P.G. Course Structure for

Home Science

Dietetics and Clinical Nutrition

(MHSD)

Session 2025 onwards

As per NEP: 2020 Guidelines

Course Structure for PG in Dietetics and Clinical Nutrition (Home Science)

Semester	Course Title and Code	T	P	Other	Credits per course	Total Credits
1st	Applied Physiology **MHSDCAP125**	3	1	-	04	20
	Food Chemistry **MHSDCFC125**	3	1	-	04	
	Assessment of Nutritional Status **MHSDCNA125**	2	2	-	04	
	Community Health and Nutrition **MHSDCCN125**	2	2	-	04	
	Research Methods and Statistics (Common Paper) **MHSCCRM125**	**4**		**-**	**04**	
2nd	Maternal and Child Nutrition **MHSDCMN225**	3	1	-	04	**20**
	Clinical and Therapeutic Nutrition **MHSDCTN225**	3	1	-	04	
	Advanced Nutrition **MHSDCAN225**	4		-	04	
	Food Service Management **MHSDCFM225**	3	1	-	04	
	INTERNSHIP (Common) **MHSCIDC225**		**-**	**4**	**04**	

Exit Option for Post Graduate Diploma in Dietetics and Clinical 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)

3rd	Nutrition in Critical Care **MHSDCNC325**	3	1		04	**20**
	Food Safety and Quality Control **MHSDCFS325**	3	1		04	
	Women Nutrition and Health **MHSDCWN325**	3	1		04	
	Applied Microbiology **MHSDCAM325**	3	1		04	
	Artificial Intelligence and Digital Technology for Home Science (Common Paper) **MHSCCAI325**	**4**			**04**	
	Post Graduate Degree in Dietetics and Clinical Nutrition with Course Work (CW+CW) **OR** **Post Graduate Degree in Dietetics and Clinical Nutrition with Research Work (CW+R)**					
4th	Sports Nutrition and Fitness **MHSDCSN425**	3	1		04	**20**
	Policies and Programmes in Public Health Nutrition **MHSDCPN425**	3	1		04	
	Current and Emerging Concepts in Human Nutrition **MHSDCEC425**	4			04	
	Nutrition in Emergency and Disaster **MHSDCNE425**	3	1		04	
	Dissertation **MHSDPDI425**	**-**	**-**	**4**	**04**	
	Post Graduate Degree in Dietetics and Clinical Nutrition with Course Work (CW+CW)					

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

Programme Learning Outcomes (PLOs)
Home Science: Dietetics and Clinical Nutrition

(MHSD)

PLOs	**PG in Home Science – Dietetics and Clinical Nutrition**	
After completion of M.Sc Home Science in Dietetics and Clinical 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, food service establishments ,work simplification, therapeutic ,Critical care 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 safety, food spoilage, food service operations, nutritional screening, preservation and clinical dietetics.
PLO-3	Application of knowledge and skills	Design therapeutic and preventive nutritional plans tailored to individuals and communities using evidence-based approaches.
PLO-4	Communication skills	Communicate effectively with health care professionals, patients and communities about diet, nutrition and health using written, verbal and digital tools.
PLO-5	Critical Thinking and problem solving	Analyse nutritional and health data critically to identify issues, synthesize information and propose scientific and ethical solutions.
PLO-6	Ethics and professional conduct	Adhere to ethical guidelines in dietetic practice, research and public health interventions, maintaining confidentiality and professional integrity.
PLO-7	Life Long Learning	Engage in continuous learning and professional development through research, workshops, emerging nutritional trends and technological advances.
PLO-8	Social Awareness	Understand the impact of environmental, social and cultural factors on nutrition and health, promoting sustainability and equity.
PLO-9	Research and Innovation	Demonstrate the ability to design, conduct and present independent research using appropriate methods, data analysis and ethical considerations.
PLO-10	Problem Solving	Solve complex nutritional and health-related problems in clinical and community settings through critical evaluation and multidisciplinary collaboration.

