FOOD SCIENCE
NUTRITION
AND
DIETETICS
## M.Sc. FOOD SCIENCE NUTRITION AND DIETETICS

(Revised syllabus for regular students those who study in S.V.U. College (Campus), Tirupati)
(with effect from the batch of students who admitted during the academic year 2015-16)

(CHOICE BASED CREDIT SYSTEM)

**SCHEME OF INSTRUCTION AND EXAMINATION**

<table>
<thead>
<tr>
<th>Sem</th>
<th>Course Code</th>
<th>Title of the course</th>
<th>Core / Elective</th>
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<tr>
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<td>FSND-101</td>
<td>Essentials of Food and Community Nutrition</td>
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I SEMESTER
SEMESTER – I

FSND 101: ESSENTIALS OF FOOD AND COMMUNITY NUTRITION
(Common to all Branches of M.Sc Home Science and MS Food Technology Course)

THEORY:

UNIT-I: Food Composition - Grouping and menu planning:
- Food groups – Classification – food composition, properties, characteristics culinary aspects and nutritive values of different foods, Functions of foods and nutrients – cereal grains, millets, pulses, nuts and oil seeds fruits and vegetables, milk and milk products, meat, egg, poultry and fish, spices and condiments.
- Nutrition through life span – Infancy, Pre-school children, childhood, Adolescence, Adulthood and Ageing – Nutritional requirements and Recommended Dietary Allowances (RDA) – Justification for special needs during periods of growth and development, pregnancy and lactation – significance of breast feeding – Principles of menu planning appropriate to age and stage of life span.

Unit – II: Assessment of Nutritional Status of the community:

Unit – III: Major Nutrition Problems of the Community:
Malnutrition and under nutrition-PEM/CED, obesity- deficiencies vit-A, iron /iodine – Aetiology – Symptoms - government programmes to eradicate PEM, vitamin-A, Iron and Iodine deficiencies – principles of planning diets for different conditions of malnutrition

Unit – IV: Strategies to combat malnutrition:
Food security – Definition – Management of food insecurity - Food Production, Processing and Preservation-Food Fortification and enrichment- New Foods -Formulation of Food Mixtures.
Food Assistance and Food Supplementation - Policies and Programmes of the Government - Governmental Policies and Programmes - Food Assistance and Food Supplementation Programmes - Public Distribution System (PDS) - Food For Work (FFW), Special Nutrition Programme (SNP), School Lunch Programme (SLP), Mid Day Meal Programme (MMP), Balawadi Nutrition Programme (BNP), Integrated Child Development Services (ICDS) – MCH Services - Immunization- Universal Immunization Programme (UIP).

Nutrition Education - Importance - Approaches Media and Methods

PRACTICALS:
1. Planning and Preparation of Cereal and Pulse Products.
2. Planning and Preparation of Milk and Meat Products.
3. Planning and Preparation of Fruits and Vegetable Products.
4. Assessment of Nutritional Status using Anthropometry, Dietary and Clinical methods.
5. Planning of Diets for Different Age Groups and Physiological Conditions.
8. Study of the following through visits
   - Govt School Lunch Programme
   - ICDS Programme
   - Anganwadi Training Centers.
9. School Lunch Programme at Sri Venkateswara University Laboratory Nursery School.

REFERENCES - TEXT BOOKS
2. Gopalan, C (Editor) - Basic Issues in Combating Malnutrition - NFI Publication.
3. Gopalan, C (Editor) - Women Nutrition in India. NFI Publication.
7. Monograph on Integrated Training on National Programmes for Mother and Child Development of Women and Child Department, Government of India, New Delhi.

JOURNALS AND PROCEEDINGS
- Proceedings of Nutrition society of India. ICMR. NIN Hyderabad, India 1969 onwards.
- Nutrition Quarterly Journal (ICMR) NIN, Hyderabad.
- The Indian Journal of pediatrics.
- The American Journal of clinical nutrition.
- Future' quarterly journal / UNICEF.
- Indian Journal of Nutrition and dietetics, Coimbatore, India.

FSND 102: RESEARCH METHODOLOGY
(Common to all Branches of M.Sc Home Science and MS Food Technology Course)

THEORY:
UNIT – I : Research Purpose And Process
  i. Research – Significance, meaning, objectives, Approaches, Research process, Criteria of good research, Problems encountered by Researchers in India
  ii. Variable-types – Concepts, Theory-Inductive and Deductive
  iii. Types of Research : Historical, descriptive, experimental, case study, survey research, participatory research, Fundamental, applied and action, exploratory ex-post facto
    - Longitudinal and cross sectional, co-relational.
  Basic Principles of Research Design: Meaning, Need and features of a good design - Purposes of research design.
  iv. Steps in Research Design

UNIT –II: Research Problem and Methods of Sampling:
  i. Definition and Identification of a Research Problem
    - Selection of research problem
    - Justification
    - Theory, hypothesis, basic assumptions, limitations and delimitations of the Problem.
  ii. Probability and Non-probability Techniques
    - 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.

