ,therapeutic and normal diets, physiology, microbiology, food safety and public health relevant to individual and community well being
PLO-2	Skills	Employ scientific methods and modern tools to analyse athletic performance, food components, assess nutritional status and apply techniques in disaster mitigation, food processing, food safety, food spoilage, preservation and clinical dietetics.
PLO-3	Application of knowledge and skills	Design and implement nutritional interventions, disaster mitigation strategies, therapeutic and normal diets and food-based strategies to address public health and clinical issues across life stages.
PLO-4	Communication skills	Communicate Nutritional knowledge, disaster management strategies, food safety laws, research findings and policy implications effectively to diverse stakeholders, including communities, professionals and policy makers.
PLO-5	Critical Thinking and problem solving	Critically evaluate nutritional problems using evidence-based approaches, statistical tools and scientific reasoning to develop practical solutions.
PLO-6	Ethics and professional conduct	Uphold ethical principles, research, and public health nutrition practice and food safety management, ensuring accountability, equity and confidentiality.
PLO-7	Life Long Learning	Engage in continuous learning by integrating advances in food science, diet therapy, food safety, disaster management, digital technology, artificial intelligence and emerging nutritional paradigms.
PLO-8	Social Awareness	Recognize and address the socio-economic, gender and environmental dimensions of food and nutrition policies, sustainability and access to safe and nutritious food.
PLO-9	Research and Innovation	Conduct original research in food and nutritional science, apply statistical tools, interpret findings and contribute to evidence-based innovations.
PLO-10	Entrepreneurship and Employability	Apply entrepreneurial and technological skills in foods processing, disaster management, quality assurance, product development and nutrition-based service delivery.

CLOs-PLOs Mapping Matrix for all Courses

Home Science: Food Science and Nutrition

(MHSF)

Course Code	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCAP125	3	2	3	2	2.5	2	3	2	2	2.5	2.4
MHSFCFC125	3	2	2	2	2	3	3	2	3	2	2.4
MHSFCNA125	3	3	2.75	2.75	3	2.75	2	2.75	2.75	2	2.6
MHSFCCN125	3	2.5	2.5	3	2.5	2.75	2.75	3	2.5	2.5	2.7
MHSCCRM125	2.50	2.87	2.37	2.12	2.25	2.25	2.75	2.75	2.25	2.62	2.4
MHSFCMN225	3	2	2.7	2	3	3	2	3	2.7	2	2.5
MHSFCTN225	3	2	3	2.5	2	2	3	3	3	3	2.6
MHSFCAN225	3	3	2	3	3	2	3	3	2	2	2.6
MHSFCPF225	3	3	2	3	2	3	3	3	3	3	2.8
MHSCIFN225	2.25	2.25	2.50	3.00	2.25	2.62	2.62	2.62	2.62	2.87	2.5
MHSFCFP325	3	2.75	2.75	3	3	2.5	1	3	2	3	2.6
MHSFCFS325	2.87	2.62	2.25	2.25	2	3	2.87	2.62	2	3	2.5
MHSFCWN325	3	2.12	2.37	2.25	2.75	3	2.25	2	2.25	2.25	2.4
MHSFCAM325	3	2.87	2	2.5	2.25	3	2.5	2.5	2.25	2.25	2.5
MHSCCAI325	2.37	2.62	2.37	2.50	2.62	2.25	2.75	2.62	2.25	2.50	2.4
MHSFCSN425	3	2.5	2.5	2.25	3	2.5	2.25	2.25	2.25	2.12	2.4
MHSFCPN425	2.75	2.25	2.87	2.87	3	2.5	2.25	2.87	2.37	2.37	2.57
MHSFCEC425	3	3	3	2	2	3	3	3	2	3	2.7
MHSFCNE425	3	2.75	2.87	2.87	2.37	2.5	2.75	2	2	2.87	2.6
MHSFPDI425	2.75	2.37	2.25	2.50	2.62	2.62	2.62	2.37	2.37	2.37	2.4
Average PLO	2.87	2.52	2.50	2.51	2.50	2.61	20.56	2.61	2.37	2.51	2.52

Semester -1

Home Science:Food Science and Nutrition

(MHSF)

SEMESTER-I

APPLIED PHYSIOLOGY

Course Code: **MHSFCAP125**

Credits: **04 (3+1)**

Total Contact Hrs. 60

Max. Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to :

CLO 1: Explain the structure and function of cell organelles, blood components, and the cardiovascular system.

CLO2: Understand the functions of key physiological systems, including the digestive, excretory, and nervous systems.

CLO3: Explain the physiological processes of reproduction, muscle function, and hormonal regulation by major endocrine glands.

CLO4: Identify various tissues microscopically and perform basic hematological tests, including hemoglobin estimation and blood group determination.

CLO- PLO Matrix for the course MHSFCAP125 (Applied Physiology)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCAP125.1	3	2	3	2	2	2	3	2	2	**3**	**2.4**
MHSFCAP125.2	3	2	3	2	2	2	3	2	2	**3**	**2.4**
MHSFCAP125.3	3	2	3	2	3	2	3	2	2	**2**	**2.4**
MHSFCAP125.4	3	2	3	2	3	2	3	2	2	**2**	**2.4**
Average PLO	**3**	**2**	**3**	**2**	**2.5**	**2**	**3**	**2**	**2**	**2.5**	**2.4**

Unit I:Cell, Blood and Cardio-Vascular System

- Function of Cell Organelles.
- Coagulation of blood, blood groups.
- Hemolytic disease of the newborn, blood transfusion.
- Conduction system , cardiac cycle,cardiac output and Heart sounds.

Unit II: Digestive,Excretory and Nervous System.

- Structure and functions of digestive organs and its associated glands.
- Composition and function of different digestive juices.
- Urinary System –Mechanism of urine formation.Renin angiotensin system.
- Structure and function of different parts of brain.

Unit III: Reproduction,Muscles and Hormones

- Spermatogenesis and Oogenesis.Ovulation.Parturition and its stages
- Kinds of muscles-voluntary and involuntary muscles.
- Physiology of muscle contraction.
- Thyroid, para-thyroid, adrenal gland, pancreas, pituitary and gonads – Structure and functions. Hormones secreted by these glands, their functions and associated abnormalities.

Unit IV:(Practical)

- Microscopic examination of slides of various tissues.
- Estimation of hemoglobin (Sahli's method).
- Determination of various blood group.
- Examination of Urine.

References:

- Elaine N. Marieb. (2021).Human Anatomy and Physiology.5th edition.Pearson education.
- Eldra Pearl Solomon,William Davis P.(2000).Human Anatomy &Physiology.17th edition.Holt-Saunders International Editions,Sunders College Publishers.
- Guyton, A. C. and Hall, J. B. (2000) Text book of Medical Physiology, 14th Edition,Elsevier publishers.
- Jain A. K. Text Book of Physiology Vol. I & II (2017).7th edition. Avichal Publishing Company, NewDelhi..
- Martini.(2000).Anatomy & Physiology.6th edition.PrenticeHall.Inc.
- Pal ,G.K.,Pravati Pal (2020).Textbook of Practical Physiology.5th edition. University press (India) pvt.ltd.
- Sembulingam K., and SembulingamP.(2019).Essentials of Medical physiology.8th edition.Jaypee Brothers Medical Publishers.
- Tortora G.J. &Grabowshi S.R.(2017). Principles of Anatomy & Physiology, 15th edition, Wiley Blackwell Publishers.
- Vander,Sherman,Lucian.(2011).Human Physiology.6th edition.WCB,McGraw-Hill publishers.
- Walter F.Boron,EmileL.Boulpaep.(2016).Elsevier publishers.

SEMESTER-I

FOOD CHEMISTRY

Code: **MHSFCFC125**

Credits: **4(3+1)**

Total Contact Hrs. **60**

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to :

CLO 1: Analyse the structural and functional properties of monosaccharides and their derivatives, and evaluate the regulation and implications of metabolic pathways of major carbohydrates.

CLO 2: Learn the properties of fatty acids and analyze the metabolism of lipids—including lipoprotein function and ketone bodies and the clinical relevance of genetic disorders of lipid metabolism.

CLO 3: Explain the structure, function, and metabolism of proteins and enzymes, and analyze their clinical relevance, including inborn errors, diagnostic applications, and coenzyme functions.

CLO 4: Perform qualitative and quantitative biochemical analyses of carbohydrates, proteins, fats and vitamins, and accurately measure pH using standard methods in food and biological samples.

CLO- PLO Matrix for the course MHSFCFC125 (Food Chemistry)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCFC125.1	3	2	2	2	2	3	3	2	3	2	**2.4**
MHSFCFC125.2	3	2	2	2	2	3	3	2	3	2	**2.4**
MHSFCFC125.3	3	2	2	2	2	3	3	2	3	2	**2.4**
MHSFCFC125.4	3	2	2	2	2	3	3	2	3	2	**2.4**
Average PLO	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**3**	**2**	**2.4**

Unit-I:Carbohydrates& their Metabolism

- Functions and Properties of monosaccharides: Optical isomerism, Mutarotation.Killiani Fischer synthesis.
- Biologically important derivatives of monosaccharides
- Metabolic regulation of glycolysis and citric acid cycle (TCA).
- Disorders of carbohydrate metabolism

Unit-II: Fatty Acids and their Metabolism

- Fatty acids –Nomenclature and properties of saturated and unsaturated fatty acids.
- Lipoproteins – Types and clinical significance.
- Oxidation of fatty acids and ketone bodies.
- Genetic disorders of lipid metabolism.

