

Syllabus

M.Sc. FOOD AND NUTRITION

PROGRAMME OUTCOME

In-depth Understanding of Human Physiology and Biochemistry: Graduates will demonstrate a thorough understanding of human anatomy, physiology, and biochemical processes, including digestion, metabolism, excretion, and hormonal regulation. This knowledge will be essential to assess, interpret, and manage nutritional needs in health and disease.

Proficiency in Nutritional Science and Therapeutic Nutrition: Graduates will be able to assess nutritional status, plan and implement dietary interventions for different physiological stages and disease conditions, and apply therapeutic nutrition principles to improve individual and community health outcomes.

Competence in Food Science, Processing, and Safety: Graduates will acquire practical and theoretical knowledge of food composition, food processing techniques, preservation, quality control, and safety standards, ensuring the nutritional adequacy and safety of foods from farm to fork.

Research, Analytical, and Statistical Skills: Graduates will develop critical thinking and analytical skills for conducting scientific research, including data collection, statistical analysis, interpretation, and scientific communication, enabling them to contribute to evidence-based practices in nutrition and health.

Community Nutrition, Public Health, and Ethics: Graduates will be capable of addressing community health challenges through public health nutrition interventions, policies, and communication strategies, while adhering to ethical standards and demonstrating leadership in multidisciplinary settings.

PROGRAMME SPECIFIC OUTCOME

Understanding Human Physiology and Biochemistry: Graduates will understand the structure and function of human body systems (e.g., digestive, circulatory, respiratory, nervous, excretory, endocrine), along with biochemical processes such as metabolism of carbohydrates, proteins, lipids, nucleic acids, and the role of enzymes and hormones.

Mastery of Nutrition and Dietetics Principles: Graduates will be able to assess nutritional requirements across the life span — from infancy to old age — including special conditions like pregnancy, lactation, sports, disease states (e.g., diabetes, cardiovascular disorders, renal diseases, AIDS, cancer), and manage them through appropriate dietary planning and interventions.

Competence in Food Science and Food Chemistry: Graduates will demonstrate in-depth knowledge of food composition, functional properties of food components, effects of processing and storage, sensory evaluation, and methods to improve nutritional quality through technologies like fortification, fermentation, and supplementation.

Practical Skills in Food Processing, Preservation, and Safety: Graduates will gain practical skills in food preservation methods (thermal, chemical, irradiation), food processing technologies, and compliance with national and international food safety standards (FSSAI, Codex, HACCP, ISO, BIS, etc.).

Application of Clinical and Therapeutic Nutrition: Graduates will be able to plan and manage therapeutic diets for clinical conditions affecting the GI tract, liver, pancreas, kidney, and endocrine system using principles of medical nutrition therapy and evidence-based practice.

Research and Analytical Skills: Graduates will be skilled in applying biostatistical tools, experimental designs, research methodology, and scientific writing in nutrition and food science research. They will be able to critically evaluate data, interpret results, and prepare research reports, dissertations, and grant proposals.

Technological Proficiency in Tools and Techniques: Graduates will be proficient in using laboratory instruments and techniques (e.g., chromatography, electrophoresis, spectrophotometry) and modern software (MS Word, Excel, PowerPoint, statistical tools) for data collection, analysis, and presentation.

Knowledge of Public Health and Community Nutrition: Graduates will be prepared to assess and address nutritional problems at the community level, plan and implement intervention programs (e.g., ICDS, MDM, immunization), and work with governmental and non-governmental organizations to improve public health and nutritional outcomes.

Food Service and Management Competence: Graduates will be able to manage institutional food service operations in settings like hospitals, hostels, and commercial establishments, applying principles of quantity food production, budgeting, menu planning, personnel and financial management, hygiene, and sanitation.

Ethical, Legal, and Sustainable Practices: Graduates will understand the ethical, legal, and social issues related to food production, distribution, safety, and nutrition. They will be prepared to contribute to sustainable development, food security, and environmentally responsible practices.

Paper Code	Papers	Credits	L-T-P-C	Marks		
				Sessional	End Semester	Total

Semester First						
FAN501	Physiology	3	3-0-0-3	40	60	100
FAN502	Basics of Nutrition	5	3-0-4-5	40	60	100
FAN503	Principles of Food Science	5	3-0-4-5	40	60	100
FAN504	Biochemistry of Nutrition	3	2-0-2-3	40	60	100
FAN505	Basics of Statistics and Computer Application	4	2-1-2-4	40	60	100
		Total 20				
Semester Second						
FAN506	Research Methods	4	3-1-0-4	40	60	100
FAN507	Advanced Nutritional Biochemistry	5	3-0-4-5	40	60	100
FAN508	Instrumentation in Nutrition	2	2-0-0-2	40	60	100
FAN509	Food Microbiology & Food Safety	5	3-0-4-5	40	60	100
FAN510	Advanced Human Nutrition	5	3-0-4-5	40	60	100
		Total 20				
Semester Third						
FAN511	Food Chemistry and Food Analysis	5	3-0-4-5	40	60	100
FAN512	Therapeutic Nutrition	5	3-0-4-5	40	60	100
FAN513	Institutional Food Management	4	3-1-0-4	40	60	100
FAN514	Public Health Nutrition	5	3-0-4-5	40	60	100
FAN515	Food Processing & Food Laws	3	3-0-0-3	40	60	100
		Total 22				
Semester Fourth						
FAN516	Seminar	4	0-0-4-4	40	60	100
FAN517	Scientific Writing	2	2-0-0-2	40	60	100
FAN518	Statistical Techniques and Data Analysis	2	2-0-0-2	40	60	100
FAN519	Dissertation	15	0-0-30-15	40	60	100
		Total 23				

Total credits for the 2 years Semester of P. G. (Food and Nutrition) are 85

Paper: Physiology

Course Details:

This course provides an in-depth understanding of human physiology, focusing on the structure and function of major organ systems and their relevance to nutrition and health. It explores the cellular basis of physiological functions, including transport mechanisms and homeostasis, followed by detailed coverage of systems such as digestive, circulatory, respiratory, excretory, endocrine, nervous, immune, and reproductive. Students will gain knowledge of key physiological processes such as nutrient digestion and absorption, hormonal regulation, neural transmission, gas exchange, acid-base balance, and immune responses. Special emphasis is given to the physiological changes during pregnancy, lactation, and their nutritional implications. The course prepares students to link physiological mechanisms with nutritional science and lays the groundwork for clinical nutrition and dietetics.

Course Objectives:

1. To understand the structure and function of major body systems including digestive, circulatory, respiratory, excretory, endocrine, nervous, immune, and reproductive systems.
2. To explain key physiological processes such as hormone regulation, nerve impulse conduction, gas exchange, urine formation, and nutrient absorption.
3. To recognize the body's mechanisms for maintaining homeostasis, immunity, and reproductive health across various life stages.

Course Outcomes (COs):

CO1: Understand cell functions, membrane transport, and digestive system structure and function.

CO2: Explain circulatory and respiratory system functions including blood flow, gas exchange, and blood composition.

CO3: Describe excretory system mechanisms including urine formation and acid-base balance.

CO4: Explain hormonal regulation, neural transmission, immune responses, and reproductive physiology.

CO–PO Mapping Table (Simple Format)

Course Outcomes (COs) PO1: PO2: PO3: PO4: PO5:

CO1	3	2	1	1	1
CO2	3	2	1	1	1
CO3	3	2	1	1	1
CO4	3	2	1	1	2

Unit-I

Cell Structure and Function: Cell membrane, Transport across cell membrane, Homeostasis.

Digestive System: Secretary, digestive and absorptive functions of GIT, Function of liver, pancreas and gall bladder, Motility and hormones of GIT.

Unit-II

Circulatory System: Regulation of cardiac output and blood pressure, Blood formation, composition, Blood clotting and plasma protein.

Respiratory System: Transport and exchange of oxygen and CO₂, Role of haemoglobin and buffer systems.

Unit-III

Excretory System: Structure and function of Nephron, Urine formation, Role of kidney in maintaining pH of blood, Electrolyte and acid base balance.

Unit-IV

Endocrine System: Role and regulation of hormonal secretion.

Nervous System: Blood Brain Barrier, Conduction of nerve impulse, Synapses, Role of neurotransmitters.

Unit-V

Immune System: Cell mediated and humeral immunity, Inflammation, Immunization.

Reproduction: Sex hormone, Contraception, Breast milk production, Physiological changes in pregnancy.

Reference Books

- Subrahmanyam S. and Kutty K (1985). Textbook of Human Physiology. Revised by H.D.Singh. S. Chand Publishing
- Chaudhury, K.C (2004). Concise Medical Physiology. New Central Book Publishing, Calcutta.
- Ganong, W.F. (2001). Review of Medical Physiology. Tata McGraw-Hill publishing company. New Delhi.