UNIT –III: Qualitative Research Methods and methods of data collection
  i. Qualitative Research.
    - Definition and types of qualitative research.
  ii. Methods and techniques of data collection.
    - Group discussions
    - Interviews : key informants, in-depth interviews
    - Observations
    - Social mapping
    - Participatory rapid assessment
    - Participatory learning assessment
  iii. Data Gathering Instruments:
    - Observation, questionnaire, interview, case study, home visits.

UNIT – IV: Measurement, Data Processing and Interpretation
  i. Measurement Scales – Nominal, Ordinal, Interval and Ratio
  ii. Tests of Sound Measurement-Validity and Reliability and Pracitcality.
  iii. Important scaling Techniques
  iv. Analysis of data and research report.
  v. Project Proposal – Preparation.

PRACTICALS:
  1. Identification of different variables in specialization of study.
  2. Framing of hypothesis-Null and alternate Hypothesis
  3. Selection of Random sample, using tippets random number tables.
  4. Preparation of schedule/questionnaire.
  6. Tabulation of data
  7. Preparation of research proposal

REFERENCES
7. Kerlinger F.N.(1983)“Foundations of Behaviouring Research”, Subject Publications, Delhi,
FT 103: FOOD SCIENCE AND EXPERIMENTAL FOODS  
(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course) 

THEORY: 

UNIT I: Foods of plant origin 
- Pectin and Gums-Functional roles in food products. 
- Baking process - Cereal flours, flour mixes, dough and batter, Leavening agents-Applications 
- Pulses and Legumes: Composition, Toxic constituents, processing, effect of cooking. 
- Vegetables and Fruits: Classification, composition, Pigments and Flavors constituents - cooking effect, Browning reaction. 

UNIT II: Foods of animal origin 
- Milk: Composition, kinds of milk, milk products and Functional properties of Milk-Cooking applications. 
- Fish and Marine foods: Classification and Composition, Selection and cooking. 

UNIT III: Sugars and Fats 
- Sugars, sugar crystals and Confections – Types of sugars and sugar syrups, Sugar cookery, Crystallization of sugars, Confectionery-Types and confections raw materials and their role, chocolate processing, Indian confectionery, sugar substitutes. 
- Fats and oils -Sources, composition, Absorption, Functional properties of fat and uses in food Preparations, Rancidity, Fat substitutes or replacements. 

UNIT IV: Food Evaluation –Attributes of food quality-Subjective and objective evaluation. 
- Sensory evaluation-Requirements-panel-sensory testing procedures and tests. 
- Objective evaluation-Food Rheology-objective methods of food evaluation. 

PRACTICALS: 
1. Standardization of weights and measures of various foods 
2. Starch cookery- Structure, gelatinization and factors affecting gelatinization
3. Baking – Determination of gluten content, Preparation of plain cake, Bread and evaluation by subjective and objective methods.
5. Vegetable cookery – Effect of time, temperature, media and cooking methods on pigments.
6. Fruit - Enzymatic Browning- Effect
7. Sugars and confections: Factors affecting crystallization in candies like fondant, experiments on applying scientific methods to Indian confectionary, preparation of confections – role of ingredients and processing of confectionary.
11. Meat cookery: Effect of different cooking methods and tenderizers
12. Fish cookery, and other marine foods.
13. Sensory evaluation of food
14. Objective evaluation of food

TEXT BOOKS & REFERENCE BOOKS:

JOURNALS:
1. Journal of Food Technology.
2. Journal of Food Science and Technology (CFTRI Publication)
4. Indian Journal of Nutrition and Dietetics.
FSND 104: CLINICAL NUTRITION AND DIETETICS-I

THEORY:

UNIT I: Dietetics and Roles of Dietician:
Dietetics – Definition- Dietician as part of the nutrition and health care team – Nature of work - Professional qualifications and requirements of a dietitian - roles and responsibilities of dietician- Dietetic Association-the nutrition care process – nutrition assessment - Disease diagnostic tests- nutrition intervention, nutrition monitoring and evaluation and directions – Food Service in hospitals – Different aspects to be considered – Management of human and Non-human resources

UNIT-II: Diet counseling:
Diet counseling- definition- the process- theories and approaches to counseling, reality theory, behavioral counseling, cognitive- behavioral approaches- psycho education and rational emotive therapy - directive and non – directive counseling – counseling strategies: individual and group counseling – factors to be considered- role of communication in the process of counseling

Unit III: Therapeutic Diets-
Definitions- Purpose and scope- routine Hospital diets- Normal and General diets – Therapeutic modifications of normal dies meeting the requirements of different disorders – Basis for diet prescriptions: general factors and nutrition considerations
Planning therapeutic diets – use of food guides and food exchange systems – principles of preventive diet plans.

IV: Special Feeding Methods:
Peripheral Vein Feeding - Enteral and Parenteral Nutrition:
Nutrition support in stress and critically ill conditions – surgery, infections and burns.

PRACTICALS:
Visit the local hospitals to study:
1. Food preparation and service to patients.
3. Hospitals, Visits to each hospital (6 Practical Sessions)
4. To prescribe the diets for the patients from different wards and do diet counseling.
5. Presentation of case reports.
6. Study of TPN solution and administration.
7. Therapeutic modification of normal diet.
8. Use of food exchange lists in planning therapeutic diets.