Unit-III: Proteins and Enzymes:

- Proteins: Functions, elemental composition. Classification and properties of amino acids. Structure of proteins, bonds responsible for protein structure. Classification and Properties of proteins. Denaturation of proteins. Transamination and deamination.
- Urea cycle. Inborn errors of protein metabolism.
- Enzymes:Classification and nomenclature, Enzymespecificity, Factors influencing enzyme activity, Co-enzymes and prosthetic groups, Biochemical role of co-enzymes. Application of enzymes in diagnostics.

Unit- IV: (Practical)

- Qualitative Analysis of carbohydrates.
- Qualitative Analysis of Proteins/Amino-acids.
- Qualitative test for Fats, cholesterol
- Use of pH meter and determination of pH value of dilute and strong acids and bases. Fruits and vegetable extracts.
- Estimation of proteins by Lowry's method.
- Estimation of Vitamin C

References:

1. Murray, R. K., Grannar, D. K., Mayes, P. A. and Rodwell, V. W., (2000): 25th Ed. Harpers Bio-chemistry. Macmillan Worth Publishers.
2. Nelson, D. L. and Cox, M. M. (2000): 3rd Edition Lehningers Principles of Biochemistry, Macmillan Worth Publishers.
3. Devlin, T. M. (1997): 4lh Edition Textbook of Biochemistry with Clinical Correlation, Wiley Liss Inc.
4. Stryer, L. (1998): 4[1,1] Ed. Biochemistry, W. H. Freeman and Co.
5. Raghuramula, N.: Madhavan Nair and K. Kalyanasundaram, S. A Manual of Laboratory Techniques N1N. 1CMR.
6. Fundamentals of Biochemistry (2005): 6th Edition, J. L Jain, S. Chand & company limited
7. Biochemistry 4th Ed. - D. Voet, J. Voet (Wiley, 2011).

SEMESTER-I

ASSESSMENT OF NUTRITIONAL STATUS

Code: **MHSFCNA125**

Credits: **4 (2+2)**

Total Contact Hrs. 60

Max. Marks: 100

Course Learning Outcomes: By the end of this paper the student will be able to learn :

CLO 1: Techniques used in taking anthropometric measurements and also learn how to identify various nutritional deficiencies through examination of clinical signs and symptoms.

CLO 2: Various biochemical tests and dietary methods for assessing nutritional status of an individual.

CLO 3: Dietary pattern of an individual using 24 hour recall method and food frequency method.

CLO 4: How to take accurate anthropometric measurements through proper techniques and assess nutritional status of pregnant and lactating women through various methods of nutritional assessment.

CLO- PLO Matrix for the course MHSFCNA125 (Assessment of Nutritional status)

UNIT- Wise CLOs	PLO 1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCNA125.1	3	3	2	2	3	2	2	2	2	2	**2.3**
MHSFCNA125.2	3	3	3	3	3	3	2	3	3	2	**2.8**
MHSFCNA125.3	3	3	3	3	3	3	2	3	3	2	**2.8**
MHSFCNA125.4	3	3	3	3	3	3	2	3	3	2	**2.8**
Average PLO	**3**	**3**	**2.75**	**2.75**	**3**	**2.75**	**2**	**2.75**	**2.75**	**2**	**2.6**

Unit I: Assessment of Nutritional Status by Anthropometry & Clinical Examination

- **Anthropometric Evaluation**
    - Weight &Height
    - Mid arm circumference
    - Head circumference
    - Chest circumference
    - Skin fold thickness (Use of Calipers)
    - Anthropometric Indices
    - Growth Charts/Percentiles

- **Clinical Evaluation**
    - PEM, (Protein Energy Malnutrition)
    - Vitamin A Deficiency
    - Iron Deficiency
    - Calcium Deficiency
    - Dental Caries and Fluorosis

Unit II: Assessment of Nutritional Status by Biochemical and Dietary Assessments

- **Biochemical Evaluation:**
    - Haemoglobin estimation
    - Test for Stools
    - Urine examination
    - Nutrient Analysis
- **Dietary Evaluation**
    - Food Frequency Method
    - 24 hr. recall method
    - Dietary History

Unit III(Practical)

- **Diet survey methods**
    - Diet history – Individual, Family
    - 24-hour recall method
    - Food Frequency method

Unit IV (Practical)

- **Anthropometric Practices of Studying Various Groups (Infants, children &adults)**
  - Height
  - Weight
  - Mid-arm circumference
  - Head circumference
  - Chest circumference
  - Waist hip ratio
  - BMI
  - Comparison of standards. (Given by ICMR)

- **Assessment of Nutritional Status of:**
  - Pregnant women
  - Lactating women

References

- Jelliffe, D, B, and jelliffee, E. F.P, (1989): Community Nutritional Assessment, Oxford University Press.
- Beghin, I., Cap, M. and Dujardan, B. (1988): A Guide to nutritional status Assessment, WHO, Geneva.
- Gopaldas, T. and Seshadri, S., (1987) Nutrition Monitoring and Assessment, Oxford University Press.
- Mason, J. B, Habich, J.P. Tabatabi, H. and Valverde, V., (1984) Nutritional Survelliance, WHO.
- Lee, R.D., and Nieman, D. C., (1993): Nutritional Assessment, Brown and Benchmark Publishers.
- Sauberlich, H. E., (1999) Laboratory Tests for the Assessment of Nutrition Status, CRC, Press.
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- Collins, K.J., (ed) (1990) Handbook of methods for the measurements of work performance, physical fitness and energy expenditure in Tropical Population. International Union of Biological Sciences.
- Ulijaszek, S. J., and Masice-Taylor, C.G.N., (ed) Anthropometry: the individual and the Population, Cambridge University Press, Cambridge.

SEMESTER-I

COMMUNITY HEALTH AND NUTRITION

Code: **MHSFCCN125**

Credits: **4 (2+2)**

Total Contact Hrs. 60

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to :

CLO1: Understand the concept of community and its impact on nutritional status of the community

CLO 2: Know about nutrition programmes and interventions for improving health and nutrition of community

CLO 3: Attain practical exposure for field visits of nutrition programmes like anaganwaricentres and primary health centres

CLO 4: Design and implement nutrition and health programmes

CLO- PLO Matrix for the course MHSFCCN125 (Community health and Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCCN125.1	3	2	2	3	2	2	2	3	2	2	**2.3**
MHSFCCN125.2	3	2	2	3	2	3	3	3	2	2	**2.5**
MHSFCCN125.3	3	3	3	3	3	3	3	3	3	3	**3**
MHSFCCN125.4	3	3	3	3	3	3	3	3	3	3	**3**
Average PLO	**3**	**2.5**	**2.5**	**3**	**2.5**	**2.75**	**2.75**	**3**	**2.5**	**2.5**	**2.7**

Unit I: Community Health

- Definition and concept of community.
- Health-definition, dimensions, determinants and indicators
- Role of the public health nutritionist in National Development
- Infection and parasitic infestation and its impact on nutritional status of the community.

Unit II: Nutrition problems in India

- Common Nutritional Problems in India
- Combating major nutritional problems in Indi**a**
- Role of National Nutrition Policy in protecting health of the Nation
- Nutrition intervention programme for improving nutrition and health.
- POSHAN Abhiyaan

UNIT III (Practical)

- Field visit to
    - Primary health centres
    - ANC
    - Ongoing Nutrition and health programs
- Identification of nutritional problems and their determinants in different population groups based on National /Regional level nutrition and health suveys- Secondary data analysis

UNIT IV (Practical)

- Designing and Implimentation of Nutrition and Health Education programs For:
    - Pregnant women
    - Lactating Women
    - Adolescents
    - School going Children
- Visit to ICDS centres to evaluate the Health and Nutrition component.

References:

- Park K., Preventive and Social Medicine. BanarasidasBhanot Publishers 26th Ed. 2025.
- Dwyer, T. Mayer, Food and Nutrition Policy in a changing world. New York, Oxford University Press, 1979.
- Singhai, C. G. Environment Nutrition and Health Hazards in India, Vohra Publishers and distributors, Allahabad (India) 2013.
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- Mclaren S. Donald. Nutrition in the community John, Wiley & Sons Chichester 1983.
- Mclaren S. Donald Nutrition and its Disorders 3rd Ed. Churchill Livingstore Edinburgh, 1981.

SEMESTER-I

RESEARCH METHODS AND STATISTICS

Code: **MHSCCRM125**

Credits: **4**

Total Contact Hrs. **60**

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to :

CLO 1: Understand the significance of research methodology in Home Science research.

CLO 2: Understand the types, tools and methods of research and develop the ability to construct the data gathering instruments appropriate to the research design.