Paper: Basic of Human Nutrition

Course Details:

This course offers an in-depth understanding of the principles of human nutrition with a focus on the functions, sources, requirements, and metabolism of essential nutrients. It begins with the study of energy balance, body composition, and methods for measuring energy expenditure. Students will explore macronutrients—carbohydrates, proteins, and lipids—including their physiological roles, dietary needs, and impact on health, along with concepts like glycemic index and protein-energy malnutrition (PEM). The course also covers water and electrolyte balance, the role of essential fatty acids, lipoprotein transport, and dehydration therapy. Detailed study of macro, micro, and trace minerals and vitamins is included, addressing bioavailability, interactions, deficiencies, toxicities, and recommended dietary intakes. Emphasis is placed on the application of this knowledge to plan balanced diets, understand food groups, use exchange lists, and assess nutritional status for individuals and groups.

Course Objectives:

1. To understand the sources, functions, requirements, and health impacts of macronutrients (carbohydrates, proteins, fats), water, vitamins, and minerals.
2. To learn how the body uses energy from food, including how to measure energy expenditure and estimate energy needs for individuals and groups.
3. To explore the role of nutrients in maintaining body functions, preventing deficiencies, and promoting a balanced and healthy diet.

Course Outcomes (COs):

CO1: Understand how the body obtains and uses energy from food, how to measure energy needs, and plan a balanced diet.

CO2: Identify types, roles, and dietary requirements of carbohydrates and proteins and improve protein quality.

CO3: Explain the functions and requirements of fats and water and how water balance is regulated.

CO4: Understand the sources, functions, and health impacts of minerals and vitamins, including effects of deficiency or toxicity.

CO–PO Mapping Table (Simple Format)

Course Outcomes (COs) PO1: PO2: PO3: PO4: PO5:

CO1	2	3	2	1	2
CO2	2	3	2	1	2
CO3	2	3	2	1	2
CO4	2	3	2	1	2

Unit-I

Energy: Energy content of foods. Body composition, Physiological fuel value, Measurement of Energy Expenditure: BMR, RMR, Thermic effect of feeding and physical activity, RDA Estimating energy requirement for individuals and groups, Food groups, Balanced diet, Exchange list

Unit-II

Carbohydrates: Type, Source, Function, Dietary requirements and physiological significance. Glycaemic index of foods.

Proteins: Type, Source, Function, Dietary requirements. Evaluation methods and improvement of protein quality. PEM.

Unit-III

Lipids: Type, Source, Function, Dietary requirements, EFA, Transport of lipoprotein, Prostaglandins.

Water: Regulation of intra and extra cellular volume, Electrolyte balance, Osmolality, Water balance and its regulation, Oral dehydration therapy.

Unit-IV

Minerals: (Note: for each nutrient sources, bioavailability, metabolism, function, RDI, deficiency and toxicity, interactions with other nutrients are to be discussed).

Macro minerals: calcium, phosphorus, magnesium, sodium, potassium and chloride.

Micro minerals: Iron, copper, zinc, manganese, iodine, fluoride.

Trace minerals: selenium, cobalt, chromium.

Unit-V

Vitamins: Type, Source, Function, Dietary requirements, Deficiency and Toxicity of Fat soluble and Water soluble vitamins.

Practical

- Calculation of BMR and activity increments.

- Identification of clinical signs and symptoms of various deficiency diseases.
- Recording of 7 day dietary intakes.
- Enlisting foodstuffs based on their nutrient content.

- Preparation of essential macro (protein, fibre) and micronutrient (calcium, iron, vitamin C, A and B) rich recipe, calculation of nutritive value and cost per serving.

Reference Books

- Bamji, M.S., Rao, N.P & Reddy, V. (1996). Textbook of Human Nutrition. Oxford & IBH Publishing Co. (P). Ltd. Delhi.
- Gopalan, G. RamaShastri B.V & Balasubramanian, S.C. (2000). Nutritive Value of Indian Foods. National Institute of Nutrition, Indian Council of Medical Research, Hyderabad 500-007, India.
- Sri Lakshmi, B. (2000). Nutrition Science. New Age International (P) Ltd. Pub. New Delhi
- Swaminathan, M. (2009). Textbook of Food and Nutrition. Bappa publishers, Bangalore.

Paper: Principles of Food Science

Course Details:

This course provides foundational knowledge in food science, emphasizing the composition, nutritional value, and functional properties of various food groups. It explores the impact of cooking, processing, and storage on the nutritional and sensory qualities of foods. The course covers cereals, millets, pulses, fruits, vegetables, milk, eggs, flesh foods, fats, oils, sugars, beverages, and spices, highlighting their nutritive value and culinary applications. Students will learn about methods to improve food quality through fermentation, germination, fortification, and supplementation. Additionally, the course introduces topics on food safety, including food toxins, additives, adulterants, preservatives, and packaging. Sensory evaluation techniques and food quality assessment are also integrated to develop a scientific understanding of food preparation and preservation.

Course Objectives:

1. To understand the composition, nutritional value, and the effects of cooking, processing, and storage on different food groups **such as cereals, pulses, fruits, vegetables, milk, eggs, meat, fats, and oils.**
2. To explore various techniques for enhancing the nutritional quality of foods, **including fermentation, germination, fortification, and safe food handling practices.**
3. To gain knowledge of key food safety concerns, **including food toxins, additives, adulterants, preservatives, and the role of packaging in maintaining food quality and safety.**

Course Outcomes (COs):

CO1: Understand how cooking and processing affect nutrients and quality of various foods and learn methods to improve nutritional value.

CO2: Know the nutritional value and changes in vegetables, fruits, milk, and sugar due to cooking and storage.

CO3: Learn the nutrition, quality assessment, and effects of cooking and storage on eggs and meat.

CO4: Understand the roles of fats, oils, beverages, spices, and key food safety issues such as toxins, additives, adulterants, preservatives, and packaging.

CO–PO Mapping Table (Simple Format)

Course Outcomes (COs) PO1: PO2: PO3: PO4: PO5:

CO1	1	2	3	1	2
CO2	1	2	3	1	2
CO3	1	2	3	1	2
CO4	1	2	3	1	3

Unit- I

Introduction to Food Science.

Effect of cooking and processing techniques on nutrients, Sensory evaluation of food.

Cereals, Millets and Pulses: Composition and nutritive value, Cereal cookery, Effect of cooking, processing and storage in nutritive value. Methods for improving nutritional quality of foods- fermentation, germination, supplementation, fortification.

Unit- II

Vegetables and Fruits- Type, Composition, Nutritive value, Effect of cooking, processing and storage on pigments and nutritive value, Post harvest changes.

Milk and milk products- Nutritional composition, Properties, Processing, Storage and Packaging. Effects of heat, acid and enzyme on its quality, Milk Cookery.

Sugar: Type, Function and Nutritional composition of sugar. Sugar cookery.

Unit- III

Egg- Structure and Nutritional composition of egg, Evaluation of egg quality, Egg cookery.

Flesh Food- Type, Structure and Nutritional composition, Effect of cooking, processing and storage in nutritive value. Ageing, Tenderization, Curing.

Unit-IV

Fats and Oils- Type, Nutritive value and Function. Its role and importance.

Beverages and Spices-Classification and Importance.

Unit-V

Food toxins, Food Additives, Adulterants, Preservatives, Packaging.

Practical:

- Sensory evaluation of the given samples using descriptive method.
- Sensory evaluation of given sample with the help of 'Duo trio test' and prepare evaluation card for the same.
- Sensory evaluation of given samples using 'Triangle Test' and prepare an evaluation

card for the same.

- To demonstrate the process of sugar re crystallization through the preparation of fondant, *shakkarpara* and fudge.
- To determine the best method of preparing a stable emulsion like mayonnaise.
- Preparation of fruit jam and fruit jelly.
- To study and detect various adulterants in food stuffs.

Reference Books

- Manay, M. and Manay, S.N. (2014). Food Facts and Principles. New Age International (P) Limited, New Delhi.
- Meyer, .L.H (1987). Food Chemistry. CBS Publishers.
- Srilakshmi, B. (2015). Food Science. New Age International (P) Limited, New Delhi.

Paper: Biochemistry of Nutrition

Course Details:

This course provides a comprehensive introduction to the biochemical principles underlying human nutrition and metabolism. It begins with an overview of metabolism and the composition and function of cell membranes, including nutrient transport mechanisms. The course covers the structure, classification, and nutritional significance of carbohydrates, proteins, and lipids, and delves into the metabolic pathways associated with each: glycolysis, TCA cycle, glycogenesis, gluconeogenesis, beta-oxidation, urea cycle, and more. Students will explore nucleic acids—DNA and RNA—their structure, replication, and role in protein synthesis. The course also includes an in-depth study of enzymes and their role in metabolic regulation, as well as the biochemical functions of hormones. Emphasis is placed on understanding the integration and regulation of metabolic pathways and their relevance to human health and disease.