TEXT BOOKS:

REFERENCE BOOKS

JOURNALS:
2. Foods and Nutrition - Notes and Reviews.
3. Indian Journal of Nutrition and Dietetics.

SEMESTER II

FSND 201: FOOD CHEMISTRY AND ANALYSIS
(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

THEORY:

UNIT-I: Water Chemistry and Dispersed Systems:
i. Water chemistry – Chemistry of Water, Free, Bound And Entrapped Water, Water Activity And Moisture Determination.
ii. Dispersed systems – Liquid dispersions, Gels, Emulsions, Foams

UNIT-II: Carbohydrates and Lipids
i. Carbohydrates – classification, structure, physic – chemical properties of monosaccharides
   - pentoses, and hexoses, oligosaccharides – Maltose, Lactose, sucrose and poly saccharides – starch, cellulose.
   - Physical properties – crystallization, plasticity
   - Chemical properties – Thermal decomposition, hydrogenation, inter esterification
UNIT-III: Proteins and amino acids
i. Proteins and amino acids – classification, structure, physical properties
ii. Functional and Chemical properties – protein hydration, solubility, interfacial properties, Emulsification and foaming, Gelation, Dough formation

UNIT-IV: Food Analysis
i. Methods of sampling, Determination of total ash
ii. Principles and methods of chemical analysis
   - Carbohydrates – qualitative and quantitative analysis of starch and sugars
   - Proteins – Electrophoresis, microkelhdhal method
   - Fats – analysis of solid and liquid fats, Rancidity
   - Determination of vitamin and minerals – vitamin-C, Iron, phosphorus, calcium

PRACTICALS:
1. Qualitative analysis of carbohydrates.
2. Qualitative analysis of proteins and amino acids
3. Qualitative analysis of fats and oils
4. Qualitative analysis of hydrolysis of starch
5. Determination of starch and sugars
6. Estimation of crude fiber
7. Estimation of proteins - micro kjeldal method
8. Separation of proteins and amino acids – Electrophoresis
10. Determination of moisture
11. Determination of Total ash
12. Estimation of calcium
13. Estimation of phosphorus
14. Estimation of Iron
15. Estimation of vitamin C
16. Qualitative analysis of enzymes in plant foods
17. Qualitative analysis of enzymes in animal foods
18. Demonstration of estimation of minerals using atomic absorption spectro photometer (AAS)

REFERENCES:
JOURNALS:
1. Journal of Food Science and Technology
2. Indian Food Industry, A publication of Association of Food Scientists and technologists.
3. Food Chemistry
4. Journal of Food Science
5. IFCON’93 and IFCON’88 proceedings of IFCON 3003: International food convention, Food technology update, Mysore.

FSND 202: NUTRITIONAL BIOCHEMISTRY

THEORY:

UNIT - I
Metabolism of Macro Nutrients - An overview of sources, structure functions, Digestion and Absorption of Carbohydrates, Lipids and proteins.
- Protein bio synthesis - Nucleic acid - DNA, RNA, Bases - Purines and Pyrimidines, Pentose sugar -Synthesis of Nucleic Acids - Steps of replication - Initiation, Elongation and Termination - Transportation and Translation.

UNIT – II
i. Interrelation between carbohydrate, lipid and protein in Normal conditions, Adaptations under starvation and heavy exercise – High energy compounds of biological significance – ATP, CP.(Adenosine triphosphate and creatine phosphates)

UNIT - III

UNIT – IV:
Micro Nutrients - Minerals –and Trace elements- An overview of sources, Physiological functions of Calcium, Phosphorus, Iron, Iodine, Zinc, Selenium, Copper, Flourine and the
Electrolytes. Sodium, Potassium and Chloride – Requirements in Health and Deficiency / disease.
PRACTICALS:
1. Estimation of blood glucose.
2. Oral Glucose Load Test
3. Estimation of Serum Proteins by Biuret / Reinhold Method
4. Estimation of Serum Triglycerides.
5. Estimation of Serum Cholesterol.
6. Estimation of Serum Iron
7. Estimation of Serum Iron Binding Capacity
8. Estimation of Haemoglobin
9. Microscopic Examination of Blood Smear for types of blood cells.
10. Estimation of Packed cell volume in the blood.
11. Estimation of Iodine.
12. Estimation of Serum Calcium / Urinary Calcium.
13. Estimation of Plasma Vitamin A.
14. Estimation of Serum Vitamin C.

REFERENCES:

FSND 203: CLINICAL NUTRITION AND DIETETICS- II

THEORY:

UNIT I: Dietary management in metabolic disorders
  iii. Gout and Inborn Errors of Metabolism
      Gout: Etiology – Clinical symptoms – Role of Proteins and purines – Dietary management.
      Inborn errors of metabolism – phenyl ketonuria (PKU) maple syrup urine disease (MSUD) - Galactosemia – Tyrosinemia – Homosystinuria – Dietary management
  iv. Obesity and Underweight
      Prevalence and Classification- Etiology-Energy Balance- Metabolic Aberrations and clinical Manifestations-Consequences
      Management of Obesity-Dietary and Lifestyle Modifications - Preventive Aspects
      Underweight- Etiology- Metabolic Aberrations and clinical Manifestations-Dietary Management.

