

**SYLLABUS FOR
FOUR YEARS UNDER-GRADUATE COURSE
WITH SINGLE MAJOR IN NUTRITION
(w.e.f. 2023)**



BANKURA UNIVERSITY, BANKURA

WEST BENGAL

PIN 722155

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO	Description
PSO 1	Apply knowledge of nutrition, food science, and metabolism to solve health and dietary problems.
PSO 2	Analyze nutritional issues using scientific, biochemical, and statistical approaches.
PSO 3	Design appropriate dietary interventions for metabolic disorders and health conditions.
PSO 4	Apply laboratory and analytical techniques used in food science and nutrition research.
PSO 5	Interpret research data and apply statistical methods in nutrition and health studies.
PSO 6	Design and prepare a research proposal by selecting suitable research designs, sampling methods, data collection tools, ethical considerations, and statistical approaches.
PSO 7	Develop communication and professional skills for community nutrition and health promotion.

SEMESTER- VII

Course Type	CourseCode	Course Title	Credit	Marks			No. of Hours		
				I.A	ESE	Total	Lec	Tu.	Pr.
Major	S/NUT/701/MJC-17	Inborn Errors of Metabolism and Food Allergies	4 (3+1)	10	40 (25+15)	50	3	NA	2
Major	S/NUT/702/MJC-18	Advanced Techniques in Food Technology	4 (3+1)	10	40 (25+15)	50	3	NA	2
Major	S/NUT/703/MJC-19	Research Methodology	4 (3+1)	10	40 (25+15)	50	3	NA	2
Major	S/NUT/704/MJC-20	Biostatistics	4 (3+1)	10	40 (25+15)	50	3	NA	2
Minor	S/NUT/706/MN-7	Management of Inherited Metabolic Diseases and Food Allergy	4 (3+1)	10	40 (25+15)	50	3	NA	2

I.A. – Internal Assessment; ESE- End Semester Examination; Lec. – Lecture; Tu. – Tutorial; Pr. - Practical

Detailed Syllabus

Semester VII

Course Code: S/NUT/701/MJC-17

Course Category: Major

Course Title: Inborn Errors of Metabolism (IEM) and Food Allergies (Theory & Practical)

Course Outcomes:

- Explaining the basic concepts of genetic mutations, enzyme deficiencies, and the mechanisms involved in inborn errors of metabolism
- Identification, description and nutritional management of major disorders of carbohydrate, protein, amino acid and lipid metabolism
- Understanding the differences between food allergies and food intolerances, the underlying immunological basis, elimination diets and management plans
- Apply theoretical knowledge to practical situations through case study analysis and develop diet plans for metabolic disorders and food allergies

Course Type: Theory

Course Title: Inborn Errors of Metabolism and Food Allergies (Theory)

- 1. Introduction to metabolism and genetic disorders:** Concept of Inborn Errors of Metabolism, Genetic mutations and enzyme deficiencies
- 2. Disorders of carbohydrate metabolism and nutritional management:** Concept of disorders of carbohydrate metabolism. Glycogen storage diseases, Lactose intolerance, Galactosemia
- 3. Disorders of protein and amino acid metabolism and nutritional management:** Phenylketonuria, Maple Syrup Urine Disease, Tyrosinemia and homocystinuria
- 4. Disorders of lipid metabolism and nutritional management:** Fatty acid oxidation disorders, Lipoprotein metabolism disorders
- 5. Food Allergies and Intolerances:** Immunological basis of food allergy, Types of food allergy, Pathophysiology of anaphylaxis, Difference between allergy and intolerance, Major food allergens (milk, egg, peanut, fish, wheat), Celiac Disease, Diagnosis and elimination diets

Course Type: Practical

Course Title: Inborn Errors of Metabolism and Food Allergies (Practical)

1. Diet planning for PKU, lactose intolerance, galactosemia
2. Elimination diet planning based on different cases of food allergy
3. Case study analysis of metabolic disorders
4. Exposure to sophisticated health facilities to learn about commercial formulation for managing inborn errors of metabolism and allergies.

Suggested Reading:

1. L. Kathleen Mahan & Janice Raymond - Krause's Food & the Nutrition Care Process; Elsevier Health Sciences
2. F. P. Antia & Philip Abraham - Clinical Dietetics and Nutrition; Oxford University Press
3. B. Srilakshmi - Nutrition Science; New Age International Publishers
4. Victor W. Rodwell et al. - Harper's Illustrated Biochemistry; McGraw-Hill Education
5. MN Chatterjea & Rana Shinde - Medical Biochemistry; Jaypee Brothers Medical Publishers
6. Dean D. Metcalfe et. al. - Food Allergy: Adverse Reactions to Foods and Food Additives; Wiley-Blackwell

Course Code: S/NUT/702/MJC-18

Course Category: Major

Course Title: Advanced Techniques in Food Technology (Theory & Practical)

Course Outcomes:

- Understanding the principles and applications of modern food processing technologies
- Explaining advanced packaging technologies in improving food quality and shelf life.
- Understanding the role and importance of fermentation technology in food processing
- Learning about the principles and applications of analytical instruments used in food science
- Demonstration and hands-on training of laboratory techniques

