Foods and Nutrition

FOODS & NUTRITION
PAPER-1

Course Code: CFG101  Course Category: Multi-disciplinary

Course Title: RESEARCH METHODS

Credit: 04  Contact hour/week=04

Objectives:

- To understand the significance of statistics and research methodology in Home Science research
- To understand the types, tools and methods of research and develop the ability to construct data gathering instruments appropriate to the research design.
- To understand an
- To apply the appropriate statistical technique for the measurement scale and design.

Contents:

2. Role of statistics and research in Home Science Discipline.
   Objectives of research: Explain, control and pre-diction.
3. Types of Research: Historical, descriptive, experimental, case study, Social research, participatory research.
4. Definition and identification of a Research Problem
   - Selection of research problem
   - Justification
   - Theory, hypothesis, basic assumptions, limitations and delimitations of the problem.
5. Types of variables
6. Theory of probability
• Population and sample
• Probability sampling: Simple random, systematic random sampling, two stages and multi stage sampling, cluster sampling
• Non-Probability sampling: purposive, quota and volunteer sampling / snowball sampling

7. **Basic principles of Research Design**
   • Purpose of research design: Fundamental, applied and action, exploratory and descriptive, experimental, survey and case study, ex-post factor.
   • Longitudinal and cross sectional, co-relational

8. **Data Gathering Instruments:**
   • Observation, questionnaire, Interview, Scaling Methods, Case study, Home Visits, reliability and validity of measuring instruments.

**References:**


Course Code: FN102  
Course Title: ADVANCED NUTRITIONAL BIOCHEMISTRY  
Credit: 04  
Contact hour/week=04

Objectives

This course will enable the students to:

- Augment the biochemistry knowledge acquired and at the undergraduate level
- Understand the mechanisms adopted by the human body for regulation of metabolic Pathways
- Get an insight into interrelationships between various metabolic pathways
- Become proficient for specialization in nutrition.
- Understand integration of cellular level metabolic events to nutritional disorders and imbalances.

Contents

1. **Heteropolysaccharides**: Definition, classification, structure and properties of glycoprotein and proteoglycans.
2. **Plasma Proteins** – Nature, properties and functions
3. **Overview of regulation of intermediary metabolism**: Equilibrium and non-equilibrium reactions, committed steps, allosteric modifications, covalent modulation, cross-over theorem and futile cycles.
4. **Intermediary metabolism**: Reactions, standard free energy changes and regulation.
   - Carbohydrates – glycolysis, gluconeogenesis, citric acid cycle, hexose monophosphate pathway.
   - Lipids, beta-oxidation, de novo synthesis of fatty acids, synthesis and breakdown of unsaturated fatty acids, cholesterol, phospholipids and triacylglycerol
5. **Purines and Pyrimidines** – Synthesis and breakdown.
7. **Hormones** – Mechanism of action of hormones.

**References:**

Course Code: FN103                  Course Category: Core

Course Title: FOOD SCIENCE

Credit: 04                   Contact hour/week=04

Objectives:
This Course is designed to:

- Provide an understanding of composition of various food stuffs.
- Familiarize students with changes occurring in various foodstuffs as a result of processing and cooking.
- Enable students to use the theoretical knowledge in various applications and food preparations.

Contents:
1. Constituents of Foods : Properties and significance
2. Water and Food Dispersions :
   - Free and bound water
   - Water activity and Food Spoilage
   - Freezing and ice structure
   - Colloidal salts, stabilization of colloidal systems, Rheology of food dispersions
   - Gels: Structure, formation, strength, types and permanence.
   - Emulsions: Formation, stability, surfactants and emulsifiers.
   - Foams: Structure, formation and stabilization.
3. Polysaccharides, Sugars and Sweeteners
   - Starch: Structure, gelatinization, methods for following gelatinization changes.
   - Characteristics of some food starches. Effects of ingredients and conditions on gelatinization. Modified food starches.
   - Cellulose, hemicelluloses, pectins, gums.
   - Sugars and Sweeteners: Sugars, syrups, sugar alcohols, potent sweeteners, Sugar products.
   - Sweetener Chemistry related to usage in food products: solubility & crystallization, hygroscopic, fermentation & non-enzymatic browning.