CLOs-PLOs Mapping Matrix for all Courses

Home Science: Dietetics and Clinical Nutrition

(MHSD)

Course Code	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCAP125	3	2	3	2	2.5	2	3	2	2	2.5	2.4
MHSDCFC125	3	2	2	2	2	3	3	2	3	2	2.4
MHSDCNA125	3	3	2.75	2.75	3	2.75	2	2.75	2.75	2	2.6
MHSDCCN125	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
MHSDCMN225	3	2	2.7	2	3	3	2	3	2.7	2	2.5
MHSDCTN225	3	2	3	2.5	2	2	3	3	3	3	2.6
MHSDCAN225	3	3	2	3	3	2	3	3	2	2	2.6
MHSDCFM225	3	3	2.75	2	2.5	2.12	2.12	2.12	2.87	3	2.55
MHSCIDC225	2.25	2.25	2.50	3.00	2.25	2.62	2.62	2.62	2.62	2.87	2.5
MHSDCNC325	3	3	3	2.62	2.37	2.12	2	2	2.5	2.5	2.51
MHSDCFS325	2.87	2.62	2.25	2.25	2	3	2.87	2.62	2	3	2.54
MHSDCWN325	3	2.12	2.37	2.25	2.75	3	2.25	2	2.25	2.25	2.4
MHSDCAM325	3	2.87	2	2.5	2.25	3	2.5	2.5	2.25	2.25	2.51
MHSCCAI325	2.37	2.62	2.37	2.50	2.62	2.25	2.75	2.62	2.25	2.50	2.4
MHSDCSN425	3	2.5	2.5	2.25	3	2.5	2.25	2.25	2.25	2.12	2.4
MHSDCPN425	2.75	2.25	2.87	2.87	3	2.5	2.25	2.87	2.37	2.37	2.57
MHSDCEC425	3	3	3	2	2	3	3	3	2	3	2.7
MHSDCNE425	3	2.75	2.87	2.87	2.37	2.5	2.75	2	2	2.87	2.6
MHSDPDI425	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	2.53	2.55	2.44	2.49	2.54	2.57	2.52	2.39	2.48	2.52

Semester -1

Home Science: Dietetics and Clinical Nutrition

(MHSD)

SEMESTER-I

APPLIED PHYSIOLOGY

Course Code: **MHSDCAP125**

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.

CLO 2: Understand the functions of key physiological systems, including the digestive, excretory, and nervous systems.

CLO 3: Explain the physiological processes of reproduction, muscle function, and hormonal regulation by major endocrine glands.

CLO 4: Identify various tissues microscopically and perform basic hematological tests, including hemoglobin estimation and blood group determination.

CLO- PLO Matrix for the course MHSDCAP125 (Applied Physiology)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCAP125.1	3	2	3	2	2	2	3	2	2	**3**	**2.4**
MHSDCAP125.2	3	2	3	2	2	2	3	2	2	**3**	**2.4**
MHSDCAP125.3	3	2	3	2	3	2	3	2	2	**2**	**2.4**
MHSDCAP125.4	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.

SEMESTER-I

FOOD CHEMISTRY

Code: **MHSDCFC125**

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 MHSDCFC125 (Food Chemistry)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCFC125.1	3	2	2	2	2	3	3	2	3	2	**2.4**
MHSDCFC125.2	3	2	2	2	2	3	3	2	3	2	**2.4**
MHSDCFC125.3	3	2	2	2	2	3	3	2	3	2	**2.4**
MHSDCFC125.4	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, Enzyme specificity, 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:

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

SEMESTER-I

ASSESSMENT OF NUTRITIONAL STATUS

Code: **MHSDCNA125**

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 MHSDCNA125 (Assessment of Nutritional status)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCNA125.1	3	3	2	2	3	2	2	2	2	2	**2.3**
MHSDCNA125.2	3	3	3	3	3	3	2	3	3	2	**2.8**
MHSDCNA125.3	3	3	3	3	3	3	2	3	3	2	**2.8**
MHSDCNA125.4	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.
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- Rosalind Gibson. 2nd edition. (2005) . Principles of Nutritional assessment, Oxford University press, N.York
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SEMESTER-I