UNIT II: Dietary Management in-
i. **Gastrointestinal Disorders**

The Physiology of Gastrointestinal system an overview- Its role in wellness- Diseases of the Upper Gastrointestinal tract-Dysphasia-Gastro Esophageal Reflux Disease(GERD), Hiatal Hernia, and Esophagitis-Diseases of the Stomach and Intestine- Peptic Ulcer- Dumping syndrome- celiac disease-Gluten Sensitive Enteropathy-Lactose intolerance- Inflammatory Bowel disease (IBD)- Chronic Ulcerative Colitis and Chohn’s Disease- Short Bowell Syndrome- Intestinal gas and Flatulence - constipation- diarrhea - Dietary Management.

ii. **Disorders of Liver, Gallbladder and Pancreas**


**UNIT III: Dietary Management in**

i. **Cardiovascular Diseases**

The Cardiovascular system- Functions (an overview)- Etiology-Risk factors-Prevalence- Common Disorders: Dyslipidemia, Coronary Artery Disease(Atherosclerosis), Hypertension (HT), Angina Pectoris, Myocardial Infarction (MI), Congestive Cardiac Failure, Rheumatic Heart Disease- Prevention and dietary Management of CVD.

ii. **Kidney Diseases**

The Excretory System and functions – Kidney Function Tests (an Overview) - Etiology-Symptoms and Dietary Management in Acute and Chronic Nephrotic Syndrome, Acute Renal failure (ARF)- Chronic Renal failure (CRF)-End Stage Renal Disease (ESRD)- Dialysis- kidney Transplantation.

**UNIT-IV: Dietary Management in Specific diseases/ Conditions and interaction of food, nutrients and drugs:**

i. Nutrition during specific diseases
   a. AIDS
   b. Alcoholism
   c. Pulmonary Disorder
   d. Nervous Disorders


**TEXT BOOKS:**


**REFERENCE BOOKS:**


JOURNALS:
2. Foods and Nutrition - Notes and Reviews.
3. Indian Journal of Nutrition and Dietetics.

FSND 204: FOOD MICROBIOLOGY AND SAFETY
(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)

THEORY:

UNIT-I: Food and microorganisms:
- Food as a substrate for microorganisms, physical, chemical and biological factors affecting microbial growth.
- Bacteria, Molds, Yeasts and Viruses : General characteristics, classification – structure – growth – morphological characteristics – cultural characteristics – Food Bacteriology in Food Industry.

UNIT-II: Food Spoilage
- Microorganisms causing spoilage – principles underlying spoilage – chemical, physical and physiological changes caused by microorganisms.
- Spoilage of different foods

UNIT III:
- Natural and environmental contaminants
- Food contamination : Sources of contamination in :
  - Cereals and cereal products
  - Sugars and sugar products
- Legumes, nuts and oils
- Fruits and Vegetables
- Eggs and poultry
- Meat and Meat products
- Fish and Other seafood
- Milk and Milk products
- Spices and condiments
- Preserved foods – canned, bottled, dehydrated

**UNIT-IV**

i. Food safety – concept, factors affecting food safety - physical, chemical and biological hazards.

ii. Food hazards of microbial origin – food borne disease, food borne intoxications, food borne infections, food born toxic infections.

**PRACTICALS:**

- Morphological and cultural characteristics of bacteria, yeast and molds – Identification and testing. Testing of spoilage
- Testing the presence and type of organisms in relation to raw and processed foods and products - Media preparation – inoculation of organisms.

**SELECTED REFERENCES :**


**JOURNALS:**

1. Advances in Food Research
2. Advances in applied Microbiology
3. Bacteriological Reviews
4. Indian Journal of food technology
5. Journal of Applied Bacteriology
FSND: 205: HUMAN VALUES AND PROFESSIONAL ETHICS - I

(Revised Syllabus with effect from 2015-2016)

Unit-I:

Unit-II:
Nature of Values- Good and Bad, Ends and Means, Actual and potential Values, Objective and Subjective Values, Analysis of basic moral concepts- right, ought, duty, obligation, justice, responsibility and freedom. Good behavior and respect for elders, Character and Conduct.

Unit-III:
Ahimsa (Non-Violence), Satya (Truth), Brahmacharya (Celibacy), Asteya (Non-possession) and Aparigrahaha(Non-stealing). Purusharthas(Cardinal virtues)-Dharma (Righteousness), Artha(Wealth), Kama( Fulfillment Bodily Desires). Moksha(Liberation).

Unit-IV:
Bhagavad Gita- (a) Niskama karma. (b) Buddhism- The Four Noble Truths – AryaAstangamarga, (c) Jainism- mahavrataras and anuvratas. Values Embedded in Various Religions, Religious Tolerance, Gandhian Ethics.

Unit-V:
Crime and Theories of punishment- (a) Reformative, Retributive and Deterrent. (b) Views on manu and Yajnavalkya.