CLO 3: Acquaint skill of data processing and data analysis through various statistical measures

CLO 4: Learn qualitative analysis of data with scientifically writing and application of statistical software

CLO-PLO Matrix for the CourseMHSCCRM125 (Research Methods and Statistics)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSCCRM125.1	2	3	3	3	2	3	3	3	2	3	2.70
MHSCCRM125.2	2	3	2.5	3	2	2	3	3	2.5	2.5	2.55
MHSCCRM125.3	3	3.5	2	3.5	2.5	2	2.5	2.5	2.5	2	2.6
MHSCCRM125.4	3	2	2	2	2.5	2	2.5	2.5	2	3	2.35
Average PLO	2.50	2.87	2.37	2.12	2.25	2.25	2.75	2.75	2.25	2.62	2.4

Unit I: Introduction to Research Methodology

- Meaning, Importance, Objectives, Types of Research, Identification of a research problem–criteria for selection and formulation
- Designing the research study – concept, importance and contents of a research plan**.** Hypotheses – Types, sources and process of setting up hypotheses
- Data collection Methods: observation, questionnaire, interview, case studies and scaling techniques. Google Forms

Unit II: Research Methods and Data Gathering Instruments

- Sampling— Characteristics and steps of sampling. Pilot studies and pretesting.
- Sampling Techniques: Probability and Non-Probability. Determination of sample size.
- Data Processing— Rules and types of diagrams, Presentation of data through Bar diagram and its types, Pie diagram and histogram

Unit III: Processing and Analysis of Data

- Measures of Central Tendency: Mean, Median, Mode, quartile, decile and percentiles
- Measures of Dispersion: Range, inter quartile range, quartile deviation, mean deviation and standard deviation
- Chi Square and t-Test (dependent and Independent)

Unit IV: Analysis and Interpretation of Data

- Correlation analysis— Karl Pearson's coefficient of correlation, Rank difference method (Spearmen's method), concurrent deviations
- Analysis of variance and Regression Analysis—lines of regression and regression equation.
- Applications of SPSS & MINITAB, preparation of worksheets etc.Report writing—Types, and format. Plagiarism and Ethical issues.

References:

- Abu-Bader, Soleman Hassan (2010). Advanced And Multivariate Statistical Methods For Social Science Research With A Complete SPSS Guide. Chicago: Lyceum Books, Pune
- Bandakar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of social Research Himalaya Publishing House Mumbai.
- Bhantnagar, G. L. (1990): Research methods and measurement in Behavioural and social science, degree, colo publishing academy, New Delhi.
- Dooley, D. (1995): Strategies for Interpreting Qualitative data sage publication, California.
- Gay, L.R. (1981, 2nd Ed) Educational Research, Charles, E. Merill Columbus Ohio.
- Long, J. S., (1988): Common Problems Proper Solution: Avoiding Errors in Qualitative Research, Beverly Hills, Sage Publications, California.
- Mukherjee, R. (1989): The Quality of Life: Valuation in Social Research, Sage Publication, New Delhi.
- Stranss, A. and Corbin, J. (1990): Basis of qualitive Research: Grounded Theory Procedures and Techniques, Sage Publications, California.
- Chawla, Deepak &Sondhi, Neena (2011). Research methodology: Concepts and cases .NewDelhi: Vikas Publishing House. Pune

Semester -2

Home Science:Food Science and Nutrition

(MHSF)

SEMESTER-II

MATERNAL AND CHILD NUTRITION

Code: **MHSFCMN225**

Credits: **4 (3+1)**

Total Contact Hrs. **60**

Max. Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:Describe the nutritional needs and physiological changes during pregnancy and lactation, including related concerns and contraindications.

CLO 2:Understand the nutritional requirements, feeding practices, and common health concerns during infancy and childhood.

CLO 3:A**nalyze** the nutritional needs, dietary behaviours, and physiological changes during adolescence and adulthood, along with associated health concerns.

CLO 4:Plan and prepare appropriate diets for different physiological stages and nutritional needs, including pregnancy, lactation, childhood, adolescence, and adulthood.

CLO- PLO Matrix for the course MHSFCMN225 (Maternal and child Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCMN225	3	2	3	2	3	3	2	3	3	2	**2.6**
MHSFCMN225	3	2	2	2	3	3	2	3	2	2	**2.4**
MHSFCMN225	3	2	3	2	3	3	2	3	3	2	**2.6**
MHSFCMN225	3	2	3	2	3	3	2	3	3	2	**2.6**
Average PLO	**3**	**2**	**2.7**	**2**	**3**	**3**	**2**	**3**	**2.7**	**2**	**2.5**

Unit I: Nutrition in Pregnancy and Lactation

- **Nutrition in pregnancy**
    - Nutrition before conception
    - Physiology of pregnancy
    - Gestational weight gain
    - Nutrition & Nutritional supplementation during pregnancy
    - Common nutrition related concerns of pregnancy, High risk pregnancies
- **Nutrition in lactation**
    - Physiology of lactation and Hormonal Controls
    - Nutrition for breast feeding women
    - Practices incompatible with lactation
    - Contra Indications to breast feeding

Unit II: Infancy and childhood Nutrition

- **Nutrition in Infancy**
    - Physiological development & Nutrient Requirements
    - Feeding the Infant and Introduction of semi solid foods
    - Feeding problems during infancy
- **Nutrition in Childhood**
    - General physiological development
    - Influences on childhood food habits and intake
    - Nutritional concerns & Common diseases of childhood

Unit- III: Nutrition during Adolescence & Adulthood

- **Nutrition in Adolescence**
    - Physical growth and development and Nutritional requirements
    - Food Habits: Irregular meals and snacking, eating away from home, Fast foods and media, potential nutritional inadequacies
- **Nutrition in Adulthood**
    - Physiological Changes
    - Nutrient needs of the mature adults
    - Defensive nutritional paradigm

Unit- IV :(Practical)

- **Diet planning and preparation for:**
    - Pregnancy and Lactation
    - Weaning food recipes
    - Children suffering from PEM (3-6 years)
    - Packed lunch for School going child
    - Adolescents
    - Male Adult and Menopausal Female

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SEMESTER-II

CLINICAL AND THERAPEUTIC NUTRITION

Code: MHSFCTN225

Credits: 4 (3+1)

Total Contact Hrs. 60

Max. Marks: 100

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1: Understand about various routine hospital diets and the role of nutrition support in burn and surgery to promote optimal recovery and reduce the risk of complications. Understand the role of nutrition and lifestyle modifications in the prevention in and management of various gastrointestinal diseases such as peptic ulcer, gastritis, constipation, and diarrhea and so on

CLO 2:Identify liver and renal diseases such as hepatitis, cirrhosis, nephrotic syndrome of renal failure and also understand the treatment of these diseases

CLO 3:Recognize the diagnostic criteria and management strategies for various metabolic disorders including lifestyle modifications, pharmacological interventions and dietary modifications.

CLO 4: Learn principle of dietary modification for various conditions and diseases such as peptic ulcer, liver diseases, hypertension, diabetes, obesity, diarrhea, constipation.

CLO- PLO Matrix for the course MHSFCTN225 (Clinical and Therapeutic Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCTN225.1	3	2	3	2	2	2	3	3	3	3	**2.6**
MHSFCTN225.2	3	2	3	2	2	2	3	3	3	3	**2.6**
MHSFCTN225.3	3	2	3	3	2	2	3	3	3	3	**2.6**
MHSFCTN225.4	3	2	3	3	2	2	3	3	3	3	**2.6**
Average PLO	**3**	**2**	**3**	**2.5**	**2**	**2**	**3**	**3**	**3**	**3**	**2.6**

Unit I:

- **Modification of Normal diet**
  - Liquid diet, soft diet and bland diet
  - Routine hospital diets, methods of feeding- oral, parenteral and tube feeding
  - Dietary management during Stress
- **Fever and Dietary management**
  - Types of fevers : Acute and Chronic
  - Physiology of fevers, metabolic changes and dietary management
- **Gastro-intestinal Disorders and Dietary management**
  - Types, Etiology, symptoms.
  - Dietary Modifications.
  - Nutritional Care process.

Unit II:

- Hepatobiliary Disorders and Dietary Management
  - Types, Etiology, symptoms.
  - Dietary Modifications.
  - Nutritional Care process.
  - Gallstone formation and cholecystitis
- **Renal Disorders and Dietary Management**
  - Types, Etiology, symptoms.
  - Dietary Modifications.
  - Nutritional Care process.

Unit III:

- **Cardiovascular Disorders and Dietary Management**
  - Atherosclerosis, Hypertension-Clinical features, risk factors for coronary heart diseases
  - Hyperlipidemia, Dietary modification and management of sodium restricted diet
- **Body Weight and Management**
  - Definition, diagnostic test, etiology, types and complications
  - Dietary management and other recommendations

- **Metabolic Disorders and Dietary Management**
  - Diabetes mellitus: Types, causes, symptoms, complications, diagnosis, treatment, dietary management and counseling. Hypoglycemic agents, Glycemic Index
  - Gout, low purine diets (Dietary modification)

Unit- IV: (Practical)

- **Planning and Preparation of Diets for:**
  - Diarrhea and Constipation
  - Liver diseases
  - Peptic ulcer patient
  - Hypertension.
  - Obesity and under nutrition
  - Diabetes

References:

1. Anderson Dibble., Nutrition in health Disease.
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3. Lea &Febiger USA Publishing.
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5. B. Shri. Lakshmi., Dietetics, 4th Edition. New age, International (p) Ltd. Publishing.
6. Davis J., and Sherer, K. (1994): Applied Nutrition and Diet Therapy for nurses 2nd Ed. W.B.Saunders. Co.
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SEMESTER-II

ADVANCED NUTRITION

Code: **MHSFCAN225**

Credits: **4**

Total Contact Hrs. **60**

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1: Explain the components and significance of body composition and energy expenditure, and apply methods to measure and estimate energy requirements using standard models and units.