   **Beverages**: Synthetic and Natural, alcoholic and non-alcoholic, carbonated and non-carbonated, coffee, tea, cocoa, malted drinks.
   Confectioneries and chocolate products, bakery products, dehydrated products

7. **Traditional Processed Products**: Fermented Foods – cereal-based, pulse-based, fruit/vegetable-based, vinegar, pickles.


9. **Food colorents**: Pigments in animal and plant tissues, Food colours – Types, properties, safety issues

**REFERENCES**


JOURNALS

1. Journal of Food Sciences.
2. Advances in Food Research
3. Journal of Food Science and Technology
5. Cereal Science
6. Journal of Dairy Science
Course Code: CFG105                                                Course Category: Skill Oriented
Course Title: CLINICAL AND THERAPEUTIC NUTRITION (Skill Oriented)
Credit: 04                                                                 Contact hour/week=04

Objectives:
This Course will enable students to:

- Understand the etiology, Physiologic and Metabolic Anomalies of acute and chronic diseases and patient needs.
- Know the effect of the various diseases on nutritional status and nutritional and dietary requirements.
- Be able to recommend and provide appropriate nutritional care for prevention / and treatment of the various diseases.

Contents

1. Obtaining medical & dietary history of patients.
3. Etiopathophysiology, metabolic and clinical aberrations, complications, prevention and recent advances in the medical nutritional management of:
   - Weight imbalances
   - Cardio vascular disorders
   - Diabetes mellitus and other metabolic disorders.

   - GI Tract Disorders
   - Liver and gall bladder, Pancreatic disorders
   - Renal disorders
   - Stress and trauma
   - Cancer
   - Infection AIDS
   - Respiratory problems
References:


Journal and Other References Series:

14. Nutrition Update Series

15. World review of nutrition and dietetics.

16. Journal of the American Dietetic Association
Course Code: FN201                        Course Category: Core
Course Title: Maternal & Child Nutrition
Credit: 04                              Contact hour/week=04

Objectives:
This course is designed to enable the students to:

- Understand physiological changes in pregnancy and lactation.
- Get acquainted with growth and developmental changes.
- Understand the inter-relationship between nutrition and growth and development during life cycle.

Contents
1. Importance of Maternal Nutrition:
   - Importance of nutrition prior to and during pregnancy.
   - Pre-requisites for successful outcome. Effect of undernutrition on mother and child including pregnancy outcome and Maternal and Child Health – Short term and Long term.
   - Physiology and endocrinology of pregnancy and embryonic and fetal growth and development.
   - Nutritional requirements during pregnancy
   - Adolescent Pregnancy
   - Pregnancy and AIDS
   - Pregnancy and TB
   - Intra-Uterine growth retardation
   - Complications of pregnancy and management and importance of antenatal care.
   - Congenital malformation, fetal alcohol syndrome and gestational diabetes mellitus.

2. Lactation:
   - Development of mammary tissue and role of hormones
• Physiology and endocrinology of lactation – Synthesis of milk components, let down reflex, role of hormones, lactational amenorrhea, and effect of breast feeding of maternal health.
• Human milk composition and factors affecting breastfeeding and fertility
• Management of lactation – Prenatal breastfeeding skill education. Rooming in, problems – sore nipples, engorged breast, inverted nipples etc.
• Exclusive breastfeeding

3. Growth and development during infancy, childhood.

References
2. International Child Health: A Digest of Current Information.
10. ACC / SCN Reports.

Course Code: FN202
Course Category: Multi-Disciplinary

Course Title: Methods of Investigation

Credit: 04
Contact hour/week=04

Objectives:
This course will enable the students to:

- To understand the principles of various analytical techniques available for nutrition research.
- To familiarize with the applications of the above techniques.