COMMUNITY HEALTH AND NUTRITION

Code: **MHSDCCN125**

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 MHSDCCN125 (Community health and Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCCN125.1	3	2	2	3	2	2	2	3	2	2	**2.3**
MHSDCCN125.2	3	2	2	3	2	3	3	3	2	2	**2.5**
MHSDCCN125.3	3	3	3	3	3	3	3	3	3	3	**3**
MHSDCCN125.4	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 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.
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Semester -2

Home Science: Dietetics and Clinical Nutrition

(MHSD)

SEMESTER-II

MATERNAL AND CHILD NUTRITION

Code: **MHSDCMN225**

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 MHSDCMN225 (Maternal and child Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCMN225	3	2	3	2	3	3	2	3	3	2	**2.6**
MHSDCMN225	3	2	2	2	3	3	2	3	2	2	**2.4**
MHSDCMN225	3	2	3	2	3	3	2	3	3	2	**2.6**
MHSDCMN225	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: MHSDCTN225

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 MHSDCTN225 (Clinical and Therapeutic Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCTN225.1	3	2	3	2	2	2	3	3	3	3	**2.6**
MHSDCTN225.2	3	2	3	2	2	2	3	3	3	3	**2.6**
MHSDCTN225.3	3	2	3	3	2	2	3	3	3	3	**2.6**
MHSDCTN225.4	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

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SEMESTER-II

ADVANCED NUTRITION

Code: **MHSDCAN225**

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 MHSDCAN225 (Advanced Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCAN225	3	3	2	3	3	2	3	3	2	2	**2.6**
MHSDCAN225	3	3	2	3	3	2	3	3	2	2	**2.6**
MHSDCAN225	3	3	2	3	3	2	3	3	2	2	**2.6**
MHSDCAN225	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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- Annual Reviews of Nutrition. Annual Review Inc., California USA.
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SEMESTER-II

FOOD SERVICE MANAGEMENT

Code: ***MHSDCFM225***

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: Evaluate the principles, types, and management of Indian food service establishments—including menu planning, food selection, storage, and mass production—ensuring operational efficiency and quality control.

CLO 2:Apply principles of sanitation, environmental and personal hygiene, and food safety to prevent contamination and ensure safe food handling and equipment use in food service settings.

CLO 3:Learn principles of making kitchen layouts, apply work simplification principles, and learn to select appropriate equipment for kitchen and service areas to optimize workflow and food service operations.

CLO 4:Conduct market surveys, cost analyses, and kitchen layout evaluations; assess food service units and equipment; plan menus; and standardize recipes for quantity food production across various catering contexts.

CLO-PLO Matrix for the course MHSDCFM225 (Food Service Management)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCFM225.1	3	3	2.5	2	3	2	2	2	3	3	2.55
MHSDCFM225.2	3	3	2.5	2	3	2.5	2.5	2.5	2.5	3	2.65
MHSDCFM225.3	3	3	3	2	2	2	2	2	3	3	2.5
MHSDCFM225.4	3	3	3	2	2	2	2	2	3	3	2.5
Average PLO	3	3	2.75	2	2.5	2.12	2.12	2.12	2.87	3	2.55

Unit I: Food – Service, Management, Selection, Storage and Production

- Introduction to food service establishment and Types of food services in India.
- Meal Planning – Menu, types of menus, need for menu planning, principles involved in planning menus.
- Food selection and storage
- Quantity Food production

Unit II: Sanitation and Safety

- Environmental Hygiene and Sanitation
- Hygiene in Food Handling
- Personnel Hygiene (with reference to sources of food infection and health rules.
- Safety in food catering and use of equipment

Unit III: Physical layout and equipment

- Developing Kitchen plans
- Layout of Kitchens
- Work Simplification
- Equipment for Kitchen and Service rooms

UNIT IV: (Practical)

- Market survey and cost analysis of processed and finished food products (Traditional meat products, Fluid milk and milk products, Processed apple products and pickles)
- Evaluation of food service units and Equipments.
- Layout analysis of kitchen – Hospital & Hostel based
- Planning menus for quantity:
    - Banquet
    - Outdoor catering
    - Packed meals
    - Restaurant
- Standardizing recipes for quantity

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SEMESTER-II

INTERNSHIP (DIETETICS & CLINICAL NUTRITION)

Code: **MHSCIDC225**

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: Apply Nutrition Knowledge in Clinical Settings: Demonstrate the ability to apply knowledge of nutrition and dietetics to develop and implement therapeutic diets for patients with various medical conditions.