REFERENCES:
2. The Ethics of Management" by Larue Tone Hosmer. Richard D. Irwin Inc.
5. Harold H. Titus: Ethics for Today
6. Maitra, S.K: Hindu Ethics
7. William Lilly: Introduction to Ethics
16. I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar
SEMESTER III

FSND 301: STATISTICS and COMPUTER APPLICATIONS
(Common to all Branches of M.Sc Home Science and MS Food Technology Course)

THEORY

PART - A - STATISTICS

UNIT-I
i. Statistics: Meaning, Definition and Scope, limitations.
   Role of Statistics in Research.
ii. Descriptive statistics:
   - Classification and tabulation of data.
   - Graphic presentation of data.
   - Diagrammatic presentation of data.
   - Measurement of central tendency, variation, and dispersion.
   - Normal distribution, Frequency distribution, histogram, frequency polygons, curve Ogive.
iii. Testing of hypothesis:
   - Type I and Type II errors. Levels of significance.
   - Correlation, coefficient of correlation, rank correlation.
   - Regression and prediction.

UNIT-II
Inferential Statistics
i. ‘t’ test for Large samples (mean and proportions) small samples
ii. Χ² - test of significance of association
iii. Analysis of variance – one way, two way
   (The student needs to understand only application and calculation procedures)

PRACTICAL:
1. Graphic presentation of data.
2. Diagrammatic representation of data.
3. Calculation of Averages – Arithmetic mean, mode of median.
4. Calculation of standard deviation, quartile deviation.
5. Calculation of product movement correlation to Rank correlation.
6. Fitting a straight line equation and testing the goodness of fit.
7. Calculating Χ² to find the significance of association.
8. Calculation of ‘t’ statistic to give inference for small sample and large sample.
9. Analysis of variance – one way; two way classification.

PART – B - COMPUTER APPLICATIONS

UNIT-III
i. Introduction of Computer - Block diagram. The P.C and its component, Memory Capacity, Physical storage of data, various devices, Hardware and Software operating - DOS commands for file handling.
ii. MS Office and its component - Word and its applications / creating documents - Editing spell check, auto correct and print preview, creating tables and sorting data in tables, Mail Merge and its usage.

UNIT-IV
ii.  Power Point Presentation and Internet Explorer.

PRACTICALS
1. All relevant practical skills regarding usage of Computers.
2. Analysis of data using computers.

TEXT BOOKS

FSND 302: ADVANCED HUMAN NUTRITION

THEORY:

UNIT-I Nutrition, Brain and Behaviour:
- Brain – Structure, composition and functions
- Neurotransmitters- Nutrient precursors of neurotransmitters – Tryptophan, tyrosine, choline and lecithin
- Role of neurotransmitters in Brain function
- Role of Nutrients on Brain growth and development with special reference to protein, zinc, iodine and folic acid

UNIT-II Nutrition and immunity
- Innate immunity
- Acquired immunity – cell mediated immunity, Humoral immunity
- Role of nutrients in immunity
- Effect of malnutrition on immunity

UNIT-III Endemic nutrition problems and their management
- Fluorosis – Aetiology, prevalence, symptoms and nutritional management
- Iodine deficiency disorders - Aetiology, prevalence, symptoms and nutritional management
- Osteoporosis - Aetiology, prevalence, symptoms and nutritional management

UNIT-IV Principles of Nutrition and management systems in Emergencies - Droughts, Famines, Floods – Disaster management system
- Assessment of food needs in emergency situations
- Food distribution strategy – Identifying and reaching the vulnerable group – Targeting Food Aid.
- Mass and Supplementary Feeding / Special foods/rations for nutritional relief
- Household food security and nutrition in emergencies

Special needs
- High altitudes and Low temperatures ,Space nutrition,

PRACTICALS:
1. Assessment of cognitive competencies in different grades of malnutrition
   - Grade-I
   - Grade-II
   - Grade-III
2. Assessment of immune competencies on vulnerable groups
   - Women
   - Old age
3. Determination of fluorine content in water
4. Determination of T3,T4 and TSH
5. Determination of Bone density
6. Determination of osteoporosis
7. Planning and evaluation of menus for floods, High altitudes, space nutrition

TEXTBOOKS AND REFERENCE BOOKS:
5. Joseph Boozek and Beat Schurch (Editors) : "Malnutrition and Behaviour” : Critical assessment of Key issues ". Nestle Foundation, Lausanne, Switzerland - Publication Series - Vol.4. - 1983. (Chapter 1,2,3,4,5 and 6).

**Journals and Reference Materials**

1. American Journal of Clinical Nutrition
2. Nutrition Research
3. Journal of Nutrition
4. British Journal of Nutrition
5. Nutrition Reviews
6. Asia Pacific Journal of Nutrition
7. Proceedings of Nutrition Society of India
8. NFI Bulletins, Special Publication, Series and Scientific reports Series

**FSND 303: NUTRITION FOR HEALTH AND FITNESS**

**THEORY:**

**UNIT-I**


**UNIT-II**

Energy metabolism in physical activity- Aerobic and Anaerobic metabolic pathways, energy requirements and assessment of energy expenditure based on physical activity.

**UNIT-III**

Nutritional and physical performance- carbohydrate, fat, protein and exercise, vitamins, minerals and fluid needs during exercise, nutrition in post exercise recovery. Special conditions- weight management and obesity.