Contents

1. **Introduction to method of analysis**: volumetric analysis, standard substance and solutions, calibration of glasswares, standardization of solutions with examples.
2. **Electrolytic dissociation**: Acids, bases, salts, buffers, Henderson – Hasselbach equation. Theory of indicators and principles of measurement of pH
3. **Basics of Instrumentation**: Physico-chemical principles and methodology: colorimetry, photometry, fluorimetry, flame photometry and atomic absorptiometry.
4. **Chromatography**: Principles and application in paper (circular, ascending and descending), ion-exchange, column, thin layer, gas liquid and high performance liquid chromatographic techniques.
5. **Electrophoresis**: Principle and applications in paper and gel electrophoresis.
6. **NMR and its application**.
7. **Immunological Methods**: RIA, ELISA.
8. **Bioassays**: Animal studies, human studies, microbiological assays.
References

Course Code: FN203  
Course Category: Core

Course Title: Advanced Nutrition-I

Credit: 04  
Contact hour/week=04

Objectives:
This course is designed to:

- Provide in-depth knowledge of the physiological and metabolic role of various nutrients and their interactions in human nutrition.
- Enable students to understand the basis of human nutritional requirements and recommendations through the life cycle.
- Enable students to understand the pharmacological actions of nutrients and their implications.
- Familiarize students with recent advances in nutrition.

Contents


References


JOURNALS

1. Nutrition Reviews
2. Journal of Nutrition
3. American Journal of Clinical Nutrition
4. British Journal of Nutrition
5. European Journal of Clinical Nutrition
6. International Journal of Vitamin and Nutrition Research
Course Code: CFG205  
Course Category: Skill Oriented

Course Title: Statistics & Computer Application

Credit: 04  
Contact hour/week=04

Objectives:

- To understand the role of statistics and computer applications in research.
- To apply statistical techniques to research data for analyzing & interpreting data meaningfully.

*NOTE: Students should be given hands on experiences to use appropriate software packages for selected statistical analyses.*

Contents:

2. Frequency distribution, histogram, frequency, polygons, ogive.
3. Binomial distribution
5. Parametric and non-parametric tests.
6. Testing of hypothesis. Type I and Type II errors. Levels of Significance.
7. Chi-square test. Goodness of fit. Independence of attributes 2x2 and r x c contingency tables.
8. Application of student 't' test for small samples. Difference in proportion for means and difference in means.
9. Correlation, coefficient of correlation, ranks correlation.
Course Code: FN301  
Course Category: Core

**Course Title: Institutional Food Administration**

Credit: 04  
Contact hour/week = 04

**Objectives:**
- To develop a knowledge base in key areas of Institutional Food Administration
- To provide practical field level experience in Institutional Food Administration.
- To impart necessary expertise to functional as a food service manager
- To equip individual to start their own food service unit leading to entrepreneurship
- To develop critical abilities and provide basic grounding in research techniques.

**Theory**
1. **Introduction to Food Service Systems**
   - Evolution of the Food service industry
   - Characteristics of the various types of food service units
2. **Approaches to Management**
   - Theories of Management
3. **Management of Resources**
   - **Finance**
     - Determining the finance needed to establish or run an unit
     - Budgets
     - Sources of finance
     - Planning adequate cash flow
   - **Space & Equipment**
     - Step in Planning layouts
     - Determining equipment
     - Maintenance of equipment
     - Layout analysis
   - **Material**
     - Menu planning
     - Purchase
     - Storage
• Quantity food production
• Service and modes of delivery

Staff
• Manpower planning
• Recruitment, induction, training, motivation and performance appraisal

Time and Energy
• Measures of utilization and conservation

4. Cost Accounting / Analysis
• Food cost analysis

5. Marketing and Sales Management
• Marketing strategies
• Sales analysis
• Market Promotion

6. Quality Assurance
• Food quality
• Total quality management

References: Management


**Personal management**

**Cost Control**

**Layout and Design**
Course Code: FN302  
Course Title: Advanced Food Microbiology  
Credit: 04  
Contact hour/week=04

Objectives:
This course will enable the student to:
- Gain deeper knowledge of role of micro-organisms in human and environment.
- Understand the importance of micro-organism in food spoilage and to learn advanced, techniques used in food preservation.
- Understand the latest procedures adopted in various food operations to prevent food-borne. Disorders and legal aspects involved in these areas.

Contents
1. Introduction to historical developments in food preservation. Spoilage, infections and legislation.
2. Micro-organisms of importance in Food: Their primary sources in foods, Morphology, cultural characteristics.
   - Factors affecting the growth of microorganisms in food. Intrinsic and Extrinsic parameters that affect microbial growth
3. Spoilage of different groups of Foods: Meat, eggs and poultry, fish and other sea foods, canned food.
5. Food borne disease: Bacterial, food-borne important, Mycotoxins.
6. Role of Microbes in fermented foods.