CLO 2:Develop Effective Communication Skills: Develop effective communication skills to counsel patients and healthcare professionals on nutrition and diet-related matters, taking into account cultural and individual needs.

CLO 3:Conduct Comprehensive Nutrition Assessments: Conduct comprehensive nutrition assessments, including dietary history, anthropometric measurements, and medical history, to identify nutrition-related problems and develop personalized nutrition plans.

CLO 4: Collaborate with Healthcare Teams: Collaborate with healthcare teams to provide patient-centered care, participate in multidisciplinary rounds, and contribute to the development of nutrition-related policies and procedures.

CLO-PLO Matrix for the Course MHSCIDC225 (Internship)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSCIDC225.1	3	2	3	3	2	3	2.5	3	2.5	3	2.70
MHSCIDC225.2	2	2.5	3	3	3	2.5	3	2	3	2.5	2.65
MHSCIDC225.3	2	2	2	3	2.5	2.5	3	3	3	3	2.60
MHSCIDC225.4	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. The Internship is split up as follows:

- **A. Food Service:** Administration

(Kitchen functioning, Stores, Accounting Practices, Purchasing, Food Preparation, Distribution, Service, Safety and Sanitation, Facility layout and Management)

- **B. Clinical Posting**
  - Renal Unit
  - Endocrinology
  - Cardiovascular
  - Surgical and Post Operative Unit
  - Pediatrics
  - Gastrointestinal Unit
  - Private ward
  - Outpatient's ward (OPD) etc.

- **Nutrition and Diet Counseling:**
  - Exposure to OPD Diet Clinic
  - Prescribing therapeutic diets to OPD patients
  - Prescribing therapeutic diets to discharged warded patients under the supervision of dietitian

- **Research and Training:**
  - Case study work
  - Presentation of case study(s)
  - Assignment

Semester -3

Home Science: Dietetics and Clinical Nutrition

(MHSD)

SEMESTER-III

NUTRITION IN CRITICAL CARE

Code: **MHSDCNC325**

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:Apply nutritional screening and assessment methods to evaluate the nutritional status of critically ill patients and plan appropriate nutritional care.

CLO 2:Understand and apply nutritional support methods, including tube feeding and parenteral nutrition, for critically ill patients.

CLO 3:Identify and apply nutritional requirements and special diets for patients with critical conditions such as burns, cardiovascular complications, cancer etc.

CLO 4:Plan and prepare modified therapeutic diets such as liquid, high-calorie, low-sodium, and low-fat diets.

CLO-PLO Matrix for the course MHSDCNC325 (Nutrition In Critical Care)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCNC325.1	3	3	3	2.5	2.5	2	2	2	2.5	2.5	2.5
MHSDCNC325.2	3	3	3	2.5	2	2	2	2	2.5	2.5	2.45
MHSDCNC325.3	3	3	3	2.5	2.5	2.5	2	2	2.5	2.5	2.55
MHSDCNC325.4	3	3	3	3	2.5	2	2	2	2.5	2.5	2.55
Average PLO	3	3	3	2.62	2.37	2.12	2	2	2.5	2.5	2.51

Unit I: Nutritional Screening and Nutritional Status Assessment of Critically Ill Patients

- **Nutritional Screening**
    - Planning Nutritional Care
    - Concept of screening, aims and objectives.
    - Uses, Types and Criteria of screening
- **Nutritional Assessment**
    - Assessment procedure - Body weight in relation to height.
    - Estimation of somatic protein by mid-arm muscle circumference.
    - Clinical observation and Dietary assessment.