CLO 2: Explain protein and lipid metabolism, assess protein quality, and evaluate the functions, requirements, and balance of body water and electrolytes in health and deficiency conditions.

CLO 3: Analyze the functions, metabolism, and nutritional significance of macro and micro minerals, including their absorption, balance, deficiency, toxicity, and role in maintaining physiological health.

CLO 4: Evaluate the nutritional significance, functions, sources, and deficiency manifestations of fat- and water-soluble vitamins and their role in maintaining health and preventing deficiency disorders.

CLO- PLO Matrix for the course MHSFCAN225 (Advanced Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCAN225	3	3	2	3	3	2	3	3	2	2	**2.6**
MHSFCAN225	3	3	2	3	3	2	3	3	2	2	**2.6**
MHSFCAN225	3	3	2	3	3	2	3	3	2	2	**2.6**
MHSFCAN225	3	3	2	3	3	2	3	3	2	2	**2.6**
Average PLO	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2.6**

Unit I: Body Composition and Energy

- **Body composition**: Importance, components. Wang's five level model of body composition
- **Energy**: Introduction, Components of Energy Expenditure. Energy Expended in physical activity. Measurement of energy expenditure. Units of measurement, Estimating Energy Requirements

Unit II: Proteins, Lipids, Water and Electrolytes

- **Proteins:** Metabolism, Nitrogen Balance. Quality of Proteins. Methods used for evaluating protein quality (amino acid score, PER, BV, NPU)
- **Lipids:** Fatty Acids and Essential Fatty Acid deficiency
- **Water and electrolytes:**Body water, (Preformed and metabolic water) Functions, Distribution, Requirement, Water Balance. Water Retention and Depletion. Electrolyte balance

Unit III: Role of Minerals in Nutrition

- **Macro Elements:**

  - **Calcium**: Metabolism, Absorption and factors affecting it
    Calcium Balance and factors contributing to balance
  - **Phosphorous**, **Magnesium**,**Sulphur** : Functions, deficiency and toxicity

- ***Micro Elements:***

  - **Iron**: Absorption, Transport, Storage, Excretion, Functions, Deficiency and Toxicity
  - **Other Micro-Elements:** Functions, Deficiency and Toxicity

Unit IV: Role of Vitamins in Nutrition

- **Fat Soluble vitamins:**
  - **Vitamin A:** Functions, sources and deficiency
  - **Vitamin D:** Functions, sources and deficiency
  - **Vitamin E & K:** Functions, sources and deficiency

- **Water Soluble Vitamins:**

  - **Thiamine: Functions, sources and deficiency**
  - **Riboflavin:** Functions, sources, and deficiency
  - **Ascorbic Acid:** Functions, sources and deficiency
  - **Other water-soluble vitamins**

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SEMESTER-II

PRINCIPLES OF FOOD SCIENCE

Code: **MHSFCPF225**

Credits: **4 (2+2)**

Total Contact Hrs. **60**

Max. Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to understand:

CLO 1: The properties and uses of sugar, egg, starch and milk in various culinary applications . Students will also learn how to apply various techniques such as temporary, caramelizing and whipping to prepare sugar, starch, egg and milk based dishes

CLO 2: The properties and uses of different fats and oils and uses in culinary applications and learn how to select appropriate fat or oil for specific cooking task. Applications of various cooking techniques to pulses, vegetable and meat and poultry

CLO 3: Sugar cooking techniques including caramelization , crystallization and also learn roll and properties of egg in cookery , principle involved in gelatination process and preparing variety of milk based dishes

CLO 4: Develop recipes using fats and oils and the smoking process. Also observe the process of browning reactions in fruits and vegetables and the effect of addition of various ingredients on cooking quality of pulses.

CLO- PLO Matrix for the course MHSFCPF225 (Principles of Food Science)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCPF225	3	3	2	3	2	3	3	3	3	3	**2.8**
MHSFCPF225	3	3	2	3	2	3	3	3	3	3	**2.8**
MHSFCPF225	3	3	2	3	2	3	3	3	3	3	**2.8**
MHSFCPF225	3	3	2	3	2	3	3	3	3	3	**2.8**
Average PLO	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**2.8**

Unit-I

- **Sugar Cookery**: Sources & uses of sugar in cookery, caramelization by heat and pH changes. Crystallization of sugar solution**.**
- Stages of sugar cookery. Crystalline and non-crystalline candies.
- **Starch Cookery**: Types of starch, gelatinization, retrogradation, Leavening agents. Gelatin and its uses in food
- **Milk Cookery:** Properties of milk protein. Uses of milk in food preparation. Cheese and Ice Cream preparation.
- **Egg Cookery:** Uses, properties and coagulation of egg proteins. Egg as binding, foaming, emulsifying and thickening agent. Mayonnaise preparation.

Unit-II

- **Vegetables and Fruits**: Starch, pecticsubstances & pigments (chlorophylls, anthocyanins).Enzymes.Browning,use of plant-enzymes for textural changes in food,
- **Fats and Oils:** Uses in food preparation. Smoking point and melting point. Hydrogenation. Fat as shortening agent. Rancidity - types. Changes on storage & during cooking.
- **Pulse Cookery**: Factors affecting cooking quality of legumes. Germination of pulses and effect of germination on pulses.
- **Meat, Poultry and Fish:** Postmortem changes in muscle meat. Tenderness of meat. Processing and effect of processing.

Unit III (Practical)

Sugar Cookery:

- Experiments on Stages of sugar cookery
- Preparation of crystalline and non-crystalline candies

Cereal & Starch Cookery:

- Gelatinization of starch
- Preparation of Cakes / Biscuits

Milk Cookery:

- Preparation of cottage cheese, with different curdling agents
- Cream of tomato soup
- Ice cream preparation

Egg Cookery:

- Stages of fresh egg white foam,
- Coagulation of whole egg, egg yolk and egg white.
- Preparation of custard
- Preparation of Emulsions (Mayonnaise)

Unit IV (Practical)

Pulse/legume cookery:

- Cooking of legumes by different methods, effect of addition of salt, acid, alkali, oil & spices on quality and time, effect of soaking, germination and pressure cooking on time and quality

Vegetable and fruit cookery:

- Factors affecting colour, texture and flavour of vegetables (acid and alkali).
- Observation of browning in raw fruits andvegetables

Fats & oils:

- Observing Smoking point of different oils.
- Factors affecting absorption of deep fat and shallow fried foods.

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15. Vaclavik V and Christian E. Second Edition (2003). Plenum Publishers, New York.

SEMESTER-II

INTERNSHIP(FOOD SCIENCE & NUTRITION)

Code: **MHSCIFN225**

Credits: **4**

Time period: **6 weeks**

Max. Marks: 100

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1: Demonstrate practical skills in fruit and vegetable processing techniques to ensure quality, safety, and sustainability in food products.

CLO 2: Apply knowledge of bakery technology to produce and evaluate baked goods with respect to processing parameters, quality standards, and innovation.

CLO 3: Analyze and interpret recent advancements in research and technology relevant to food processing and nutrition science.

CLO 4: Evaluate food production systems and facilities through field visits, identifying best practices in processing, storage, and farm operations for sustainable food systems.

CLO-PLO Matrix for the Course MHSCIFN225 (Internship)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSCIFN225.1	3	2	3	3	2	3	2.5	3	2.5	3	2.70
MHSCIFN225.2	2	2.5	3	3	3	2.5	3	2	3	2.5	2.65
MHSCIFN225.3	2	2	2	3	2.5	2.5	3	3	3	3	2.60
MHSCIFN225.4	2	2.5	2	3	2.5	2.5	2	2.5	2	3	2.40
Average PLO	2.25	2.25	2.50	3.00	2.25	2.62	2.62	2.62	2.62	2.87	2.5

Duration

The internship programme shall be of 6 weeks duration.

INTERNSHIP WILL INCLUDE

- Processing of Fruits and vegetables
- Technology chain for bakery
- Grading and packing for horticulture produce
- Mushroom production technology
- Innovative entrepreneurship with respect to food commodities
- Field visits to food processing units, storage facilities and farms

The internship is designed to provide postgraduate students in food science and nutrition with an experiential exposure in scientific and technological advancements in the field of nutrition, leading to more personalised, effective and accessible solutions for community health and well-being especially

Semester - 3

Home Science:Food Science and Nutrition

(MHSF)

SEMESTER-III

FOOD PROCESSING AND TECHNOLOGY

Code: MHSFCFP325

Credits: 4(3+1)

Total Contact Hrs. 60

Max.Marks: 100

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:To understand the basic principles of food preservation

CLO 2: Know the Application of principles of food preservation

CLO 3:Gain knowledge regarding the processed products of plant origin

CLO 4:Know the nutritional importance and processing of animal-origin foods

CLO-PLO Matrix for the course MHSFCFP325 (Food Processing and Technology)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCFP325.1	3	3	3	3	3	3	1	3	2	3	2.7
MHSFCFP325.2	3	3	3	3	3	3	1	3	2	3	2.7
MHSFCFP325.3	3	2	2	3	3	1	1	3	2	3	2.3
MHSFCFP325.4	3	3	3	3	3	3	1	3	2	3	2.7
Average PLO	3	2.75	2.75	3	3	2.5	1	3	2	3	2.6

Unit I: Principles in Food Processing Operations- thermal, refrigeration, freezing and dehydration

- **Thermal processing:** Effect of thermal processing on food quality and shelf life, Pasteurization, Sterilization and Canning
- **Refrigeration:** Refrigeration, cold storage and shelf life extension, cold stores with air circulation, humidity control and gas modification.
- **Freezing:** Primary (raw materials), Secondary (processing environment, handling).
- **Dehydration:** Food dehydration and methods of dehydration.