Course Type: Theory

Course Title: Advanced Techniques in Food Technology (Theory)

1. **Modern Food Processing Technologies:** High-pressure processing, Extrusion technology, Food additives as preservatives, membrane technology, ohmic heating, pulsed electric field, ozonization
2. **Packaging Technologies:** MAP, Active and intelligent packaging, Shelf-life testing
3. **Fermentation technology in food processing**
4. **Instrumentation in Food Science:** Chromatography: TLC, HPLC and Gas Chromatography (GC), paper chromatography, spectroscopy, electrophoresis, laminar air flow, refractometry

Course Type: Practical

Course Title: Advanced Techniques in Food Technology (Practical)

1. Demonstration of TLC
2. Electrophoresis
3. Spectroscopy in food analysis
4. Refractometry
5. Fermentation

Suggested Readings:

1. P. J. Fellows - Food Processing Technology: Principles and Practice; Woodhead Publishing (Elsevier)
2. Sunetra Roday - Food Science and Nutrition; Oxford University Press
3. B. Srilakshmi - Food Technology; New Age International Publishers
4. R. Paul Singh and Dennis R. Heldman - Introduction to Food Engineering; Academic Press (Elsevier)
5. S. Suzanne Nielsen - Food Analysis; Springer
6. Douglas A. Skoog, F. James Holler, and Stanley R. Crouch - Principles of Instrumental Analysis; Cengage Learning
7. William C. Frazier and Dennis C. Westhoff - Food Microbiology; Tata McGraw-Hill Education
8. James M. Jay, Martin J. Loessner, and David A. Golden - Modern Food Microbiology; Springer.

Course Code: S/NUT/703/MJC-19

Course Category: Major

Course Title: Research Methodology (Theory & Practical)

Course Outcomes:

- Explain the fundamental concepts, principles, and types of research, and formulate research problems, objectives, and hypotheses relevant to their discipline.
- Conduct a systematic literature survey using offline and online resources, critically evaluate and organize information using appropriate documentation and reference management techniques.
- Design and prepare a research proposal
- Demonstrate proficiency in scientific writing by preparing research reports, literature reviews, citations, references, and bibliographies while adhering to academic integrity and avoiding plagiarism.
- Communicate research findings effectively through presentation demonstrating critical thinking, ethical research practices, and professional competence.

Course Type: Theory & Practical

Course Title: Research Methodology (Theory)

- 1. Fundamentals of research:** Meaning, aims & objective of research. Significance of research. Types of research based on purpose, approach, time, objective, research design.
- 2. Research Problem:** Defining research problem, technique involved in defining a problem. Steps of research process. Thrust areas in research in nutrition and dietetics, research proposal
- 3. Literature survey and documentation:** Methods of literature survey, use of offline and online resources for literature survey. Importance of documentation and documentation techniques, use of computer in literature survey and documentation.
- 4. Sampling design and data collection:** Steps in sampling design. Sample size. Census and sample survey. Collection of primary data through different methods (Questionnaire, observation, Interview, case study, sociometry, Anthropometry, Projective tests and other methods), Collection of Secondary data. Pilot project and its importance.
- 5. Hypothesis:** Types of hypotheses (experimental and nonexperimental). Hypothesis testing (parametric and non-parametric tests), types of errors and their control.
- 6. Reporting of research:** technique of research report writing. Types of research report. Components of research report – Title, abstract, key words, introduction, aims & objectives, methodology, results, discussion, conclusion, summary, acknowledgement, references etc.
- 7. Ethical issues in research:** Code of Ethics in Research – Ethics and Research Process – Importance of Ethics in Research

Course Type: Practical

Course Title: Research Methodology (Practical)

1. Assignment 1 – Write and submit a research proposal on a topic of relevance to nutrition research (recommended format - Cover Page, Table of Contents, Introduction, Review of Literature, Statement of the Problem, Justification of the Study, Aims & Objectives, Research Questions, Hypotheses, Materials and Methods, Statistical Analysis Plan, Ethical Considerations, Expected Outcomes, Estimated Timeline, Estimated Budget, References in MLA style)

OR

- Assignment 2 – Write and submit a review of literature report on a topic of relevance to nutrition research (recommended format- Cover Page, Table of Contents, Introduction and Justification, Aims & Objectives, Thematic Review of Literature, Review of Previous Studies, Critical Analysis, Research Gap, Summary of Literature Review, References in MLA style)

2. Presentation of prepared report by ppt

Suggested Readings:

1. C. R. Kothari & Gaurav Garg - Research Methodology: Methods and Techniques, 4th Edition, New Age International Publishers, New Delhi
2. Ranjit Kumar - Research Methodology: A Step-by-Step Guide for Beginners, 5th Edition, SAGE Publications, New Delhi
3. Prabhat Pandey & Meenu Mishra Pandey - Research Methodology: Tools and Techniques, Latest Edition, Bridge Center, Romania
4. Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, Joseph Bizup & William T. FitzGerald - The Craft of Research, 5th Edition, University of Chicago Press
5. Robert A. Day & Barbara Gastel - How to Write and Publish a Scientific Paper, 9th Edition, Cambridge University Press