References


**Journals**

14. Journals of Food Science Published by the Institute of Food technologists, Chicago 1u. U.S.A.

15. Journal of Food Science and Technology Published by Association of Food Scientists and Technologists (India) CFTRI-MYSORE.

16. Food Technology Published by the Institute of Food Technologists, Chicago 1u. U.S.A.
Course Code: FN303  
Course Category: Core

Course Title: Advanced Human Physiology

Credit: 04  
Contact hour/week=04

Objectives:
This course will enable students to:

☒ Advance their understanding of some of the relevant issues and topics of human physiology.
☒ Enable the students to understand the integrated function of the system and the grounding of nutritional science in physiology.
☒ Understand alterations of structure and function in various organs and systems in disease conditions.

Contents

1. **Cell structure and function**: Levels of cellular organization and function organelles, tissues, organs and systems. Brief review: Cell membrane transport across cell, membrane and intercellular communication. Regulation of cell multiplication

2. **Nervous System**: Review of structure and function of neuron - conduction of nerve impulse, synapses, and role of neurotransmitters - Organization of central and Peripheral nervous system.

3. **Endocrine system**: Endocrine glands (Pituitary gland, Thyroid, parathyroid, Islets of Langerhans, Adrenals, Ovary and Testis, Thymus, Pineal gland structure, function, role of hormones, regulation of hormonal secretion, Disorders of endocrine glands.

4. **Excretory system**: Structure and function of nephron - Urine formation - Role of kidney in maintaining pH of blood - diuretics

5. **Immune system**: Cell mediated and humeral Immunity: Activation of WBC and production of antibodies. Role in inflammation and defense


References

References

Course Code: CFG305  Course Category: Multi-Disciplinary
Course Title: Scientific Writing
Credit: 04  Contact hour/week=04
Objectives:

- To be able to appreciate and understand importance of writing scientifically.
- To develop competence in writing and abstracting skills.

Contents

2. **Drafting titles, Sub titles, tables, illustrations**
   - Tables as systematic means of presenting data in rows and columns and lucid way of indicating relationships and results.
   - Formatting tables: Title, Body Stab Column, Column Head, Spanner Head, and Box Head.
   - Appendices: use and guidelines.

3. **The writing process**
   - Getting started
   - Use outline as a starting device
   - Drafting
   - Reflecting, re-reading
     - Checking organization
     - Checking headings
     - Checking content
     - Checking clarity
     - Checking grammar
   - Brevity and precision in writing
   - Drafting and re-drafting based on critical evaluation

3. **Parts of dissertation / research report / article**
   - Introduction
   - Review of literature
   - Methods
   - Results and discussion
   - Summary and abstract
   - References
   - **Ask questions related to:** content, continuity, clarity, validity internal consistency and objectivity during writing each of the above parts.
6. Writing for Grants
   - The question to be addressed
   - Rationale and importance of the question being addressed
   - Empirical and theoretical framework
   - Presenting pilot study / data or background information
   - Research proposal and time frame
   - Specificity of methodology
   - Organization of different phases of study.
   - Expected outcome of study and its implications
   - Budgeting
   - Available infra-structure and resources
   - Executive summary

References
3. Dunn, F.V. & Others. (Ed.) Disseminating research: Changing practice, N.Y. Sage

Course Code: FN401
Course Category: Core
Course Title: FOOD PROCESSING AND TECHNOLOGY (Core)
Credit: 04
Contact hour/week=04
Objectives:
This course is designed for students to:

- Impact systematic knowledge of basic and applied aspects of food processing and technology.
- Provide the necessary knowledge of basic principles and procedures in the production of important food products.
- Orient the students to potential use of various by products of food industry.