Course Objectives:

1. To understand the structure, function, and metabolic pathways of carbohydrates, proteins, and lipids, and their role in maintaining body functions.
2. To gain knowledge of key biochemical processes such as glycolysis, TCA cycle, urea cycle, beta-oxidation, and nucleic acid functions including replication, transcription, and translation.
3. To explore the role of enzymes, coenzymes, cofactors, and hormones in metabolism, as well as the electron transport chain and oxidative phosphorylation.

Course Outcomes (COs):

CO1: Understand the basics of metabolism, cell membrane structure, and the nutritional importance of carbohydrates, proteins, and fats.

CO2: Explain carbohydrate metabolism including glycolysis, TCA cycle, and blood glucose regulation.

CO3: Describe protein metabolism including transamination, deamination, and urea cycle.

CO4: Understand lipid metabolism, nucleic acid structure and function, and energy production through electron transport chain.

CO5: Explain the roles of enzymes, coenzymes, cofactors, and hormones in metabolic regulation.

CO–PO Mapping Table (Simple Format)

Course Outcomes (COs) PO1: PO2: PO3: PO4: PO5:

CO1	3	2	1	1	1
CO2	3	2	1	1	1
CO3	3	2	1	1	1
CO4	3	2	1	1	1
CO5	3	2	1	2	1

Unit I

Concept of metabolism.

Composition of membrane structures, Transport process across cell membranes.

Introduction, Classification and Nutritional importance of nutrients- Carbohydrate, Protein and Lipids.

Unit II

Metabolism of Carbohydrate- Glycolysis, TCA cycle, Glycogenesis, Glycogenolysis (in brief), Glycolysis, Citric acid cycle & its significance, HMP shunt & Gluconeogenesis (in brief), Regulation of blood glucose level.

Unit-III

Metabolism of Protein-Transamination, Deamination, Oxidation of amino acid, Ammonia formation & transport, Urea cycle. synthesis and breakdown of body protein.

Unit-IV

Metabolism of Lipid- Beta oxidation of fatty acids, Ketosis, Cholesterol & its clinical significance.

Unit-IV

Nucleic acid- DNA, RNA, Watson and Crick model and Chargraff's rule. Structure and function of different ribonucleic acids. Replication, Transcription and Translation.

Unit V

Electron transport chain and Oxidative phosphorylation.

Role of enzymes in metabolism- Definition, Classification, Mode of action, Factors affecting enzyme activity, Coenzymes and Co-factors.

Hormones and its role in biochemical pathway

Practical

- Estimation of Blood hemoglobin.
- Measurement of FBS, RBS and PPBS.
- Measurement of Blood pressure by Sphygmomanometer.
- Estimation of normal constituents of urine (urea, uric acid creatinine).
- Estimation of abnormal constituents of urine (Glucose, protein, ketone bodies, Blood).

Reference Books

- Dandekar, S. (2011). Medical Biochemistry. B.L. Churchill Livingstone (P) Ltd. New Delhi, India.
- Satyanarayana, U. (2009). Biochemistry. Books and Allied (P) Ltd. Calcutta, India.
- Michael A Lieberman and Allan D. Marks, (1996). Basic Medical Biochemistry. Book.
- J. David Rawn (2004). Biochemistry. Panima Publishing Corporation, New Delhi.

Paper: Basics of Statistics and Computer Application**Course Details:**

This course introduces the basic concepts of statistics and computer applications relevant to data analysis and scientific reporting. It covers types of data, levels of measurement, and essential statistical tools including mean, median, mode, and measures of variability. Students will gain an understanding of normal distribution and the application of parametric and non-parametric tests. The course also provides foundational knowledge of computer systems, with hands-on training in Microsoft Office tools—Word, Excel, and PowerPoint—for data management, analysis, and presentation. Emphasis is placed on practical applications in academic and professional settings, enabling students to interpret data effectively and utilize basic software tools for documentation and communication.

Course Objectives

1. To understand different types of data, measurement scales, and basic statistical concepts including measures of central tendency (mean, median, mode) and variability.
2. To gain knowledge of statistical distributions and testing methods, including normal distribution, parametric and non-parametric tests.
3. To develop basic computer skills and apply software tools such as Microsoft Word, Excel, and PowerPoint for data handling, analysis, and presentation.

CO1: Understand different types of data, measurement scales, and basic statistical concepts.

CO2: Learn measures of central tendency and variability.

CO3: Understand normal distribution and the basics of parametric and non-parametric tests.

CO4: Develop basic computer skills for data handling and presentation using MS Word, Excel, and PowerPoint.

CO–PO Mapping Table (Simple Format)**Course Outcomes (COs) PO1: PO2: PO3: PO4: PO5:**

CO1	1	1	1	3	1
CO2	1	1	1	3	1
CO3	1	1	1	3	1
CO4	1	1	2	3	1

Unit-I

Data, type of data, classification of measurement scale

Unit-II

Mean, Median, Mode, Measures of central tendency and Variability

Unit-III

Normal distribution.

Parametric and Non-parametric test.

Unit-IV

Introduction and scope of computer

Unit-V

Microsoft Word, Microsoft excel, Microsoft power point and its application.

Practical

- Handling of computer.
- Use and application of internet.
- Use of MS Excel (data entry, graph preparation chart preparation).
- Use of MS word.
- Use of MS power point.

Reference books:

- Elhance, D.L. (2008). Fundamentals of Statistics. Kitab Mahal, Patna.
- Rao, K.V. (2007) Biostatistics. Jaypee Brothers medical publishers, New Delhi.
- Sundar, R.P. & Richard, J. (2003). An Introduction to Biostatistics. Prentice Hall, New Delhi.
- Fundamentals of Computers by E. Balagurusamy (Author) Publisher: McGraw Hill Education (India) Private Limited
- Ms Office 2007 in a Nutshell by S. Saxena (Author) Publisher: S.Chand (G/L) & Company Ltd.

Semester –II

Paper Code: FAN506

LTPC: 3-1-0-4

Paper: Research Methods

Course Details:

This course provides a foundational understanding of the research process and methodologies used in scientific inquiry. It covers the objectives, characteristics, types, and approaches of research, guiding students through the process of identifying and formulating research problems and hypotheses. Emphasis is placed on the design of research, including types of research and experimental designs, variables, and confounding factors. The course also introduces sampling techniques, distinguishing between probability and non-probability sampling and addressing sampling and non-sampling errors. Students will learn methods of data collection, data preparation, analysis, and scaling techniques. Finally, the course covers interpretation of results and the principles of effective report writing, including report types and writing strategies, enabling students to communicate research findings clearly and effectively.

Course Objectives:

1. To understand different types of data, measurement scales, and basic statistical concepts **including measures of central tendency (mean, median, mode) and variability.**
2. To gain knowledge of statistical distributions and testing methods, **including normal distribution, parametric and non-parametric tests.**
3. To develop basic computer skills and apply software tools such as Microsoft Word, Excel, and PowerPoint **for data handling, analysis, and presentation.**

Course Outcomes (COs):

CO1: Understand the concept, objectives, types, and importance of research, including problem identification and hypothesis formulation.

CO2: Learn about different research designs, variables, and sampling methods.

CO3: Understand data collection, preparation, measurement, and scaling techniques.

CO4: Learn to interpret research results and write effective research reports.

CO–PO Mapping Table (Simple Format)

Course Outcomes (COs) PO1: PO2: PO3: PO4: PO5:

CO1	1	1	1	3	1
CO2	1	1	1	3	1
CO3	1	1	1	3	1
CO4	1	1	1	3	2

Unit I

Research Process—Meaning, Objective, Purpose, Characteristic, Type and Approaches.

Problem Identification and Formulation- Defining research problem, Selection of research problem, hypothesis-Null and Alternative hypothesis, Significance and Importance.

Unit II

Research Designs –Meaning and importance, Concept of research design, Types of variables, confounded relationship, Different research design, Type of Experimental Design.

Design of Sample Survey-Introduction, Sampling and Non sampling error, Type of Sampling Error: Non probability and Probability Error.

Unit III

Data Collection- Type of data, Data Collection, Data preparation and analysis of data, Measurement and scaling of data.

Interpretation and Report Writing-Meaning, Techniques, Significance and Steps of report writing, Type of report.

Reference Books

- Kothari, C.R. (2008) Research Methodology. Wishwa Prakashan. New Delhi, India.