Unit II: Principles in Food Processing Operations, Chemical Preservation and Fermentation

- **Chemical preservation:** Preservation by salt and sugars
- **Common preservatives:** Benzoates, propionates, sorbates, potassium metabisulfite, antioxidants
- **Food Additives:** Definition and Classification
- **Fermentation:** Basic principles, types of fermentation and benefits of fermentation

Unit III: Processing Technology and Nutritional Implications of plant and animal origin foods

- **Cereals:** Wheat milling products, importance of wheat based baked products, composition and nutritional importance of maize and barley, nutritional importance of minor cereals, composition of rice and parboiling of rice.
- **Fruits and Vegetables:** Nutritional and nutraceutical importance of fruits and vegetables, procedures for preparation of apple jam, lemon squash, tomato ketchups and sauces.

- **Milk :**Milk compositions and factors influencing composition, nutritional importance of milk, pasteurization, homogenization and standardization of milk
- **Milk products:** Fortified, skimmed and concentrated milks, cream, butter, cheese. Indigenous milk products such as khoa, paneer, yoghurt, ghee, malai and rabbri.
- **Meat:** Nutritional importance, spoilage and its prevention
- **Fish:**Nutritional importance, preservation(canning and pickling)
- **Egg:**Nutritional importance and quality parameters

Unit IV (Practical)

- Canning of fruits
- Dehydration of fruits
- Dehydration of vegetables
- Rehydration of dried vegetables and observing effects of preservation on acceptability
- Preparation and preservation of fruit squash
- Preparation and preservation of jam and jelly of one seasonal fruit
- Preparation and preservation of pickle
- Preparation and preservation of tomato ketchup and tomato sauce
- Preparation of bread
- Preparation of cakes
- Visit to a food processing unit and submitting a report.

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- Fellows, P.J(2000), Food Processing Technology: Principles and Practice. Second Edition, CRC Woodhead Publishing ltd, Cambridge
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SEMESTER-III

FOOD SAFETY AND QUALITY CONTROL

Code: **MHSFCFS325**

Credits: **4(3+1)**

Total Contact Hrs. **60**

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:Explain quality control principles, standards and management systems, and the role of quality control in ensuring food industry standards and safety.

CLO 2:Apply sensory and objective evaluation techniques to assess food quality, using standardized tests and physico-chemical methods, and critically analyze their applications, advantages, and limitations in food analysis

CLO 3:Explain the principles of HACCP, identify the different hazards in food, and gain insight into the Food Safety and Standards Act.

CLO 4:Learn about various methods of food evaluation through sensory and objective techniques. They will also learn about labeling, pricing and packaging of various food articles.

CLO-PLO Matrix for the course MHSFCFS325 (Food Safety and Quality Control)

Unit-Wise CLOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO10	Average CLO
MHSFCFS325.1	3	2	3	2.5	2	3	3	2.5	2	3	2.6
MHSFCFS325.2	3	3	2	2	2	3	3	2.5	2	3	2.55
MHSFCFS325.3	3	3	2	2.5	2	3	3	3	2	3	2.65
MHSFCFS325.4	2.5	2.5	2	2	2	3	2.5	2.5	2	3	2.4
Average PLO	2.87	2.62	2.25	2.25	2	3	2.87	2.62	2	3	2.5

Unit I: Quality Control

- Definition of Quality, Quality control and Quality assurance
- Total Quality Management and Different Quality Standards
- Factors affecting Food Quality – Extrinsic and Intrinsic
- Functions of Quality control in food Industry

Unit II: Sensory and Objective Evaluation of Food Quality

- **Sensory Evaluation**

- Difference tests – paired comparison test, duo-trio test, triangle test
- Rating tests – ranking test, single sample (Monadic test), two sample difference test, multiple sample difference test, Hedonic rating scale, numerical scoring test, composite scoring test
- Sensitivity test – sensitivity threshold test, dilution test, descriptive Flavour profile method
- Limitation of sensory evaluation

- **Objective Evaluation**

  - Advantage, disadvantages and basic guide lines
  - Physical and Chemical methods of food evaluation
  - Physico-chemical methods &Microscopic examination

Unit III: Hazard analysis critical control point (HACCP)

- Introduction and Principles of HACCP
- Physical, chemical and biological Hazards in foods
- Food Safety and Standards Act

Unit IV: (Practical)

- Sensory Evaluation of Food Samples Using Difference and Rating Tests
- Objective Evaluation of Food Quality
- Create a flowchart of a food production process (e.g., milk, chutney), identify potential hazards, and determine Critical Control Points (CCPs).
- Conduct a market survey of a specific product category (e.g., biscuits, milk), compare brands based on sensory attributes, labelling, pricing, and packaging.

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SEMESTER-III

WOMEN, NUTRITION & HEALTH

Code: **MHSFCWN325**

Credits: **4(3+1)**

Total Contact Hrs. **60**

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1: Understand nutrition and health problems related to women

CLO 2: Understand the nutritional needs across the life cycle

CLO 3:Critically understand policies and programs

CLO 4:Practical experience

CLO-PLO Matrix for the Course MHSFCWN325 (Women, Nutrition and Health)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCWN325.1	3	2	2	2	3	3	2	2	2	2	2.3
MHSFCWN325.2	3	2	2	2	2	3	3	2	2	2	2.3
MHSFCWN325.3	3	2	2.5	3	3	3	2	2	2	2	2.4
MHSFCWN325.4	3	2.5	3	2	3	3	2	2	3	3	2.6
Average PLO	3	2.12	2.37	2.25	2.75	3	2.25	2	2.25	2.25	2.4

Unit I: Women and Health

- Health facilities, Disease patterns and reproductive health
- Women -pregnancy and lactation
- Safe motherhood, Care of at risk mothers, Family Planning
- Women and aging - menopause, osteoporosis, chronic degenerative disease, neurological problems
- Women – AIDS and Breast Cancer

Unit II: Nutritional requirements and Dietary considerations:

- Pubescence and Adolescence, Food related habits of Adolescents, General nutritional problems during adolescence
- Pregnancy and Lactation, General dietary problems of expectant mothers
- Menopause and dietary consideration
- Nutrition related problems of old age

Unit III: Policies, Legislation's & Empowerment of Women

- Empowerment of Women
- CEDAW (Convention on Elimination of all forms of Discrimination against Women) and WRLH (Women's Right to life and Health)
- Role of Education
- Various National schemes for empowerment of women

Unit IV (Practical)

Diet and Nutrition Counseling of

- Pregnant women
- Lactating mother
- Menopausal women

References:

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SEMESTER-III

APPLIED MICROBIOLOGY

Code: **MHSFCAM325**

Credits: **4(3+1)**

Total Contact Hrs. 60

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:To understand the contamination of foods and factors influencing microbial growth.

CLO 2:To understand microbial spoilage of different foods and detect the spoilage

CLO 3:Impart knowledge regarding food borne diseases and useful microbes of food.

CLO 4:Impart practical knowledge regarding identification of food spoilage.

CLO-PLO Matrix for the Course MHSFCAM325 (Applied Microbiology)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCAM325.1	3	3	2	3	2	3	2.5	2.5	2	2	2.5
MHSFCAM325.2	3	3	2	2.5	2	3	2.5	2.5	2	2	2.45
MHSFCAM325.3	3	2.5	2	2.5	2	3	2.5	2.5	2.5	2.5	2.5
MHSFCAM325.4	3	3	2	2	3	3	2.5	2.5	2.5	2.5	2.6
Average PLO	3	2.87	2	2.5	2.25	3	2.5	2.5	2.25	2.25	2.5

Unit I:

- **Introduction to the concept of food as a microbial habitat**
- **Sources of microbial contamination in the food chain:** Primary (raw materials), Secondary (processing environment, handling).
- **Effect of Environmental Factors on Growth of Micro-Organism:-**Growth curve. Nutrients, Moisture, pH, Oxidation reduction potential, Temperature, and gaseous atmosphere, Inhibitory substances in animal and plant products
- **Control of microorganisms:** Concept of hurdle technology in controlling/inhibiting microbial growth

Unit II:

- **Microbial spoilage of foods:** Biochemical mechanisms of spoilage caused by different microbial groups in various food types (Carbohydrate fermentation, protein putrefaction, lipid oxidation catalyzed by microbial enzymes)
- **Post-harvest spoilage of fruits and vegetables:** bacterial soft rot, grey mold rot, Rhizopus soft rot, watery soft rot, and blue mold rot.
- **Spoilage of meat, poultry, seafood and related products:** putrefaction, taint, spots, whiskers, tri-methyl amine production, sliminess, and rots.
- **Spoilage of milk and milk products:**ropiness, souring, off flavors, proteolysis, and discoloration.
- **Spoilage of cereal and cereal products:** ropiness, chalky bread, red bread, and mold growth
- **Rapid tests for detection of microbial load/spoilage:** clot on boil, methylene blue reduction test, alkaline phosphatase test, and tetrazolium test.