Contents
1. Physical principles in food processing operations:
   Thermal processing: Degree of processing of preservation, selecting heat, treatments, heat resistance of micro organisms, nature of heat transfer, protective effects of food constituents, types of thermal treatments.
3. Wheat Technology - Production, processing, manufacture of breakfast cereals
4. Pulses - Production, types of processing of different pulse products - Soyabean Processing.
5. Technology of oil seeds - Processing, meal concentrates and isolates.
6. Mushroom - Production, processing, utilization.
7. Meat - Production, processing, smoking and curing of meat, grading.
8. Poultry - Production, preparing poultry for consumption, packaging.
9. Fish - Production, effect of handling practices, storage of eggs.
10. Fermentation Technology: Functional foods and Technologies to meet special needs.
11. Waste disposal and sanitation: Waste characteristics, treatments and technologies, food plant sanitation.

REFERENCES
9. Processed food Industry
10. Journal of Indian food industry

Course Code: FN402 Course Category: Core
Course Title: ADVANCED NUTRITION – II
Credit: 04 Contact hour/week=04

Objectives:
This course is designed to:

- Provide in depth knowledge of the physiological and metabolic role of various nutrients and their interactions in human nutrition.
- Enable students to understand the basis of human nutritional requirements and recommendations through the life cycle.
- Enable students to understand the pharmacological actions to nutrients and their implications.
- Familiarize students with the recent advances in nutrition.

Contents
2. Minerals: (Note: For each nutrient sources, bioavailability, metabolism, function, requirements. RDI/ESADDI, deficiency and toxicity, interactions with other nutrients are to be discussed).

   **Macro minerals:** calcium, phosphorus, magnesium, sodium, potassium & chloride.
   **Micro minerals:** Iron, copper, zinc, manganese, iodine, fluoride.
   **Trace minerals:** Selenium, cobalt, chromium, vanadium, silicon, boron, nickel.

3. Vitamins; Historical background, structure, food sources, absorption and transport, metabolism, biochemical function, assessment of status. Interactions with other nutrients Physiological, pharmacological and therapeutic effects, toxicity and deficiency with respect to the following:
   a) Fat soluble: Vitamins A, D, E & K.
   b) Water soluble: Thiamine, riboflavin, niacin, biotin, pyridoxine, folic acid, pantothenic acid, ascorbic acid, cyanocobalamin, choline, inositol.

4. Non-nutritive food components with potential health effects: Polyphenols, tannins, phytate, phytoestrogens, cyanogenic compounds, lectins and saponins.


References


JOURNALS

10. Nutrition Reviews
11. Journal of Nutrition
13. British Journal of Nutrition

Course Code: FN403 Course Category: Core
Course Title: FOOD SAFETY AND QUALITY CONTROL (Core)
Credit: 04 Contact hour/week=04

Objectives:
This Course will enable students to:

- Know the importance of quality assurance in food industry.
- Know the various tests and standards for quality assessment and food safety.
- Know the various tests used to detect food adulterants
- Be familiar with the fundamentals that should be considered for successful quality control programme.

Contents

1. Introduction to quality assurance and food safety assurance. Current concepts of quality control.

2. Quality assurance programme: Quality plan, documentation of records, process control and HACCP, hygiene and housekeeping, corrective action, quality and programme and total quality process.

3. Product Evaluation:
   - Sampling for product evaluation and line control.
   - Specification and Food standards, International, National
   - Mandatory, Voluntary.
Sample preparations

Reporting results and reliability of analysis.

4. Test for specific raw food ingredients and processed food including additives:
   a. Nutrient analysis
   b. Tests of adulterants

5. Consumer Protection

Course Code: CFG405
Course Category: Skill Oriented
Course Title: ASSESSMENT OF NUTRITIONAL STATUS
Credit: 04
Contact hour/week=04

Objectives:
The course is designed to:

- Orient the students with all the important state-of-the-art methodologies applied in nutritional assessment and surveillance of human groups.
- Develop specific skills to apply the most widely used methods.

Contents

Theory
1. Nutritional assessment as a tool for improving the quality of life of various segments of the population including hospitalized patients.
2. Current methodologies of assessment of nutritional status, their interpretation and comparative applications of the following:
   - Food consumption
   - Anthropometry
   - Clinical and Laboratory
   - Rapid Assessment & PRA
   - Functional indicators such as grip strength, respiratory fitness, Harvard Step test, squatting test.
3. Nutritional Surveillance – Basic concepts, uses and setting up of surveillance systems.
4. Monitoring and Evaluation

References
9. FAO Nutritional Studies No.4 (1953): Dietary Surveys: Their Technique and Interpretation, FAO.