Paper: Advanced Nutritional Biochemistry

Course Details:

This course explores the biochemical basis of health and disease, with a focus on clinical assessment and metabolic alterations. It begins with the definitions and scope of health and disease, emphasizing biochemical methods for assessing nutritional status and diagnosing nutrient deficiencies—both clinical and subclinical. Topics include the body's metabolic adaptations during starvation, organ interrelationships, and the biochemical changes in alcohol metabolism, fatty liver disease, and liver cirrhosis. Students will study lipoprotein metabolism and its role in atherosclerosis, along with the biochemical mechanisms of reactive oxygen species and the antioxidant defense system. The course also examines the biochemical aspects of cancer, including oncogenes, malignancy, and dietary influences. Additionally, students will learn to evaluate liver and renal function through biochemical tests, understand inborn errors of metabolism, and explore the role of endorphins and stress in human biochemistry.

Course Objectives:

1. To understand the concepts of health and disease, methods for nutritional assessment, and the biochemical indicators of nutrient deficiencies.
2. To explore the metabolism of alcohol, lipoproteins, and the role of oxidative stress, antioxidants, and diet in the development of diseases like fatty liver, atherosclerosis, and cancer.
3. To gain knowledge of liver and kidney function tests, inborn errors of metabolism, and the biochemical basis of stress and endorphin activity.

Course Outcomes (COs):

CO1: Understand the meaning of health and disease, methods of nutritional assessment, and indicators of nutrient deficiencies.

CO2: Explain alcohol metabolism, lipoprotein metabolism, and their roles in diseases like fatty liver and atherosclerosis.

CO3: Understand the role of free radicals, antioxidants, and dietary factors in cancer development.

CO4: Learn to assess liver and kidney functions, recognize inborn errors of metabolism, and understand the role of endorphins and stress in biochemistry.

Course Outcomes (COs) PO1: PO2: PO3: PO4: PO5:

CO1	3	2	1	2	2
CO2	3	3	1	2	2
CO3	3	3	1	2	2
CO4	3	3	1	2	2

Unit-I

Health and Diseases- Defining and Scope of health and disease, Methods of assessment.

Biochemical tests in assessment of nutritional status

Assesment of Nutritional deficiency- Macronutrients and Micronutrients deficiency, Clinical and Subclinical Assessment.

Starvation- Alternative methods of energy generation, Interrelationships of organ.

Unit-II

Metabolism of Alcohol- As energy source, Fatty liver disease and Liver Cirrohosis.

Lipoprotein metabolism- Lipolysis, adipose tissues, LDL, HDL,VLDL, Chylomicron and Atherosclerosis.

Reactive Oxygen Species and Antioxidant System- Free radical, Antioxidant enzyme, Mechanism.

Cancer- Concept of oncogenes, Pro-oncogenes, Malignancy and Role of diet.

Unit-III

Liver functions and their assessment - Measurements of protein, Serum enzyme levels, Bile pigment, Jaundice.

Renal functions tests - Various tests, GFR and Clearance.

Inborn errors of metabolism.

Endorphins and Stress biochemistry

Practical

Planning of Macro and Micronutrients deficiency diseases.

Diet planning for Inborn error diseases.

Diet planning for Cancer patients.

Estimation of Serum Cholesterol, LDL, HDL, TG

Evaluation of Anti-oxidant parameter

Reference Books

- Anderson, L, Dibble, M.U. &Turkki. (1982). Nutrition in Health and Disease. JB Lippincott Co. Toronto.
- Murray, R.K, Granner, D.K & Rodwell V.W. (2006). Harper's Illustrated Biochemistry. McGraw-Hill, Boston.

- Plummer, D.T. (2006). Practical Biochemistry. Tata McGraw Hill Publishing Company Ltd. New Delhi, India.
- Nelson, D. L. (2003). Lehninger Principles of Biochemistry. Macmillan Worth Publishers, India.

Paper Code: FAN508

LTPC: 2-0-0-2

Paper: Instrumentation in Nutrition

Course Details:

This course offers an in-depth understanding of analytical techniques used in biochemical and nutritional sciences. It covers the principles, methodologies, and applications of various spectroscopic methods including UV-Visible, IR, NMR, ESR, Atomic Absorption, and Plasma Emission Spectroscopy. Students will learn the fundamentals and practical uses of multiple chromatographic techniques such as gel filtration, ion exchange, affinity chromatography, thin-layer chromatography, gas chromatography, HPLC, and GLC. The course also delves into electrophoretic methods—SDS-PAGE, native PAGE, agarose electrophoresis, and 2D gel electrophoresis—emphasizing their role in protein and nucleic acid analysis. Additional topics include PCR, colorimetry, flame photometry, and respirometry. The course concludes with an overview of non-invasive diagnostic tools such as radiological techniques, bone mineral density assessment, ECG, EEG, and NMR, highlighting their advantages and limitations in biomedical applications.

Course Objectives:

1. To understand the principles, methodologies, and applications of various spectroscopic and chromatographic techniques **used in food and biochemical analysis.**
2. To gain knowledge of electrophoresis and other analytical tools such as PCR, colorimetry, flame photometry, and respirometry used for molecular and biochemical assessments.
3. To explore non-invasive diagnostic methods like radiology, bone mineral density testing, ECG, EEG, and NMR, along with their advantages and limitations.

Course Outcomes:

1. Understand the principles and uses of different spectroscopy methods like UV, IR, NMR, ESR, atomic absorption, and plasma emission spectroscopy.
2. Learn about various chromatography techniques such as gel filtration, ion exchange, affinity, thin layer, gas, and liquid chromatography, and their applications.
3. Know the basics and applications of electrophoresis methods including Native PAGE, SDS-PAGE, agarose, and 2D gel electrophoresis.
4. Understand other lab techniques like PCR, colorimetry, flame photometry, respirometry, and non-invasive assessment methods like radiology, ECG, EEG, and bone density measurement, along with their pros and cons.

Unit I

Spectrophotometer-Principle, Methodology and Application of UV Spectroscopy, Visible, IR, NMR and ESR Spectroscopy, Atomic Absorption, Plasma Emission Spectroscopy

Chromatography-Principle, Methodology and Applications of gel filtration, Ion exchange Chromatography, Affinity Chromatography; Thin Layer Chromatography, Gas Chromatography; High Performance Liquid Chromatography (HPLC) , Gas Liquid Chromatography (GLC).

Unit II

Electrophoresis- Principle and Applications of Native, SDS PAGE, Agarose Electrophoresis, 2D Gel Electrophoresis.

Application of PCR, Colorimetric, Flame photometry and Respirography.

Non-invasive methods for assessment: Radiological, Bone mineral density, ECG, EEG, NMR. Advantages and Limitations.

Reference Books

- E Kress-Rogers, C J B Brimelow (2000). Instrumentation and Sensors for the food industry, Second edition, CRC press, NW.
- Sharma BK (1986). Instrumental methods of chemical analysis, 8th edition, Goel Publishing house.
- Raghuramulu N., Madhavan Nair K. and Kalyansundaram S. (1983). A manual of laboratory techniques edited by NIN, ICMR .

Paper Code: FAN509

LTPC: 3-0-4-5

Paper: Food Microbiology & Food Safety

Course Details:

This course explores the role of microorganisms in food, highlighting both their beneficial and harmful impacts. It begins with the general characteristics of microbes such as yeasts, molds, and bacteria, and their significance in the food industry. Students will examine sources of food contamination—including air, water, soil, and post-processing—and the growth, survival, and deactivation of foodborne pathogens and microbial toxins. The course delves into foodborne diseases caused by bacteria, fungi, viruses, and other pathogens, along with strategies for prevention and control.

The beneficial role of microbes in food fermentation is also discussed, covering fermented dairy, cereal-based, alcoholic, and traditional foods, with emphasis on their therapeutic value. Food spoilage across various food groups—such as dairy, cereals, meats, poultry, and produce—is studied in detail. Students will also learn about food preservation methods including low and high temperature treatments, dehydration, chemical preservatives, and food irradiation, along with their principles and potential toxic effects. The course concludes with an introduction to the application of biotechnology in food microbiology, particularly for disease diagnosis and quality control.

Course Objectives:

1. To understand the general characteristics of microorganisms such as yeasts, molds, and bacteria, their sources of contamination, and their impact on food safety and quality.
2. To learn about foodborne diseases, their causes, prevention strategies, and the role of microbes in fermentation and the therapeutic benefits of fermented foods.
3. To study food spoilage mechanisms across different food groups and explore various preservation methods, including physical, chemical, and biotechnological approaches to ensure food safety.

Course Outcome:

1. Understand the main types of microbes (yeasts, molds, bacteria) and their importance and sources of contamination in the food industry.
2. Learn about how microbes grow in food, cause diseases, and ways to prevent foodborne illnesses.
3. Know the role of microbes in food fermentation and the benefits of fermented foods.
4. Understand food spoilage, different preservation methods, food safety principles, and the role of biotechnology in diagnosing food-related diseases.