Unit II: Nutritional Support for Critically ill Patients

- **Modified Diets and Tube feeding:**
    - Modified diets and its Purpose
    - Summary of Routine hospital diets
    - Types, Characteristics of an ideal tube feeding
    - Nutritional related problem in tube-fed patients
- **Parenteral Feeding:**
    - Estimating Nutritional needs
    - Complications of parenteral feeding.
    - Cyclic Parenteral Nutrition
    - Transitional feeding

Unit III: Nutritional Requirements and Special Diets in Critical Care

- Burns
- CV Complications
- Surgery
- AIDS
- Cancer

Unit IV: (Practical)

- **Planning and Preparation of Modified diets:**
  - Liquid diet
  - High Calorie diet
  - Low Sodium diet
  - Low fat diet

References:

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SEMESTER-III

FOOD SAFETY AND QUALITY CONTROL

Code: **MHSDCFS325**

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 MHSDCFS325 (Food Safety and Quality Control)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCFS325.1	3	2	3	2.5	2	3	3	2.5	2	3	2.6
MHSDCFS325.2	3	3	2	2	2	3	3	2.5	2	3	2.55
MHSDCFS325.3	3	3	2	2.5	2	3	3	3	2	3	2.65
MHSDCFS325.4	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	2.54

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.

References:

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SEMESTER-III

WOMEN, NUTRITION & HEALTH

Code: **MHSDCWN325**

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 MHSDCWN325 (Women, Nutrition and health)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCWN325.1	3	2	2	2	3	3	2	2	2	2	2.3
MHSDCWN325.2	3	2	2	2	2	3	3	2	2	2	2.3
MHSDCWN325.3	3	2	2.5	3	3	3	2	2	2	2	2.4
MHSDCWN325.4	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:

1. The Administrative Committee on Coordination/Subcommittee on NutritionACC/SCN Policy Discussion Papers 2001.
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4. IDRC, (1995): Gender, health and Sustainable Development.
5. NGO, Committee on UNICEF (1997): Women and Children in Urban Poverty --- What Way Out?
6. Census Reports, Government of India.
7. NFHS Reports.
8. UNICEF--- State of the World's Children.
9. Weil, D.E.C.; Alicbusan, A. P.; Wilson, J.F; Reich, M.R., and Bradley, D. J. (1990). The Impact of Development Policies oh Health. A review of the Literature World Health Organization. Geneva.
10. International Nutrition Foundation—Micro-nutrient Initiative (1999): Preventing Iron Deficiency in Women and Children; Technical Consensus on Key Issues.
11. Gopalan, C. and Kaur, S. (Eds.) (1989): Women and Nutrition in India, Nutrition Foundation of India.

SEMESTER-III

APPLIED MICROBIOLOGY

Code: **MHSDCAM325**

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 MHSDCAM325

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCAM325.1	3	3	2	3	2	3	2.5	2.5	2	2	2.5
MHSDCAM325.2	3	3	2	2.5	2	3	2.5	2.5	2	2	2.45
MHSDCAM325.3	3	2.5	2	2.5	2	3	2.5	2.5	2.5	2.5	2.5
MHSDCAM325.4	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	2.51

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:

- Pelezar,M.1.andReid,R.D.(1993):MicrobiologyMcGrawHillBookCompany, New York, 5thEdition.
- Atlas,M.Ronald(1995)PrinciplesofMicrobiologylatestEdition,Mosby- Year Book, Inc, Missouri, U. S.A.
- Frazier,W.C.(1998):FoodMicrobiologyMeGrawHillInc.4thEdition.
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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 CourseMHSCCAI325

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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- Ord, T. (2020). The Precipice: Existential Risk and the Future of Humanity. New York: Hachette Books.
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Semester -4

Home Science: Dietetics and Clinical Nutrition

(MHSD)

(CW+CW)

SEMESTER-IV

SPORTS NUTRITION AND FITNESS

Code: **MHSDCSN425**

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 MHSDCSN425 (Sports Nutrition and Fitness)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCSN425.1	3	2	2	2	2	3	2	2	2	2	2.2
MHSDCSN425.2	3	3	2	2	2	3	2	2	2	2	2.3
MHSDCSN425.3	3	3	3	3	2	3	2	2.5	2.5	2	2.6
MHSDCSN425.4	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:

1. Barkar, D. J.P. (1998). Mothers, Bahks and Health in Later life. Edinburgh, Churchill Livingstone.
2. Insel, PEM., Turner, R.E., &Roos D. (2007). Nutrition (3rd ed) Sudnury: Jones & Bartlett Publishers.
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4. Mahan, L.K., &Escoh- Sump, S. (2004). Krause's Food Nutrition & Diet Therapy (11th ed). Philadephia Sunders an imprint of Elsevier.
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6. Ward, R.H.T. Smith, S.K. Donnai D. (eds) (1994) Early Fetal Growth and Development. London, RCOG, Press.
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8. Whitney, E., &RadyRolfes, S. (2008). Understanding Nutrition (11th ed). Canda: Wadsworth, Cengage learning.
9. 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: **MHSDCPN425**

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 MHSDCPN425 (Policies and Programmes in Public Health Nutrition)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCPN425.1	2	2	3	3	3	2.5	2	3	2	2	2.45
MHSDCPN425.2	3	2	2.5	3	3	2.5	2	3	2	2	2.5
MHSDCPN425.3	2.5	2	3	3	3	2.5	3	3	2.5	3	2.75
MHSDCPN425.4	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
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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: **MHSDCEC425**

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 MHSDCEC425 (Current and Emergng Concepts In Human Nutrition)

UNIT- Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCEC425.1	3	3	3	2	2	3	3	3	2	3	**2.7**
MHSDCEC425.2	3	3	3	2	2	3	3	3	2	3	**2.7**
MHSDCEC425.3	3	3	3	2	2	3	3	3	2	3	**2.7**
MHSDCEC425.4	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:

- Robinson, C. H., Normal and Therapeutic Nutrition. (17th Edition) Macmillan Publishing Company.
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SEMESTER-IV

NUTRITION IN EMERGENCY AND DISASTER

Code: **MHSDCNE425**

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 MHSDCNE425 (Nutrition InEmergncy and Disaster)

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDCNE425.1	3	3	2.5	2.5	2	2	2.5	2	2	2.5	2.4
MHSDCNE425.2	3	2	3	3	3	2.5	3	2	2	3	2.65
MHSDCNE425.3	3	3	3	3	2.5	3	2.5	2	2	3	2.7
MHSDCNE425.4	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:

- Bhavan Sabarwal Ist edition 1999, Public Health and Nutritional
- Bortbn, J. (1998): The State of the International Humanitarian System. Briefing Paper. London: ODI.
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- Steve Collins, Arabella Duffield and Mark Myatt (July, 200): Assessment of Nutritional Status in Emergency Affected Populations - Adults, Special Supplement, UN ACC/SCN sub-committee on Nutrition.
- Sue Rodwell Williams 4th Edition Essentials of nutrition and Diet Therapy.
- Sue Rodwell Williams 4th Edition Essentials of nutrition and Diet TherapyWHO (1997): Applied Health Research Priorities in Complex Emergencies. Geneva. WHO.

- The Management of Nutrition in Major Emergencies WHO - in Collaboration with UNHCR, International Federation of Red Cross and Red Crescent Societies and WFP.
- 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.
- Young, H.; Jaspars, S. (1996): The Relationship between Malnutrition and Mortality in Emergencies: Do We Have All the Answers? London: ODA, Health and Population Division.
- Young, H., Jaspars, S. (1995): Nutrition Matters: People, Food and Famine London: Intermediate Technology Publications.
- Young, H.; Mears, C (1998): Acceptability and Use of Cereal-based Foods in Refugee Camps. Oxfam Working Paper. Oxfam Publishing, Oxford, U.K.

SEMESTER-IV

DISSERTATION

(DIETETICS & CLINICAL NUTRITION)

Code: **MHSDPDI425**

Credits: **4 (Research/Project Work)**

Total Contact Hrs. 60

Max.Marks:

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 CourseMHSDPDI425

Unit-Wise CLOs	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO7	PLO8	PLO9	PLO10	Average CLO
MHSDPDI425.1	3	2	2.5	3	2.5	3	3	3	2	3	2.7
MHSDPDI425.2	2	2.5	2.5	2	3	2	2.5	2.5	2	2.5	2.35
MHSDPDI425.3	3	2.5	2	2.5	2	2.5	2.5	2	3	2	2.40
MHSDPDI425.4	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: Dietetics and Clinical Nutrition

(MHSD)

(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

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 Dietetics and Clinical 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:

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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.

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CLO-PLO Matrix for the Course MHSCPDI425

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- Avoid listing any source that is not cited in the report.