Unit III:

- **Food-borne diseases:** outline of etiological agents, symptoms, foods involved, and control**.**
- **Coliforms:** Indicator organisms for fecal contamination and potential hygiene issues in food processing**,** presumptive and confirmed tests for coliforms
- **Principles of cleaning and disinfection:** types of cleaning agents, mechanism of action of disinfectants and sanitizers, factors affecting their efficacy, sanitation of food contact surfaces and equipment, biofilm formation and its implications, Clean in place(CIP) principles(brief overview)
- **Food Fermentation:** fermentation and its types, role of starter cultures and

indigenous micro biota in fermentation, impact of fermentation on food preservation, flavor, texture, and nutritional value.

- **Prebiotics, Probiotics, and gut health**
- **Microbiology of fermented foods:** vegetable fermentation (pickles, kanji, sauerkraut and kimchi), fermented dairy products (Yogurt, cheese, shrikhand and sour cream), fermented cereal and pulse based products (idli, dosa and sourdough bread, soy sauce), fermented meat and seafood (sausages, fish pickle etc).

Unit IV :(Practical)

- Study the use and effect of preservatives in different food products.
- Perform platform tests to check the quality of raw milk.
- Study of the spoilage of milk with special emphasis on souring and ropiness of milk.
- Study of the spoilage of bread with special emphasis on ropiness and mold growth.
- Study the spoilage of fruit juices with special emphasis on fermentation and film formation.
- Checking the viability of yeast for bread fermentation.
- Familiarization with alcoholic smell, vinegar smell, putrid smell, and sliminess in proteinaceous foods.
- Visual inspection and detection of defects of cans.
- Preparation of Fermented foods like vegetable pickles, sauerkraut, sourdough bread, yoghurt etc.

References:

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- Ward E. Robert and BamforthW.Charles, The Oxford Handbook of Food Fermentation

SEMESTER-III

ARTIFICIAL INTELLIGENCE AND DIGITAL TECHNOLOGY FOR HOME SCIENCE

Course Code: MHSCCAI325

Credits: 4

Total Contact Hrs. 60

Max. Marks: 100

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:Gain knowledge and skills to leverage the power of AI and digital technologies to enhance their understanding and practice of home science.

CLO 2:Analyse impact of digital technology on women online strategies for their safety and technology for women empowerment

CLO 3:Analyse data, develop solutions, and contribute to advancements in the field of Home Science through the application of AI and digital technologies.

CLO 4:Understand AI powered tools and platforms in home science, including natural language processing

CLO-PLO Matrix for the Course MHSCCAI325 (Artificial Intelligence and Digital Technology for Home Science)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSCCAI325.1	3	3	2	3	2.5	2.5	3	3	2	2	2.50
MHSCCAI325.2	2.5	3	2	2	3	2.5	2	2.5	2	2.5	2.40
MHSCCAI325.3	2	2	2.5	2.5	2	2	3	2.5	2.5	3	2.40
MHSCCAI325.4	2	2.5	3	2.5	3	2	3	2.5	2.5	2.5	2.55
Average PLO	2.37	2.62	2.37	2.50	2.62	2.25	2.75	2.62	2.25	2.50	2.4

Unit I : Introduction to Artificial Intelligence and Digital Technology

- Fundamentals of AI: Definition, history, types of AI (narrow, general, super), and key concepts like machine learning, deep learning, and neural networks.
- Digital Literacy: Understanding operating systems, software applications, and basic computer operations. Proficiency in using digital tools for communication, information access, and data management.
- AI in Everyday Life: Exploring how AI is already impacting various sectors and how it might further transform our daily lives.
- Ethical Considerations: Examining the societal impact of AI, including issues of bias, privacy, and responsible AI development.

Unit II: Impact of Digital Technology on Women

- Digital Technologies and Gendered Dimensions: Defining digital technologies and identity; theorizing digital identity and its relation to gender; access to technology: global inequalities and disparities; digital literacy and its impact on women's opportunities
- Online Harassment and Safety: cyberstalking, cyberbullying, and online abuse targeting women; role of social media platforms and online communities; strategies for combating online harassment and promoting online safety
- Construction of Gender; online representations of women and gender stereotypes; performance of gender online: self-presentation and identity play; impact of digital technologies on traditional gender roles
- Technology for Women's Empowerment: digital tools for education, healthcare, and economic empowerment; digital entrepreneurship and women's economic independence; importance of critical engagement with digital technologies; need for inclusive and equitable digital development

Unit III: Digital Technologies for Home Science Applications

- AI in Extension Education: Fundamentals of AI and its applications in agriculture and rural development; Drones for crop monitoring and spraying; Sensors for soil and water management; Geographic Information Systems (GIS) for spatial analysis and mapping; Mobile-based extension services.

- AI in Nutrition and Dietetics: AI-powered tools for personalized meal planning, dietary recommendations, and food analysis; tools for data collection, analysis, and presentation in areas like nutritional analysis
- AI in Human Development: Digital technologies and AI for the betterment of human lives and the advancement of society; AI for assistive technologies for people with disabilities, language translation tools, and inclusive design; use of AI-powered toys and learning tools for young children.
- AI in Textiles, Fashion and Interior Design: use of AI in fabric analysis, design, and virtual try-on technologies. AI-powered tools for 3D modelling, space planning, and virtual interior design; tools for data collection, analysis, and presentation in areas; Principles of smart home technology and its applications in areas like energy management, security, and convenience

Unit IV: Programming and AI Tools

- Machine Learning for Home Science: Specific machine learning algorithms and their applications in analysing data related to home science.
- Computer Vision for Home Science: Understanding how computer vision can be used for object recognition, image analysis, and pattern detection in areas like textiles and interior design.
- Natural Language Processing (NLP): Learning about NLP techniques for text analysis, sentiment analysis, and chatbot development for home science applications.
- AI-powered Tools and Platforms: Hands-on experience with various AI-powered tools used in home science, including design software, data analysis platforms, and smart home applications.

References

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- Acemoglu, D. and Restrepo, P. (2019). Automation and New Tasks: How Technology Displaces and Reinstates Labor. Journal of Economic Perspectives, 33(2):3–30.
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- Ord, T. (2020). The Precipice: Existential Risk and the Future of Humanity. New York: Hachette Books.
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Semester - 4

Home Science:Food Science and Nutrition

(MHSF)

(CW+CW)

SEMESTER-IV

SPORTS NUTRITION AND FITNESS

Code: **MHSFCSN425**

Credits: **4(3+1)**

Total Contact Hrs. 60

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:Understand sports nutrition and their role in enhancing athletic performance

CLO 2:Evaluate the role of macronutrients and micronutrients in supporting physical activity

CLO 3:Understand the role of nutrition supplements and ergogenic aids and address common nutrition related issues

CLO 4:Gain practical knowledge about fitness testing methods and planning diets.

CLO-PLO Matrix for the course MHSFCSN425 (Sports Nutrtion and Fitness)

Unit-Wise CLOs	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9	PLO10	Average CLO
MHSFCSN425.1	3	2	2	2	2	3	2	2	2	2	2.2
MHSFCSN425.2	3	3	2	2	2	3	2	2	2	2	2.3
MHSFCSN425.3	3	3	3	3	2	3	2	2.5	2.5	2	2.6
MHSFCSN425.4	3	2	3	2	2	3	3	2.5	2.5	2.5	2.5
Average PLO	3	2.5	2.5	2.25	2	3	2.25	2.25	2.25	2.12	2.4

UNIT I: Introduction to Physical Fitness and Sports Nutrition

- Integrated approach to care of athletes. Nutrition and physical performance and importance
- Components of physical fitness
- Methods of Assessing physical fitness
- Fuels for contracting muscles

UNIT II: Optimal Nutrition for exercise performance

- Estimation of energy requirements
- Weight management (weight loss and gain)
- Macro& micro nutrient recommendation for sports performance
- Fluid requirements and other considerations
- Glycogen loading

Unit III: Sports performance and aesthetics

- Disordered eating ,muscledysmorphia, ammenorhoea,premature osteoporosis
- Female athlete triad ,breaking the triad
- Muscle dysmorphia
- Nutritional supplements& ergogenic aids
- Doping in sports (PES /PED)

UNIT IV: (Practical)

- 1.Fitness testing methods
    - BMI
    - Flamingo balance test
    - Plate tapping test
    - Strength test
    - Muscular endurance

- Survey of various nutritional supplements and ergogenic aids
- Diet planning (male athlete)
- Diet planning (female athlete)

References:

10. Barkar, D. J.P. (1998). Mothers, Bahks and Health in Later life. Edinburgh, Churchill Livingstone.
11. Insel, PEM., Turner, R.E., &Roos D. (2007). Nutrition (3rd ed) Sudnury: Jones & Bartlett Publishers.
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14. Tanner, J. M. (1998) Foetus into Man: Physical Growth from Conception to Maturity. Wheaton. And Co. Ltd. Great Britain.
15. Ward, R.H.T. Smith, S.K. Donnai D. (eds) (1994) Early Fetal Growth and Development. London, RCOG, Press.
16. Watson, R. R. (Ed) (2000) Handbook of Nutrition in the aged. 3 rd Edition. CRC Press. Boca Raton.
17. Whitney, E., &RadyRolfes, S. (2008). Understanding Nutrition (11th ed). Canda: Wadsworth, Cengage learning.
18. WHO* (1999) Nutrition for Health and Development: Progress and Prospectus on the Eve of the 21st Century.