Unit – I

Introduction of Microbes-General characteristics of microorganisms: yeasts, molds and bacteria and its importance in food industry.

Source of contamination- Air, Water, Soil, Sewage, Pesticide, Insecticide, Post processing contamination.

Microbes in Foods- Growth and survival of pathogens in food, Microbial toxins, Microbial infections and intoxications, Preventing measures and deactivation techniques.

Unit – II

Food borne diseases- Causes and prevention of bacterial, fungal, viral and other infectious diseases.

Microbes in Fermentation- Role of microbes in fermentation of milk products, cereals, oriental foods, alcoholic beverages and other processed foodS. Therapeutic importance of fermented foods.

Unit – III

Food Spoilage- Spoilage of different food group- cereal, pulses, dairy products, meat, fish, eggs, poultry products, fruit and vegetables, Spoilage of various fresh and processed foods.

Food Safety- General principles involved in their preservation, Low temperature preservation: Lethal effects of chilling, Freezing and Thawing; High temperature preservation: Pasteurization, sterilization, canning, thermal death time, Dehydration, Chemical preservation, Irradiations and its toxic effects,

Role of Biotechnology in Food Microbiology- Diagnosis of Diseases.

Practical

- Microscopic examination of bacteria with simple staining, negative staining and gram stain.
- Demonstration of different sterilization procedures of glassware.
- Preparation the different culture media and demonstration of sterilization procedure for media and equipment.
- Isolation techniques of microbial cultures from soil, water and food: serial dilutions, Plating techniques.
- Determining the number of viable cells in the culture (standard plate count).

- Culturing and identification of microbes (Yeasts and Moulds) in different food samples.
- Determination of Coliform in water sample.

Reference Books

- Pelezar, M.J. Chan EGS and Krieg N.R.(1999). Microbiology
- Frazier, J. & Westhoff, D.C. (1988). Food Microbiology. 4th Ed. McGraw Hill.
- Prescott, L.M., Harley, JP and Klein DA (1999). Microbiology, WCB. Oxford.

Paper Code: FAN510

LTPC: 3-0-4-5

Paper: Advanced Human Nutrition

Course Details:

This course explores the dynamic nutritional needs across various stages of the human life cycle—from infancy to old age—with a focus on physiological changes and corresponding dietary requirements. Students will learn to determine nutritional needs using RDA and food exchange lists and apply this knowledge to real-life scenarios such as pregnancy, lactation, infancy, preschool years, adolescence, adulthood, and aging. The course examines the nutritional management of pregnancy-related complications, feeding strategies for infants and low birth weight babies, and malnutrition in early childhood. It also addresses adolescent nutritional concerns, including eating disorders like anorexia nervosa and bulimia, as well as the dietary needs and challenges of geriatric populations. Further, students will explore specialized areas such as sports nutrition, bone health, nutrition for skin and hair, and the critical role of nutrition in supporting immune function. Emphasis is placed on understanding the interplay between nutrition, growth, development, performance, and disease prevention throughout the human life span.

Course Objectives:

1. To understand the nutritional requirements at various physiological stages of life—from infancy to old age—and apply dietary planning based on RDA, food exchange lists, and individual needs.
2. To evaluate the physiological changes and nutritional demands during critical life stages such as pregnancy, lactation, infancy, childhood, adolescence, and aging, and design appropriate nutritional interventions to support health and development.
3. To identify and address nutrition-related health issues and disorders—including malnutrition, eating disorders, bone-related conditions, and immune dysfunction—through targeted dietary strategies.
4. To explore the role of nutrition in specialized areas such as sports performance, bone health, skin and hair health, and immune function, and to recommend dietary modifications for enhancing well-being and managing related conditions.

Course Outcomes:

1. Understand nutritional needs during pregnancy, lactation, and infancy, including how nutrition affects growth and development.
2. Learn about nutrition and common feeding problems in preschool, childhood, adolescence, and old age.
3. Know the basics of sports nutrition, energy needs, and bone health, including key nutrients like calcium and vitamin D.
4. Understand the role of nutrition in skin and hair health, and how nutrition affects the immune system and infection.

Unit I

Determining nutritional requirements for different physiological stages of life cycles, RDA, Food exchange list.

Pregnancy- Physiological changes in pregnancy, and nutrient requirements, Impact of good nutrition on the outcome of pregnancy, Complications of pregnancy and their nutritional

management.

Lactation and Infancy- Physiology of lactation, Impact of nutrition on efficiency and milk production, Breast feeding vs Artificial feeding, Importance of weaning and Supplementary food, Role of nutrition on physical and mental development, Types of milk and their use in infant feeding, Assessment of growth, Feeding the premature and low birth weight infants.

Unit II

Preschool age and Child hood:- Growth and development, Food Habits, Prevalence of malnutrition in preschool years, Specific problems in feeding school children.

Adolescence- Physical and physiological changes, Food preferences, Nutritional problems. Eating disorder: Anorexia Nervosa and Bulimia.

Geriatric- Physical and Physiological changes, Nutritional requirement, Problems of old age, Nutrients influencing aging process.

Unit III

Sports Nutrition- Energy production cycle, Nutritional requirements for optimum performance, Ergogenic aids, Carbohydrate loading.

Bone Health and Nutrition- Arthritis, Rheumatoid arthritis, Role of calcium, phosphorus, magnesium and vitamin D hormonal regulation.

Nutrition for Skin and Hair- Introduction and Diet management.

Role of Nutrition in Immunity- Concept of immunity, Role of nutrition in infection, Effect of nutritional status on immunity.

Practical

Planning and calculating nutritive value of balanced diet for different age groups

Enrichment and Fortification of daily diet.

Planning of diet for Pregnant and Lactating women.

Planning and calculating nutritive value for healthy skin and hair.

Planning and calculating nutritive value for Sports person.

Reference books:

- Bamji, M.S, Rao, N.P & Reddy, V. (1996). Textbook of Human Nutrition. Oxford & IBH Publishing Co. (P) Ltd. Delhi.
- Swaminathan M. (2010). Food and Nutrition, Second Edition, Bangalore Printing & publishing co. ltd., Bangalore.

SEMESTER III

Paper Code: FAN511

LTPC: 3-0-4-5

Paper: Food Chemistry and Food Analysis

Course Details:

This course provides a scientific understanding of the chemical composition of food and the changes it undergoes during processing, storage, and preparation. It begins with an introduction to food chemistry, covering the structure and functional role of water in foods, including water activity and its impact on packaging and shelf life. Students will study the classification, structure, and chemical reactions of carbohydrates, lipids, and proteins, alongside their functional and physicochemical properties. Topics include lipid oxidation, protein denaturation, emulsification, hydrogenation, and the role of fats in flavor development. The course also examines the role of vitamins and minerals in the food industry, including their behavior during processing and fortification. The nature and function of food enzymes, enzymatic browning, and the impact of enzymes like hydrolases and lipases in different food systems are explored in detail. Additionally, students will gain hands-on knowledge of food analysis techniques. Core analytical methods include proximate composition analysis (moisture, ash, fat, protein, fiber), starch determination, fat rancidity testing, and quantitative protein estimation using Biuret, Ninhydrin, and Lowry's methods. Analytical techniques for both fat-soluble and water-soluble vitamins, mineral estimation (titrimetric and gravimetric), and assessment of food's physical and rheological properties are also included. This course lays the foundation for understanding food at a molecular level and equips students with essential analytical skills for quality control and research in food science.

Course Objectives:

- 1- **To develop a foundational understanding of the chemical composition of food**, including water, carbohydrates, proteins, and lipids, and to explore their structural, functional, and physicochemical properties in relation to food quality, stability, and processing.
- 2- **To understand the roles of vitamins, minerals, enzymes, and browning reactions** in food systems, including how processing and fortification affect their stability and function within the food industry.
- 3- **To introduce the principles and practical methods of proximate analysis**, including moisture, ash, protein, fat, fiber, and carbohydrate estimation, and to apply these methods in evaluating food composition.
- 4- **To provide hands-on knowledge of food analysis techniques** used to assess nutrient content, physical and rheological properties, and chemical changes in food using titrimetric, gravimetric, and colorimetric methods.

Course Outcomes:

1. Understand the basic composition of food, including water, carbohydrates, lipids, and proteins, and their important properties and reactions.
2. Learn about vitamins, minerals, food enzymes, and how processing affects them in foods.

3. Know the principles of proximate analysis to measure moisture, fat, protein, fiber, and carbohydrates in foods.
4. Understand common methods used for food analysis, including tests for starch, fats, proteins, vitamins, and minerals.

Unit – I

Introduction to Food Chemistry: Definition and composition of food

Water: Structure of water, Type of water, Sorption phenomenon, Water activity, Role in packaging and shelf life.