**UNIT-IV**

Sports nutrition, classification of sports events, RDA for sports person, Nutritional requirements and special needs of sports person, pre, during, post sports events, water and electrolyte balance, ergogenic aids, Endurance and fatigue in sports performance-Assessment-strategies, Role of National agencies towards improvements of sports performance

**PRACTICALS:**

1. Assessment of physical fitness in different age groups/sex.
2. Assessment of Energy expenditure based on physical activity record
3. Planning diets and formulating dietary guidelines for Fitness and health
4. Planning diets and formulating dietary guidelines for Obesity management
5. Study of life styles and Physical Activity patterns
6. Assessment of Nutritional status of sports person.
7. Visits to weight management on fitness centers.
REFERENCES:

JOURNALS

FSND 304 A : NUTRITION RESEARCH TECHNIQUES

THEORY

UNIT I: Nutrition Research
Types of nutrition research studies- longitudinal, cross sectional, epidemiological, prospective and retrospective, Surveillance, in vivo and in vitro, experimental, laboratory and field studies, Immunological, Metabolic and Bioavailability studies.

UNIT II: Nutritional research with Animal and Human Models
1. Animal nutrition experiments:
Role of animal models in nutrition research, need for extrapolation of animal research results to human populations, Maintenance of animal laboratory, Principles of formulation of diets, classification and Composition, Feeding Techniques, Research with animal models.
2. Human Nutrition Research:
Definition – different areas of nutrition research with human models.

UNIT III: Research techniques for different fields
- Methods of studying the nutritional requirement : Population survey of dietary intake of nutrients, Growth studies, Depletion and repletion studies, Nutrient balance studies, Nutrient turnover, Obligatory losses of nutrients.
- Methods of estimation of protein quality : Protein efficiency ratio (PER), Digestibility coefficient, Biological value (BV), Net Protein Utilization (NPU), Net Protein Ratio (NPR), Chemical score, Protein Digestibility Corrected Amino Acid Score (PDCAAS), Net Dietary Protein Calories Percent (NDPCP).

UNIT IV
- Techniques to measure body composition.
- Techniques to measure food consumption.
- Computer applications in nutrition research.
- Ethics in nutrition research- animal & human.

PRACTICALS:
a. Human Nutrition Research-
   1. Reviewing of contemporary human nutritional research methods and techniques.
   3. Assessment of food consumption data.
   4. Computer applications for Diet survey, planning, calculations and data processing.

b. Nutrition Research with Animal models-
   1. Growth and development studies
   2. Supplementation studies.

REFERENCE BOOKS AND TEXT BOOKS:

JOURNALS:
1. Journal of Nutrition Research
2. American Journal of Clinical Nutrition
3. British Journal of Nutrition
4. Proceedings of Nutrition Society of India
5. Annual Review of Nutrition
6. Laboratory Animals Information Service Centre, NIN (ICMR) Hyd.
7. Rat News Letters
8. Nutrition Reviews
9. Indian journal of nutrition and dietetics
FSND 304-B : NUTRITION IN EMERGENCIES AND DISASTERS

THEORY:

UNIT-I
i. Natural/Manmade disasters resulting in emergency situations:
   - Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies.
   - Factors giving rise to emergency situation in these disasters.
   - Illustration using case studies from Indian subcontinent
ii. Nutritional problems in emergencies in vulnerable groups
   - Causes of malnutrition in emergency situations
   - Major deficiency diseases in emergencies
   - Specific Nutrient deficiencies - Energy, Vitamins, Minerals
   - Control of communicable diseases in emergencies – Role of immunization and sanitation.

UNIT-II
Assessment and surveillance of Nutritional status in emergency affected populations.
   - Scope of assessment of malnutrition in emergencies
   - Indicators of malnutrition. Clinical signs for screening acute malnutrition
   - Anthropometric assessment of nutritional status. Indicators and cut-offs indicating
     seriously abnormal nutrition situation: Weight for height based indices, MUAC,
     social indicators.
   - Organization of nutritional surveillance and individual screening.

UNIT-III
i. Nutritional Relief and Rehabilitation
   - Assessment of food needs in emergency situations
   - Food distribution strategy – Identifying and reaching the vulnerable group –
     Targeting Food Aid.
   - Mass and Supplementary Feeding
   - Therapeutic Feeding
   - Special foods/rations for nutritional relief
   - Local production of special foods
   - Local foods in rehabilitation
   - Organisation of mass feeding/general food distribution
   - Feeding centers
   - Transportation and food storage
   - Sanitation and hygiene,
   - Evaluation of feeding programmes
   - Household food security and nutrition in emergencies
ii. Public nutrition approach to tackle nutritional problems in emergencies

UNIT-IV
i. Introduction to Epidemiology – types of epidemiology, collection of epidemiological data, secondary routine date, Descriptive epidemiology, Cross sectional Analysis, prevalence and incidence, risk factors, risks and odds, relative and attributable risks
iii. Design and Planning of Nutritional Epidemiological studies – assessing and
supplying And Evaluating Epidemiological studies – Discussion of selected case studies

PRACTICALS:
1. Training in rapid assessment of Nutritional status
3. Planning and preparation of Nutrient Deficiency Foods to be used in
   i. Famine
   ii. Drought and
   iii. specific Nutrient Deficiency states
5. Survey of causative factors of communicable diseases – Case study Experiences on the Management of the same
6. Study of drought and famine relief programmes available with Governmental and Non-Governmental agencies

REFERENCE:
2. Field Exchange, Newsletters by Emergency Nutrition Network, Dept. of Community Health and General Practice, Ireland.
4. The Management of Nutrition in Major Emergencies WHO – in Collaboration with UNCHR, International Federation of Red Cross and Red Crescent Societies and EFP

FSND :304 C: FOOD PACKAGING

THEORY:
UNIT-I
- Food Packaging – Definition - Need and functions of packaging;
- Principles in the development of protective packaging,
- Deteriorative changes in food stuff and packaging methods for prevention.