SEMESTER-IV

POLICIES AND PROGRAMMES IN PUBLIC HEALTH NUTRITION

Code: **MHSFCPN425**

Credits: **4(3+1)**

Total Contact Hrs. 60

Max.Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:Identify major nutrient public health related problems

CLO 2:Understand and gain knowledge about life style related health problems

CLO 3:Identify national/public sector policies for promotion of nutrition and health status of the population

CLO 4:Analyze and write reports on ongoing national public health nutrition programmes.

CLO-PLO Matrix for the course MHSFCPN425 (Policies and Programmesin Public Health Nutrition)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCPN425.1	2	2	3	3	3	2.5	2	3	2	2	2.45
MHSFCPN425.2	3	2	2.5	3	3	2.5	2	3	2	2	2.5
MHSFCPN425.3	2.5	2	3	3	3	2.5	3	3	2.5	3	2.75
MHSFCPN425.4	2	3	3	2.5	3	2.5	2	2.5	3	2.5	2.6
Average PLO	2.75	2.25	2.87	2.87	3	2.5	2.25	2.87	2.37	2.37	2.57

UNIT I: Public Health Aspects of Under nutrition

- Etiology, public health implications ,preventive strategies and community based management of
  - Protein Energy Malnutrition.
  - Chronic Energy Deficiency.
  - Severe Acute Malnutrition .
  - Major Micronutrient Deficiencies

UNIT II: Public Health Aspects of Life Style Related Disorders

- Public health Implications and Preventive Strategies for
  - Obesity
  - Hypertension,
  - Coronary heart disease,
  - Diabetes,
  - Osteoporosis
  - Cancer.

Unit III: National/Public Sector Policies for Promotion of Nutrition and Health Status of the Population

- National Nutrition Policy
- PoshanAbhiyan
- National Health Policy
- National Food Security Act

UNIT IV: (Practical)

- Critical appraisal of ongoing National Public Health Nutrition Programmes:
  - ICDS
  - PoshanAbhiyan (National Nutrition Mission)
  - PM POSHAN (Mid Day Meal Programme)

References

- Gibney M.J., Margetts, B.M., Kearney, J. M. Arab, I., (Eds) (2004) Public Health Nutrition, NS Blackwell Publishing.
- National Nutrition Policy, GoI. http://wcd.nic.in/sites/default/files/nnp_0.pdf
- Park, K. (2017) Park's Textbook of Preventive and Social Medicine, 24th edition. BanarsidasBhanot Publishers.
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- National Consensus Workshop on Management of SAM children through Medical Nutrition Therapy (2009)-Compendium of Scientific Publications Volume I and II. Jointly organized by AIIMS, SitaramBhartia Institute of Science and Research, IAP (Subspeciality chapter on Nutrition), New Delhi. Sponsored by DBT.

SEMESTER-IV

CURRENT & EMERGING CONCEPTS IN HUMAN NUTRITION

Code: **MHSFCEC425**

Credits: **4**

Total Contact Hrs. **60**

Max. Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to understand:

CLO 1:The importance of antioxidants and phytochemicals in prevention of the diseases, understand prebiotics/probiotics benefits and also understand GM food technology in detail.

CLO 2:Organic farming benefits, functional foods concept, different types of fat replacers available in the market and advanced methods used for food preservation.

CLO 3:Benefits of food fortification , principle of microwave cooking and also understand in details the process of food irradiation

CLO 4:Dietary promotes health and its role in prevention of chronic diseases.

CLO-PLO Matrix for the course MHSFCEC425 (Current and Emergng Concepts In Human Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCEC425.1	3	3	3	2	2	3	3	3	2	3	**2.7**
MHSFCEC425.2	3	3	3	2	2	3	3	3	2	3	**2.7**
MHSFCEC425.3	3	3	3	2	2	3	3	3	2	3	**2.7**
MHSFCEC425.4	3	3	3	2	2	3	3	3	2	3	**2.7**
Average PLO	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**2.7**

UNIT I: Defensive Nutrition Paradigm

- Photochemical: Concept and its role in prevention of diseases, Antioxidants & their health benefits
- Concept of Nutrigenomics& Nutraceuticals
- Probiotics and their beneficial effects, prebiotics
- Genetically Modified Foods and their benefits. Safety of GM Foods.
- Nutritional Supplements & Ergogenic Aids- Types

UNIT II: Emerging trends in Nutrition

- Organic Foods & Organic Farming
- Functional Foods & their Benefits
- Various Fat replacers in the diet
- Advanced concept of food preservation
- Placebo effect

Unit III: Food Technology

- Food Engineering
- Food fortification & Enrichment- objectives,
- Commonly fortified foods & methods of fortification
- Irradiation- Safety & Quality of irradiated foods
- Microwave Cooking- Its advantages & disadvantages

UNIT IV: Fiber & its benefits

- Dietary fiber & its types (Soluble and Insoluble Fiber)
- Sources of Fiber & its components
- Importance of Fiber in Human Nutrition
- Role of Fiber in Prevention of Diseases
- Resistant starch & its Potential health benefits

References:

15. Robinson, C. H., Normal and Therapeutic Nutrition. (17th Edition) Macmillan Publishing Company.
16. Lea &Febiger USA Publishing.
17. Shills M.E., et.al., Modern Nutrition in Health and Disease.
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3 B. Shri. Lakshmi., Dietetics, 10th Edition. New age, International (p) Ltd. Publishing.

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SEMESTER-IV

NUTRITION IN EMERGENCY AND DISASTER

Code: **MHSFCNE425**

Credits: **4(3+1)**

Total Contact Hrs. **60**

Max. Marks: **100**

Course Learning Outcomes: By the end of this paper the student will be able to :

CLO 1:Understand disaster management and the roles of national and regional authorities in responding to major disasters.

CLO 2:Identify nutritional problems and assess malnutrition in emergency-affected populations using appropriate methods

CLO 3:Understand the impact of communicable diseases and **plan** strategies for nutritional relief, food distribution, and hygiene management in emergency situations.

CLO 4:Analyze major disasters in India through case studies and understand their impact and management strategies.

CLO-PLO Matrix for the course MHSFCNE425 (Nutrition InEmergncy and Disaster)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFCNE425.1	3	3	2.5	2.5	2	2	2.5	2	2	2.5	2.4
MHSFCNE425.2	3	2	3	3	3	2.5	3	2	2	3	2.65
MHSFCNE425.3	3	3	3	3	2.5	3	2.5	2	2	3	2.7
MHSFCNE425.4	3	3	3	3	2	2.5	3	2	2	3	2.65
Average PLO	3	2.75	2.87	2.87	2.37	2.5	2.75	2	2	2.87	2.6

Unit I: Disaster Management

- Disaster – Definition and management
- Short-term effect of Major disasters – Earthquakes, high winds, tidal waves,flash floods, slow – onset floods, lands slides, feminine, drought and war
- Role of National Disaster Management Authority of India and Disaster Management Cell of J&K.

Unit II: Nutritional problems and Assessment in emergency affected populations

- Causes and indictors of malnutrition in emergency situations.
- Major Nutritional deficiency diseases in emergencies:
    - Protein energy malnutrition
    - Vitamin deficiency diseases
    - Mineral deficiency diseases
- Methods of Assessment of mal-nutrition in emergencies.

Unit III: Communicable diseases, Nutritional Relief and Rehabilitation

- Common communicable diseases
- Food distribution strategy - Identifying and reaching the vulnerable group.
- Targeting Food Aid
- Transportation and food storage
- Sanitation and hygiene

UNIT IV (Practical)

1. Case study of Major Disasters in India:
    - Earthquake
    - Kashmir Flood
    - Bopal Gas tragedy
    - Landslides.

References:

- BhavanSabarwalIst edition 1999, Public Health and Nutritional
- Bortbn, J. (1998): The State of the International Humanitarian System. Briefing Paper. London: ODI.
- Bradley, A., Woodruff and Arabella Duffield (July, 2000): Assessment of-Nutritional Status in Emergency Affected Populations - Adolescents, Special Supplement, UN ACC/SCN Sub-Committee on Nutrition.
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- Sue Rodwell Williams 4th Edition Essentials of nutrition and Diet Therapy.
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- UNHCR (1999): UNHCR Handbook for Emergencies. 2nd edition, Geneva, UNHCR.
- USCR (1999): World Refugee Survey 1999. Washington EC. USCR.
- World Disasters Report - Focus on Public Health, International Federation of Red Cross and Red Crescent Societies.
- WFP (1999): World Food Programme. Food and Nutrition Handbook Draft. Rome, WFP.
- WFP (1991): Food Aid in Emergencies. Rome, WFP.

- WFP/UNHCR (1998): WFP/UNHCR Guidelines for Selective Feeding Programmes in Emergency Situations. Rome and Geneva: WFP and UNHCR.
- WHO (1997): Applied Health Research Priorities in Complex Emergencies. Geneva. WHO.
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SEMESTER-IV

DISSERTATION

(FOOD SCIENCE & NUTRITION)

Code: MHSFPDI425

Credits: 4 (Research/Project Work)

Total Contact Hrs. 60

Max.Marks: 100

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:Develop research skills commensurate with the accomplishment of a master's degree.