Carbohydrates: Classification, Structure of important polysaccharides (starch, cellulose, hemicelluloses, pectin, gums), Modified cellulose and starches. Chemical reactions of carbohydrates – oxidation, reduction, acid and alkali.

Lipids: Classification and Physico-chemical properties of lipids. Refining of crude oils, Hydrogenation and Winterization. Vegetable and animal fat. Frying and Shortening. Flavor changes in fats and oils, Lipid oxidation, Factors affecting lipid oxidation.

Proteins: Classification, Properties of protein (electrophoresis, sedimentation, and denaturation), Functional properties of protein (solubility, viscosity, gelation, emulsification and foaming).

Unit – II

Vitamins and Minerals: Role of vitamins and minerals in food industry, Effect of various processing treatments and fortification of foods.

Food enzymes- Nature, Classification, Properties of Food enzyme, Enzyme activity in different food systems, Hydrolyses and Lipases, Utilization in Food Chemistry. Browning reaction in foods.

Unit- III

Principles of Proximate Analysis- Moisture, Ash, Crude Fat, Crude Fibre, Crude Protein and Carbohydrates by difference.

Principles and methods of Food Analysis.

Determination of Starch. Test for unsaturation of fats, rancidity of fats.

Quantitative analysis of Protein by Biuret method, Ninhydrin method, Lowry's method. colorimetric methods of analysis of fat soluble and water soluble vitamins

Principles and methods for estimation of Minerals: Titrimetric and Gravimetric methods Methods for determining physical and rheological properties of food.

Practical

Determination of proximate analysis of given samples: Moisture, ash, crude fat, crude fibre, crude protein and carbohydrate by difference.

Estimation of total sugar content, reducing and non-reducing sugars in given food samples.

Estimation of starch content of cereals.

Determination of iodine value and saponification number of fats.

Estimation of minerals, iron, calcium and phosphorus

Estimation of vitamins: Ascorbic acid, thiamine, beta-carotene.

Determination of titrable acidity and total soluble solid in the given food samples.

Reference Books:

- Damodaran, S., Parkin, K.L. and Fennema, O. R. (2007). Fennema's Food Chemistry, fourth edition, published by CRC Press.
- Meyer L.H. (2003). Food Chemistry, Reinhold Pub. Corp.
- Nielsen, S.S.(2003). Food Analysis, Third Ed., Kluwer Academic/Plenum Publishers, New York.

Paper Code: FAN512

LTPC: 3-0-4-5

Paper: Therapeutic Nutrition

Course Details:

This course focuses on the principles and application of nutrition in the prevention, treatment, and management of various diseases. It begins with an overview of therapeutic nutrition, including the role of normal diets and necessary dietary modifications such as clear liquid, soft, and enteral/parenteral nutrition. The course provides in-depth knowledge of the pathophysiology, clinical manifestations, and dietary management of disorders related to the gastrointestinal tract, liver, pancreas, and biliary system—including conditions such as malabsorption syndrome, hepatic encephalopathy, cholelithiasis, and pancreatitis. Further topics include metabolic and chronic disorders such as diabetes mellitus, hypoglycemia, cardiovascular diseases (e.g., hypertension, atherosclerosis, and myocardial infarction), and weight management strategies for underweight, overweight, and obesity. The course also addresses renal diseases including nephritis, kidney failure, and urinary calculi, as well as the nutritional care for patients with AIDS, cancer, burns, and food allergies. Special emphasis is placed on the interactions between drugs and nutrients, exploring how medications can affect nutrient absorption, metabolism, and utilization, and vice versa. By the end of this course, students will be able to apply therapeutic nutrition principles to develop effective dietary plans tailored to various clinical conditions, enhancing patient care and recovery.

Course Objectives:

- 1- **To understand the principles of therapeutic nutrition**, including dietary modifications for various clinical conditions and the use of specialized feeding methods such as enteral and parenteral nutrition.
- 2- **To explore the pathophysiology, clinical symptoms, and dietary management** of common disorders affecting the gastrointestinal tract, liver, pancreas, biliary system, cardiovascular system, and endocrine system (e.g., diabetes and hypoglycemia).
- 3- **To develop nutrition care plans for patients with renal diseases, cancer, AIDS, burns, and food allergies**, incorporating disease-specific dietary guidelines and nutritional interventions to improve clinical outcomes.
- 4- **To examine the interactions between nutrients and drugs**, and understand how pharmacological treatments influence nutrient absorption, metabolism, and utilization—and vice versa.

Course outcome:

1. Understand different types of diets and how to manage nutrition for gastrointestinal, liver, pancreas, and biliary diseases.
2. Learn about diabetes, hypoglycemia, cardiovascular diseases, and their dietary management to support health.
3. Know the nutritional care needed for kidney diseases, including dialysis, as well as nutrition in AIDS, cancer, burns, and allergies.
4. Understand how nutrients and drugs interact, affecting absorption, metabolism, and overall treatment.

Unit I

Introduction to Therapeutic Nutrition- Normal diet, Dietary modifications: Clear liquid diet, Soft diet, liquid diet, Total Enteral Nutrition and Total parental Nutrition.

Disease of the G. I. System- Introduction, Pathogenesis, Clinical manifestation and Dietary management of gastrointestinal Diseases, Malabsorption Syndrome, Lactose Intolerance, Post surgical complications and management.

Diseases of the Liver, Pancreas and Biliary System-Introduction, Pathogenesis, Clinical manifestation and Dietary Management- Hepatitis, Cirrhosis of Liver, Hepatic Encephalopathy, Diseases of Gall Bladder and Pancreas (Cholelithiasis, Cholecystitis, Cholecystectomy, Pancreatitis).

Unit II

Diabetes Mellitus and Hypoglycemia: Classification, Physiological symptoms and Diagnosis, Dietary care and Nutritional Therapy, Oral Hypoglycemic Agents.

Cardiovascular diseases- Introduction, Pathogenesis, Clinical manifestation and dietary management. Atherosclerosis. Role of nutrients to prevent Atherosclerosis, Hypertension, Hyperlipoproteinemia, Congestive heart failure and Myocardial infraction.

Weight management-Introduction, Clinical manifestation and Dietary management- Underweight, Overweight and Obesity.

Unit III

Renal diseases-- Introduction, Pathogenesis, Clinical manifestation and Dietary management- Nephritis, Acute Kidney Failure, Chronic Kidney disease, Urinary calculi, Dialysis.

AIDS and Cancer- Introduction, Pathogenesis, Clinical manifestation and Dietary management during Burns, Allergy, AIDS and Cancer.

Interaction between Nutrients, and Drugs- Effect of drugs on absorption, utilization and metabolism of nutrients, Effect of nutrients on absorption and utilization of drugs.

Practical:**Planning of diets for following disease conditions:**

Fever, Malabsorption disease, Lactose Intolerance.

Hypertension and Chronic heart diseases,

Liver diseases, Cholecystitis and Pancreatitis,

Kidney diseases,

IDDM, and NIDDM.

Diet management: For AIDS, Burns, Trauma and Sepsis (Formula+diet)

Diet planning: For Formula feeds (Total Parenteral Nutrition and Total Enteral Nutrition).

Reference Books:

- Mahan, L.K. & Escott Stump, S. (2000). Krause's Food Nutrition and Diet Therapy 10th Ed., WB Saunders & Co. London.
- Shils. M.E. (2006). Modern Nutrition in Health and Disease. Lippincott, Williams & Williams, USA.
- Passmore, R. & Eastwood, M. A. (1986). Human Nutrition & Dietetics. ELBS Churchill Livingstone.

Paper: Institutional Food Management

Course Details:

This course provides an in-depth understanding of food service systems and management practices in institutional and commercial settings. It covers the principles, objectives, and types of food service operations, including hospitals, hostels, school meal programs, industrial canteens, and hotels. Students will learn about the equipment required for food preparation, distribution, and storage, with a focus on efficient service delivery in healthcare institutions. The course emphasizes the fundamentals of food service management, including menu planning, food receipt and storage, and techniques for quantity food production. It also introduces key management theories and approaches—such as classical, behavioral, systems, and TQM (Total Quality Management)—and explains their application in food service operations. Students will explore essential management tools such as organizational charts and work improvement techniques, along with core concepts in personnel management including recruitment, training, promotion, performance appraisal, and record keeping. The financial management section covers budgeting, cost control, inventory management, accounting systems, and quality assurance in food production. The course also addresses hygiene and sanitation practices in food preparation and service areas, focusing on contamination sources, personal hygiene, food safety, pest control, and dishwashing protocols. This course equips students with the knowledge and skills to effectively plan, manage, and evaluate food service operations while ensuring quality, safety, and financial sustainability.