UNIT-II
- Packaging Materials – Concepts, Significance and Classification.
- Packaging – Development, Unit/Retail.
- Primary Packaging Media – Properties and applications
- Paper boards, metals, plastics, wood and plywood, glass, flexible etc.
- Labels, caps and closures and wards, adhesives, inks and lacquers, cushioning materials, wooden Boxes, strapping and Reinforcements.

UNIT-III
- Testing and evaluation of packing media – retail packs (including shelf life evaluation) and transport packages – quality control.
- Packaging systems and methods for food products – vacuum packaging, gas flush.
- Packaging, CAP and MAP, Aseptic and retort packing, Bag-in Box etc.
- Food products – General classification and packing types, varieties and trends.
- Storage, handling and distribution of packages (foods) – including palletisation and Containerization – Shelf life evaluation of packet products

UNIT IV
- Food Marketing and role of packaging
- Packaging Aesthetic and graphic design.
- Packaging – Laws and Regulations – FDA, FSSA, Packaging Commodity Rules, Weight and Measures Act etc.
- Coding and Marking Including bar coding.
  Environmental and Eco issues and waste disposal.

PRACTICALS:
1. Collection and study of packaging materials from market for different food products.
2. Study of different packaging materials for strength, viscosity, Special needs etc.,
3. Shelf life evaluation of foods using different packaging materials.

REFERENCES
1. Sacharow and Grifin, Food Packing – AVI Publications.
2. Hotchikess Food and Packaging Interaction – American Chemical Society.
3. Stanley and Sacharow Food Packaging.
5. Bhatia S.C. Canning and Preservations of Fruits and Vegetables – New Delhi, India
7. Robertson G.L. Food Packaging – New York, Marcell Dekker, Inc.
8. Bureau of G and Multon J.K Food Packaging Technology (vol. 1and2) – VCH, publishers, INC, New York

JOURNALS:
1. Food Industry
2. Food Packer
3. Journal of Food Science and Technology.
SEMESTER - IV

FSND 401 : FOOD QUALITY STANDARDS AND CONTROL
(Common to M.Sc Food Science Nutrition & Dietetics and MS Food Technology Course)
THEORY:

UNIT-I - Food Quality, Assessment and evaluation.
- Definition and Physico Chemical attributes.
- Sensory perception; subjective/ organoleptic evaluation.
- Objective methods of evaluation.
- Chemical methods of evaluation.
- Microbial methods of evaluation.

UNIT-II - Food safety : Food Safety Standards Authority of India (FSSAI)
- Current rules and regulations
- Definitions of standards of identity and quality
- Food licensing and registration system
- International food safety measures

UNIT-III - Food safety
- Definitions
- Undesirable constituents-Naturally occurring contaminants.Heavy metals, pesticide residues,products of microbial growth etc ..Health hazards.
- Desirable constituents-chelating agents,acids,bases,buffer systems and salts;
  stabilizers,thickeners,polyhydrocalcinols,anticaking,firming,clarifying and bleaching
  agents;antioxidants,non-nutritional sweeteness,antimicrobial agents.
- Gases and propellants.

UNIT IV - Food contaminants and Standards of Quality-
- Contaminants in milk and milk products
- Contaminants in fruit and vegetable products
- Contaminants in meat, poultry, eggs and fish
- Contaminants in fats and oils
- Contaminants in spices and condiments.
- Contaminants in Water and Beverages.
- Contaminants in Food grains and flours
- Contaminants in sugars

PRACTICALS:

Assessment of quality parameters in different foods
1. Survey of different foods in market
2. Cereals and pulses – label information, adulterants
3. Fats and oils – saturation , Rancidity
4. Fruit and vegetable products – Maturity , acidity , TSS, sugars
5. Coffee and tea , spices , Honey – Adulterants
6. Milk and milk products
7. Meat products
8. Determination of different preservatives
9. Determination of different colors
10. Document preparation for the approval of FSSAI
REFERENCES:
1. S.N.Mahindru, “Food Safety –Concept and Reality” ,APH Publishing corporation, 5 ansari road, Darya ganj, New delhi-2004
2. Rajesh Mehta and J.George –“Food Safety Regulation concerns and Trade –The developing country perspective ,Mac millan India Ltd.,2005.

JOURNALS:
1. Journal of Food Science and Technology
2. Indian Food Industry, A publication of Association of Food Sciences and Technologists
3. Food Chemistry
4. Journal of Food Science
5. IFCON’ 93 and IFCON’98 International food convention, Food technology update,
Mysore.