CLO 2:Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently.

CLO 3:Address issues of research design, methodology, ethics and theoretical arguments and locate a piece of research within these.

CLO 4:Apply the knowledge about research design and methods that students have gained from the taught components to develop their dissertation project.

CLO-PLO Matrix for the CourseMHSFPDI425

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSFPDI425.1	3	2	2.5	3	2.5	3	3	3	2	3	2.7
MHSFPDI425.2	2	2.5	2.5	2	3	2	2.5	2.5	2	2.5	2.35
MHSFPDI425.3	3	2.5	2	2.5	2	2.5	2.5	2	3	2	2.40
MHSFPDI425.4	3	2.5	2	2.5	3	3	2.5	2	2.5	2	2.40
Average PLO	2.75	2.37	2.25	2.50	2.62	2.62	2.62	2.37	2.37	2.37	2.4

The student will be guided and supervised by a member of the teaching faculty of the Institute. However, the dissertation in which the research culminates should reflect the student's own work. The students will undertake an independent piece of research work on an issue of contemporary concern that contributes to the advancement of knowledge.

The **project report** should be systematically organized under the following heads:

1. Introduction

- Introduce the topic and provide background information.
- Explain the **importance and relevance** of the research area.
- Clearly state the **research problem or issue**.
- Mention the **objectives** of the study.
- Include **research questions** or **hypotheses** if applicable.
- Justify the need for conducting the study.

2. Review of Literature

- Present a **summary of previous studies** related to the topic.
- Highlight the **key findings** from existing literature.
- Identify **research gaps** or limitations in earlier studies.
- Justify how the current study addresses those gaps.
- Organize the review **thematically** or **chronologically**.
- Use proper **citations** throughout the section.

3. Methodology

- Describe the **research design** (qualitative, quantitative, or mixed methods).
- Explain the **sampling method**, sample size, and selection criteria.
- Provide details about **data collection tools** (questionnaires, interviews, etc.).
- Mention the **data analysis techniques** used (e.g., SPSS, thematic analysis).
- Include ethical considerations such as consent, anonymity, and confidentiality.

4. Results

- Present the findings **objectively** without interpretation.
- Use **tables, graphs, or charts** to make data visually clear.
- Highlight key trends, frequencies, or relationships found in the data.
- Ensure the results directly relate to the research objectives.
- Avoid excessive explanation—keep it **factual and concise**.

5. Discussion

- **Interpret the results** in light of research objectives and existing literature.
- Explain possible **reasons or implications** for the findings.
- Compare results with previous studies to support or contrast your findings.
- Address any **unexpected outcomes** or deviations.
- Acknowledge **limitations** of your study.
- Suggest the **practical relevance** or application of the findings.

6. Summary and Conclusion

- Summarize the **entire research work** in a few clear paragraphs.
- Restate the **major findings**.
- Present the **final conclusion** of the study.
- Offer **recommendations** for practice or policy if applicable.
- Suggest areas for **future research** based on findings and limitations.

7. References

- List all sources cited in the report using a **uniform citation style** (e.g., APA).
- Include books, research papers, articles, and credible web sources.
- Ensure **accuracy and consistency** in formatting.
- Avoid listing any source that is not cited in the report.

Semester – 4

Home Science: Food Science and Nutrition

(MHSF)

(CW+R)

SEMESTER-IV

(CW+R)

Research Methods and Statistics

Course Code: MHSCCRM425

Credit: 04

Max. Marks: 100

Total Contact Hrs. 60

Course Learning Outcomes

CLO 1: Understand the significance of research methodology in Home Science research.

CLO 2: Understand the types, tools and methods of research and develop the ability to construct the data gathering instruments appropriate to the research design.

CLO 3: Acquaint skill of data processing and data analysis through various statistical measures

CLO 4: Learn qualitative analysis of data with scientifically writing and application of statistical software

CLO-PLO Matrix for the Course MHSCCRM425 (Research Methods and Statistics)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSCCRM425.1	2	3	3	3	2	3	3	3	2	3	2.70
MHSCCRM425.2	2	3	2.5	3	2	2	3	3	2.5	2.5	2.55
MHSCCRM425.3	3	2.5	2	2.5	2.5	2	2.5	2.5	2.5	2	2.6
MHSCCRM425.4	3	2	2	2	2.5	2	2.5	2.5	2	3	2.35
Average PLO	2.50	2.87	2.37	2.12	2.25	2.25	2.75	2.75	2.25	2.62	2.4

Unit I: Introduction to Research Methodology

- Research methods verses methodology, research process, criteria for good research, types of research, problems encountered by researchers in India, research problem, techniques involved in defining problem
- Research process flow chart, types of research design, designing the research study – important concepts related to research design and features. Principles o experimental designs
- Dependent and independent variables, research questions, Hypotheses – Types, sources and process of setting up hypotheses
- Concept of measurements; types, nominal scale, ordinal scale, interval scale, ratio scale, construction of scales; semantic differential scale, Thurston scale, likert scale. Criteria of good measurement

Unit II: Research Methods and Data Gathering Instruments

- Data; types, advantages and disadvantages, selection of data collection method, Methods of collection of primary (Observation, Interview, Questionnaire, Interview Schedule, Google forms) and secondary data (Internal sources, Government publications, periodicals and books, commercial data), Their advantages and disadvantages
- Sampling theory; steps, principles of sampling, limitations, precision, errors, choice of sampling techniques, pilot studies and pretesting.
- Sampling Techniques: Probability and Non-Probability. Their advantages and disadvantages, random number table, determination of sample size.
- Data Processing— Rules and types of diagrams, Presentation of data through Bar diagram and its types, Pie diagram and histogram

Unit III: Processing and Analysis of Data

- Data Analysis and interpretation: editing, coding, classification, tabulation of data, kinds of statistical tables, preparation of tables, methods of tabulation
- Computer in research: Applications of SPSS & MINITAB, preparation of worksheets etc. missing values, data conversion, data replacement
- Measures of Central Tendency: Mean, Median and Mode, (individual, discrete and continuous series; Direct and shortcut method; cumulative series; mid-value of class intervals), calculation of quartile, decile and percentiles**;**
- Measures of dispersion: Range, inter quartile range, quartile deviation, mean deviation and standard deviation

Unit IV: Analysis and Interpretation of Data

- Measures of Relationship: Karl Pearson's coefficient of correlation, Rank difference method (Spearmen's method), concurrent deviations
- Parametric Test for Hypothesis Testing: t- test(dependent and Independent), chi square test, one way ANOVA
- Regression Analysis—lines of regression and regression equation. Comparison of correlation and regression
- Ingredients of Research Report: Synopsis, Project/dissertation writing—format and mechanics, techniques of interpretation, Plagiarism and Ethical issues

Suggestive Readings:

- Abu-Bader, Soleman Hassan (2010). Advanced And Multivariate Statistical Methods For Social Science Research With A Complete SPSS Guide. Chicago: Lyceum Books, Pune
- Bandakar, P.L. and Wilkinson T.S. (2000): Methodology and Techniques of social Research Himalaya Publishing House Mumbai.
- Bhantnagar, G. L. (1990): Research methods and measurement in Behavioural and social science, degree, colo publishing academy, New Delhi.
- Dooley, D. (1995): Strategies for Interpreting Qualitative data sage publication, California.
- Gay, L.R. (1981, 2nd Ed) Educational Research, Charles, E. Merill Columbus Ohio.
- Long, J. S., (1988): Common Problems Proper Solution: Avoiding Errors in Qualitative Research, Beverly Hills, Sage Publications, California.
- Mukherjee, R. (1989): The Quality of Life: Valuation in Social Research, Sage Publication, New Delhi.
- Stranss, A. and Corbin, J. (1990): Basis of qualitive Research: Grounded Theory Procedures and Techniques, Sage Publications, California.
- Chawla, Deepak & Sondhi, Neena (2011). Research methodology: Concepts and cases . NewDelhi: Vikas Publishing House. Pune

SEMESTER-IV

(CW+R)

Dissertation in Food Science and Nutrition

Course Code: **MHSCPDI425**

Credit: 16 **(Research/Project Work)**

Max. Marks: 400

Total Contact Hrs. 240

Course Learning Outcomes: By the end of this paper the student will be able to:

CLO 1:Develop research skills commensurate with the accomplishment of a master's degree.

CLO 2:Produce a coherent and logically argued piece of writing that demonstrates competence in research and the ability to operate independently.

CLO 3:Address issues of research design, methodology, ethics and theoretical arguments and locate a piece of research within these.

CLO 4:Apply the knowledge about research design and methods that students have gained from the taught components to develop their dissertation project.

CLO-PLO Matrix for the Course MHSCPDI425 (Dissertaton in Food Science and Nutrition)

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MHSCPDI425.1	3	2	2.5	3	2.5	3	3	3	2	3	2.7
MHSCPDI425.2	2	2.5	2.5	2	3	2	2.5	2.5	2	2.5	2.35
MHSCPDI425.3	3	2.5	2	2.5	2	2.5	2.5	2	3	2	2.40
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