Course Objectives:

- 1- **To provide a foundational understanding of food service systems**, including their concepts, principles, types, and operations in various institutional settings such as hospitals, hostels, schools, and commercial food establishments.
- 2- **To develop managerial competencies in menu planning, quantity food production, storage, and service**, with special emphasis on hospital food service equipment and distribution logistics.
- 3- **To explore classical and modern management theories and their application** in food service organizations, including tools of management, personnel management, financial management, budgeting, and quality control.
- 4- **To instil best practices in hygiene, sanitation, and food safety**, with a focus on contamination control, personal hygiene, dishwashing procedures, and pest management to ensure safe and high-quality food service delivery.

Course Outcomes:

1. Understand different types of food services and the basics of food preparation, storage, and distribution in hospitals and other settings.
2. Learn about various management theories, how to set goals, and the principles and functions of management in food service.
3. Know the tools of management, personnel management concepts, and how to handle training, promotion, and work evaluations.
4. Understand financial management in food services, including purchasing, inventory, budgeting, cost control, and the importance of hygiene and sanitation in food preparation and serving.

Unit I

Food Services- Concept, Principle and Objective, Type of food services (hospital, hostel, school meal, industrial canteen, commercial hotels).

Food Services in hospitals- Requirement of equipments for food preparation, Distribution, Storage and Services.

Food Service management- Menu planning, Receipt of food and its storage, Principles and Techniques in quantity food production.

Unit II

Theories of Management and Approaches- Classical Theory, neoclassical approach, Quantitative approach, MBO approach, System approach, Behavioral and Human relation approach, Contingency approach, JIT approach, TQM approach.

Developing objective and goals- Definition, Importance, Types of goal, Policies, Procedures, Rules.

Principles and procedures of management-Definition of management, Organization Interaction at work , Principles, Functions of management, Role and responsibilities.

Unit III

Tools of management –Definition, classification, Organization chart, Structure, Function, Work improvement techniques.

Personnel management -Definition, Scope, Concept of personnel management, Approaches of personnel management, Personnel policies, Training, Placement, Promotion, Personnel records, Work appraisals

Financial management in food service institutions-Methods of food purchasing, Inventory management, Maintaining quality in food production and services.

Financial management-Definition, Scope of financial management, Financial accounting, Management accounting, Budgeting, Costing, Cost control, Accounting.

Hygiene and sanitation in preparation and serving area – Personal hygiene, Types, Sources of contamination, Prevention, Safety measures, Methods of controlling infestation, Methods of dish washing.

Reference Books

- Sethi, M. (2008). Institutional Food Management. New Age International (P) Ltd.
- Bansal, T. (2011). Hotel facility and planning. Oxford publishing, New Delhi.

Paper: Public Health Nutrition**Course Details:**

This course focuses on the role of nutrition in promoting public health and addressing community-based nutritional challenges. It begins with the concept of public nutrition, exploring the socio-cultural aspects of food preferences, the relationship between nutrition and health, and the role of public nutritionists in healthcare delivery systems. Students will gain insight into nutritional epidemiology, including methods for assessing nutritional status, the use of growth standards (Gomez and Waterlow), growth charts, and population health indices. The course also covers the major nutritional problems affecting communities globally and in India, such as protein-energy malnutrition, vitamin A deficiency, anaemia, iodine deficiency disorders, and fluorosis, along with strategies for their control and management. Further, the course delves into health communication principles, models, and barriers, with practical applications in nutrition education, extension, and development using participatory tools like PLA and PRA. Students will study nutritional policy and planning, including government guidelines, the role of governmental and non-governmental organizations, and the structure of healthcare delivery in rural and urban settings, including IEC (Information, Education, and Communication) strategies. The course also examines the role of national and international organizations (WHO, UNICEF, NIN, ICAR, FAO, CSIR) in improving community nutrition.

Key national nutrition and health programs such as the Mid-Day Meal Scheme, ICDS, Special Nutrition Program, and immunization initiatives are discussed in terms of planning, execution, and evaluation. Additionally, food-based interventions like fortification, supplementation, and genetic improvement of foods are explored with respect to their application for various population groups. This course equips students with the knowledge and tools to critically assess, plan, and implement public nutrition strategies aimed at improving health outcomes on both local and global scales.

Course Objectives:

- 1- To understand the fundamental concepts of public nutrition, including community dynamics, socio-cultural influences on food preferences, and the integral relationship between health and nutrition.
- 2- To gain knowledge of nutritional epidemiology, methods for assessing nutritional status, and classification of growth standards, with a focus on identifying and addressing community nutritional problems such as malnutrition, micronutrient deficiencies, and related disorders.
- 3- To explore effective health communication strategies, nutritional education methods, and the role of governmental and non-governmental organizations in nutrition policy, planning, and delivery of health care services in diverse populations.
- 4- To analyze the contributions of national and international agencies in implementing nutritional programs, and to evaluate food-based interventions like fortification and supplementation aimed at improving community nutritional status.

Course Outcomes:

1. Understand the concept of public nutrition, the relationship between health and nutrition, and how nutritionists contribute to healthcare delivery.
2. Learn about nutritional epidemiology, growth standards, and common nutritional problems like malnutrition, anemia, and iodine deficiency in communities.

3. Know the basics of health communication, nutritional education, and the role of government and NGOs in nutrition policy and planning.
4. Understand national and international nutrition programs, agencies involved, and food-based interventions like fortification and supplementation to improve community health.

Unit-I

Concept of Public Nutrition-Concept of Community, Socio cultural aspect of food preference, Relationship between health and nutrition, Role of public nutritionists in the health care, Delivery system.

Nutritional Epidemiology- Concept and scope, Classification of growth standard (Gomez and Waterlow), Growth charts, Population health index, methods for assessing nutritional status.

Nutritional Problem of Community- Global perspectives in malnutrition, Protein energy malnutrition, vitamin A deficiency, Anaemia, Iodine deficiency disorder, Fluorosis and their Control and Management

Unit -II

Health Communication: Concepts, Scope, Elements and Models of communication, Communication Process - Approaches and Barriers to communication, Communication for Extension Education and Development. Nutritional education-Objective and Channels. PLA and PRA.

Nutritional Policy and Planning- Aims, Government guidelines and Policy, Governmental and Non Governmental organization, Health care delivery system in rural and urban India, I.E.C. (Information Education and Communication).

Unit III

National and International Agencies- Introduction to nutritional programme, Relationship of health and nutrition, Role of various agencies to improve the nutritional status of the community (WHO, UNICEF, NIN, ICAR, FAO, CSIR)

National Health Programs-Planning, Execution and Evaluation of various health programs (Special Nutritional Program, Mid day meal, ICDS, IDD), Immunization.

Food based interventions- Fortification, Supplementation, Genetic improvement of foods, Their characteristics and uses for different target groups.

Practical

- Assessment of nutritional status of an individual/community using anthropometry and dietary survey. A) Preparation of schedule B) Survey work C) Analysis of data D) Writing of report.

- Visit to local health centre to identify clinical signs and symptoms of nutritional problems.
 - Development of audio visual aids- radio script; popular article; chart/posters leaflets etc.
- Planning, implementation and evaluation of nutrition education for a target group.

Reference Books

- Gibson, R.S. (1990). Principles of Nutritional Assessment. Oxford University Press. New Delhi.
- Gopaldas, T. & Seshadri, S. (1987). Nutrition – Monitoring and Assessment. Oxford University Press. New Delhi.
- Jelliffe, D.B. Latest Ed. The Assessment of Nutritional Status of Community WHO/FAO Monograph series No.53, WHO Geneva.
- Maclaren, D.S. (1986). Nutrition in the Community 2nd Ed. John Willey and Sons, New York.
- Mann, S.K., Sangha, J.K., Mehta, U. & Jain, R. (1999). Manual on Community Nutrition. College of Home Science, PAU, Ludhiana.
- Obert, J.C. (1986). Community Nutrition. Mac Millan New York.
- Park, K. (2000). Park's Text Book of Preventive and Social Medicine 16th Ed. BanarsidasBhanot Publishing Jabalpur, India.
- Shukla, P.K. (1982). Nutritional Problems of India. Prentice Hall of India.

Paper: Food Processing and Food law**Course Details:**

This course introduces students to the foundational principles, practices, and regulatory frameworks of food processing and safety. It explores the scope and future prospects of food processing in India, highlighting methods of food preservation and strategies to reduce spoilage. The course examines post-harvest treatments such as harvesting, transportation, storage, and packaging for various food groups to enhance shelf life and reduce losses. Students will gain practical knowledge of processing techniques for fruits and vegetables, including the production of juices, jams, jellies, marmalades, sauces, pickles, and preserved or crystallized fruits. Processing of beverage and confectionery products—such as tea, coffee, candies, toffees, caramels, and chocolates—is also covered. In addition, the course introduces the concept and application of speciality and functional foods, including organic and superfoods.