Course Code: S/NUT/704/MJC-20

Course Category: Major

Course Title: Biostatistics (Theory & Practical)

Course Outcomes:

- Understanding the basic concepts, definitions, and importance of statistics in nutrition and health sciences
- Differentiation between various types of data (qualitative and quantitative, discrete and continuous) and their application in nutrition studies
- Classification, organization and analysis of data using standard principles of statistics
- Diagrammatic and graphical presentation of data interpretation in nutrition research
- Understanding sampling and basic statistical tests such as hypothesis testing, level of significance, t-test, chi-square test, and Pearson correlation, and understand their application in nutrition and health research

Course Type: Theory

Course Title: Biostatistics (Theory)

1. Introduction to Statistics and Data: Basic Concepts, Definition and importance of statistics in nutrition and health science

2.Types of Data and methods of data collection: Qualitative vs quantitative data, Discrete and continuous variables, Primary and secondary data, Sources of data in nutrition studies. Surveys, Questionnaires, Dietary assessment methods, Anthropometric measurements for data collection.

3. Classification of Data and tabulation: Frequency distribution, Class intervals, Cumulative frequency, Construction of tables, Types of tables, Tabulation rules

4: Diagrammatic and Graphical Presentation: Bar diagrams, Pie charts, Histograms, Frequency polygons. Application in nutrition research.

5. Measures of Central Tendency: Mean, Median, Mode, Skewness, kurtosis use of central tendency in research and interpretation in nutrition surveys

6. Measures of Dispersion: Range, Quartile Deviation, Mean Deviation, Standard Deviation and Variance, Coefficient of Variation. Application of statistical measures of dispersion in research.

7. Probability and Sampling: Basic Concepts of Probability, Sampling Techniques, Random sampling, Systematic sampling, Stratified sampling, Cluster sampling. Importance of sampling in nutrition surveys.

8. Basic Statistical Tests: Null and alternative hypothesis, Level of significance, Type I and Type II errors, t-test (conceptual introduction), Chi-square test, Correlation (Pearson correlation). Application in nutrition and health research.

9. Statistical Software: Excel, SPSS, R

Course Type: Practical**Course Title: Biostatistics (Practical)**

1. Data posting and analysis of datasets by application of principles of biostatistics through computer software Excel/SPSS/R

Suggested Readings:

1. S. P. Gupta – Statistical Methods; Sultan Chand & Sons.
2. B. K. Mahajan – Methods in Biostatistics for Medical Students and Research Workers; Jaypee Brothers Medical Publishers.
3. Daniel W. Wayne – Biostatistics: A Foundation for Analysis in the Health Sciences; Wiley India / John Wiley & Sons.
4. Bernard Rosner – Fundamentals of Biostatistics; Cengage Learning.
5. R. R. Pagano and K. Gauvreau – Principles of Biostatistics; Cengage Learning.
6. S. K. Sharma – Biostatistics in Nursing and Health Sciences; Elsevier India.
7. K. Park – Park's Textbook of Preventive and Social Medicine; Banarsidas Bhanot

Course Code: S/NUT/706/MN-7

Course Category: Minor

Course Title: Management of Inherited Metabolic Diseases and Food Allergy (Theory & Practical)

Course Outcomes:

- Understanding the basic aetiological concepts involved in inherited metabolic diseases
- Identification, description and nutritional management of major disorders of carbohydrate, protein and lipid metabolism
- Understanding the differences between food allergies and food intolerances, the underlying immunological basis, elimination diets and management plans
- Apply theoretical knowledge to practical situations through case study analysis and develop diet plans for metabolic disorders and food allergies

Course Type: Theory**Course Title: Management of Inherited Metabolic Diseases and Food Allergy (Theory)**

1. **Introduction to metabolism and genetic disorders:** Concept and aetiology.
2. **Disorders of carbohydrate metabolism and nutritional management:** Concept of disorders of carbohydrate metabolism. Lactose intolerance, Galactosemia.
3. **Disorders of protein and amino acid metabolism and nutritional management:** Phenylketonuria, Maple Syrup Urine Disease.
4. **Disorders of lipid metabolism and nutritional management:** Fatty acid oxidation disorders, Lipoprotein metabolism disorders
5. **Food Allergies and Intolerances:** Immunological basis of food allergy, Types of food allergy, Difference between allergy and intolerance, Major food allergens (milk, egg, peanut, fish, wheat), Diagnosis and elimination diets

Course Type: Practical**Course Title: Management of Inherited Metabolic Diseases and Food Allergy (Practical)**

1. Diet planning for PKU, lactose intolerance, galactosemia
2. Elimination diet planning based on different cases of food allergy

Suggested Reading:

1. L. Kathleen Mahan & Janice Raymond - Krause's Food & the Nutrition Care Process; Elsevier Health Sciences

2. F. P. Antia & Philip Abraham - Clinical Dietetics and Nutrition; Oxford University Press
3. B. Srilakshmi - Nutrition Science; New Age International Publishers
4. Victor W. Rodwell et al. - Harper's Illustrated Biochemistry; McGraw-Hill Education
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