A significant component of the course focuses on food safety and quality assurance through national and international laws and standards. Students will learn about key frameworks such as HACCP, GMP, GHP, and ISO standards, along with important regulatory bodies and acts like the Food Safety and Standards Act (FSSA), Codex Alimentarius, WTO, AGMARK, BIS, PFA, MMPO, MFPO, and FPO. Emphasis is placed on understanding food law compliance and the role of these systems in ensuring safe and high-quality food production. This course prepares students for roles in food industries, quality control, food safety compliance, and research by providing a blend of theoretical knowledge and industry-relevant standards.

Course Objectives:

- 1- To understand the fundamental concepts of food processing, including principles of food spoilage, preservation techniques, and post-harvest treatment methods for various food groups.
- 2- To acquire knowledge of processing methods for fruits, vegetables, beverages, and confectionery products, along with an introduction to specialty and functional foods such as organic and superfoods.
- 3- To familiarize with food safety principles, international and national food safety standards, and regulatory frameworks including HACCP, GMP, ISO, and various food laws and acts relevant to the Indian context.
- 4- To develop awareness of quality control measures, legal requirements, and compliance strategies essential for maintaining food safety and ensuring consumer protection in food production and distribution.

Course Outcomes:

1. Understand the basics of food processing, types of food spoilage, and different methods of food preservation.
2. Learn about processing techniques for fruits, vegetables, beverages, and specialty foods like organic and superfoods.
3. Know the principles of post-harvest treatment, including harvesting, transportation, storage, and packaging of various foods.
4. Understand food safety laws, standards, and quality control systems such as HACCP, GMP, ISO, and key regulations in India and internationally.

Unit I

Fundamentals of Food Processing- Concept, Prospects for future growth in India.

Food Spoilage and Food Preservation - Principle, Type and Scope of food preservation;.

Post Harvest Treatment-Harvesting, transportation, storage, packaging of different food groups

Unit II

Food Processing: Fruit juice processing, Jam, Jelly, Marmalade, Puree, Paste, Sauce, Ketchup, Pickles. Fruits and vegetable preserves, Crystallized fruits.

Beverages Processing: Coffee, Tea, Confectionery foods, Candies, Toffees, Caramels, Chocolate products.

Speciality and Functional foods: Introduction and Application. Organic food, Super food..

Unit III

Food Safety, Laws and Standards - Hazard Analysis and Critical Control Points (HACCP), Good Manufacturing Practices (GMP), Good Hygienic Practices (GHP), International Organisation for Standardization (ISO), Essential Commodities Act, Codex Alimentarius, World Trade Organisation (WTO), Technical Barrier to Trades (TBT), Sanitary Phyto-Sanitary (SPS) rules, Bureau of Indian Standards (BIS), AGMARK, Food Safety and Standards Act, 2006 (FSSA): Prevention of Food Adulteration Act (PFA), Milk and Milk Products Order (MMPO), Meat Food Products Order (MFPO), Fruits Products Order (FPO).

Reference Books

Fellows, P. J. (2016). Food Processing Technology: Principles and Practice, Fourth Edition, Woodhead Publishing.

Kiron Prabhakar (2016). A Practical Guide to Food Laws and Regulations, Bloomsbury Professional, India.

Semester IV

Paper Code: FAN516

LTPC: 0-0-4-4

Paper: Seminar

Seminar will include topics related to current researches in the field of Nutrition

Paper Code: FAN517

LTPC: 2-0-0-2

Paper: Scientific Writing

Course Details:

This course equips students with essential skills in scientific writing and research documentation, emphasizing clarity, accuracy, and academic integrity. It introduces the principles and types of scientific writing, including articles, dissertations, chapters, monographs, and bibliographies. Students will learn how to effectively structure research outputs, including the proper use of titles, headings, tables, illustrations, and appendices. The course provides a detailed understanding of the components of a dissertation or research report—such as introduction, literature review, methodology, results, and discussion—focusing on clarity, objectivity, and scientific validity throughout each section. In addition, students will gain practical skills in report writing, crafting CVs and resumes, and understanding the grant-writing process, including rationale development, budgeting, and methodological clarity. A key component of the course is the ethical aspect of writing, particularly the concept of plagiarism, supported by guidance on detection tools and adherence to academic standards. This course is designed to prepare students for academic research, publication, and professional communication in the scientific community.

Course Objectives:

- 1- To understand the principles, types, and characteristics of scientific writing, including the structure and components of articles, dissertations, and research reports.
- 2- To develop skills for drafting clear, valid, and objective scientific documents with proper use of titles, headings, tables, illustrations, and appendices.
- 3- To gain proficiency in preparing professional documents such as reports, CVs, and resumes, while understanding the ethical considerations related to plagiarism and its prevention.
- 4- To learn the process and essential elements of writing successful research grant proposals, including rationale development, budgeting, and presenting clear and specific methodologies.

Course Outcomes:

1. Understand the types and characteristics of scientific writing, including articles, dissertations, and reports.
2. Learn how to properly draft titles, headings, tables, illustrations, and appendices for clear scientific communication.
3. Know the key parts of a research report or dissertation, such as introduction, literature review, methods, results, and discussion.
4. Understand the basics of report writing, CV and resume preparation, writing grant proposals, and the importance of avoiding plagiarism using guidelines and software.

Unit I

Scientific writing: Introduction, Types, Characteristics of scientific writing, Articles, Chapter, Monographs, Dissertations, Bibliographies.

Use and guidelines: For drafting Titles, Heading, Sub heading, Tables, Illustrations, Appendices.

Parts of Dissertation/Research report/Article: Introduction, Review of Literature, Method, Results and Discussion, Clarity, Validity and Objectivity during writing each of the above parts

Unit II

Report Writing, CV and Resume making, plagiarism.

Writing for Grants: Question to be addressed, Rationale, Importance, Conceptualization, Pilot data, Clarity, Specificity of method, Budgeting, Outcome..

Plagiarism- Concept and Guidelines, Softwares.

Reference Books

- Wren & Martin (2005). High School English Grammar and Composition, S.Chand.
- Singh, R.K. (2000).Using English in Science & Technology, Prakash Book Depot, Bareilly.

Paper: Statistical Techniques and Data Analysis**Course Details:**

This course provides a comprehensive introduction to statistical methods and experimental designs used in research and data analysis. It covers both parametric and non-parametric tests, including the T-test and Chi-square test, emphasizing the principles of hypothesis testing, types of errors, and significance levels. Students will explore correlation and regression techniques to analyse relationships between variables. The course also delves into the analysis of variance (ANOVA) with one-way and two-way classifications to compare group means and understand data variability. Additionally, students will learn various experimental designs such as Completely Randomized Design, Randomized Block Design, Latin Square Design, and Factorial Design, enabling them to plan and interpret experiments effectively. This course aims to equip students with practical statistical tools and design strategies applicable across diverse scientific disciplines.

Course Objectives:

1. To understand the fundamental concepts of hypothesis testing, including Type I and Type II errors, and the application of parametric and non-parametric tests such as T-test and Chi-square test.
2. To develop skills in analyzing relationships between variables using regression analysis, correlation coefficients, and rank correlation methods.
3. To learn the principles and techniques of analysis of variance (ANOVA) for different classification methods including one-way and two-way ANOVA.
4. To gain knowledge of various experimental designs such as Completely Randomized Design, Randomized Block Design, Latin Square Design, and Factorial Design, and their applications in research.

Course outcomes:

1. Understand parametric and non-parametric tests, including T-test and Chi-square test, and concepts of hypothesis testing with Type I and II errors.
2. Learn about correlation and regression, including calculating and interpreting different types of correlation coefficients.
3. Know how to perform and interpret Analysis of Variance (ANOVA) for one-way and two-way classifications.
4. Understand different experimental designs such as completely randomized, randomized block, Latin square, and factorial designs.

Unit I

Parametric and Non-parametric tests. T test, Chi test, Testing of hypothesis-Type I and Type II errors, Levels of significance.

Regression Correlation, Coefficient of correlation, Rank correlation.

Unit II

Analysis of variance, One way, Two way classification

Experimental Designs-Completely randomized design, Randomized block design, Latin square design, Factorial design.

Reference Books

- Bandarkar, P.L. and Wilkinson T.S. (2000): “Methodology and Techniques of Social Research”, Himalaya Publishing House, Mumbai. Page 7 2.
- Batnagar, G.L. (1990): “Research Methods and Measurements in Behavioural and Social Sciences”, Agri. Cole publishing Academy, New Delhi.
- Kothari, C.R. (2004): “Research Methodology (Methods and Techniques)”. New Age International (p) Ltd., New Delhi.

Paper Code: FAN519

LTPC: 0-0-30-15

Paper: Dissertation

Dissertation will be of one semester only which will include Practical work, Report Writing and Viva Voce on specific topic provided for Dissertation work to individual student.