FSND 402: INSTITUTIONAL FOOD SERVICE MANAGEMENT

THEORY:

UNIT-I: Introduction to food service Industry, management and types of Food service establishments.
- Principles and functions of food service management.
- Need and importance
- Tools of Management.
- Management of resources.
- Types: Hotels and Restaurants - Hotels/Motels, restaurants, cafes, clubs public houses, winebars, specialty restaurants, fast foods, take-aways, street foods.
- Welfare and Industrial - Residential establishments - School, colleges, hostels, old people House, Hospitals, nursing homes, Industrial canteens, Temple feeding and Marriage feeding.
- Transport - Railway, Airlines and Sea.

UNIT-II: Infrastructure and Equipment in Food Science Institutions
- Building plans, outlays of work places - kitchen spaces, storage spaces and service areas.
- Equipment - Classification of equipment, selection of equipment, Design, installation, operation and maintenance.
- Menu – types of menu in Food service institutions, principles and planning
- Food service operation and types of food services - systems of service, mechanics of waiter service, self-service, vending and mobile catering.
  - Food services systems - Introduction, Standards of hygiene.
  - Cook-chill system and benefits.
  - Cook-freeze system and benefits.
  - sous-vide.
- Computers in service - Introduction, catering controls.

UNIT-III: Food safety in public catering.
- Health and Hygiene of personnel.
- Laws governing food service in public catering.
- Sanitation of food service establishments.
- Food safety in hotels, restaurants, street foods, industry and canteens, hospitals, hostels, airlines, railways, temple and mass feeding programmes.
- Laboratory support services in food safety.
- Food borne diseases and importance of surveillance
- Food safety awareness programmes to food handlers and consumers.
- Role of media in food safety education.

UNIT IV: Financial and Personnel Management
- Definition and scope of financial management.
- Cost concept, cost control and pricing.
- Book keeping and accounting.
- Personnel Management - Recruitment, selection and Induction, Job analysis, description Monitoring work employee facilities and benefits, Inservice Training. Skills required to operate and manage food service system.
PRACTICALS:
1. Survey of different types of food service establishments.
2. Standardization of recipes suitable for different food service establishment.
3. Portioning, costing and multiplication of the recipes.
4. Practice in preparation of volume meals at different costs suitable for different service systems.
5. Meal planning exercise for various food service systems
6. Exercise on preparation of work schedule
7. Visit to the following types of
   - Hotels / restaurant.
   - Welfare and industrial - transport.
   and writing report with regard to outlays, equipment, personnel etc. organizational set up.
8. Carrying out an evaluation study project on any aspect unit of food service.

REFERENCES

JOURNALS
1. Journal of Food Science and Technology
2. Indian Food Industry, A publication of Association of Food Sciences and technologists
3. IFCON’ 93 and IFCON98 International food convention, Food technology update, Mysore.
FT 403: FOOD PRODUCT DEVELOPMENT AND MARKETING

THEORY:

UNIT I: Innovations in Product Development
- Introduction to the Product development and formulation - Need for Product development
- New Food Products - Definition, Classification, General characteristics of New food product
- Factors affecting food product development - Corporate factors - Market place factors, technological pressures - Governmental issues and legislations

UNIT II: Food product development Process

UNIT III: Speciality food products

Product development with reference to nutritional and health needs: Health foods, Medical foods, Therapeutic foods, Infant foods, Geriatric foods, Functional foods, Neutraceuticals, prebiotics and probiotics, Herbal foods, Sports drinks.

UNIT IV: Product Commercialization and Marketing
- Entrepreneurship, Test Marketing; evaluating results and analyzing.
- Ethics in food product development
- Intellectual property/ Patents

PRACTICALS
1. Market Survey to identify new products in terms of
   - Line Extension, Repositioning Existing Products, New form/Reformulation,
   - New packaging of existing products, Innovative products and Creative Products.
2. Market Survey to identify
   - Nutrition products, Therapeutic products, Specialty products, Technology Driven products.
3. Identification of product for development
   - Idea generation, Screening of Ideas, Concept, Market research concerned product development.
4. Development of the product.
   - Formulation, Standardization, Scaling up.
5. Sensory evaluation
   - Designing of score card, Sensory Evaluation.
6. Food and Nutrition labeling and packaging.
7. Costing and Pricing.
8. Test Marketing.
REFERENCES

1. Proc. Food Processors Institute: A key to Sharpening your Competitive Edge. Food Processors Institute, Washington, DC.

JOURNALS

1. International Journal of Food Science and Technology  
2. Food Technology  
3. Journal of Food Science and Technology (IAFST), CFTRI, Mysore.  
4. Trends in Food Science and Technology  
5. Critical Reviews is Food Science and Nutrition  
6. Food Packer  
7. Food Industry (IAFST) Mysore: CFTRI.

FT 404 A: FOOD PROCESSING AND PRESERVATION TECHNOLOGY  
(Common to MSc Food Science Nutrition & Dietetics and MS Food Technology Course)

THEORY

UNIT I: Scope and significance of food processing and preservation  
- Need and Purpose, Principles and Methods of food processing and preservation.  
- Traditional Methods of food processing and preservation  
- Preservatives and Additives - Classification, applications, permissible limits and safety aspects.

UNIT II: Modern Methods of food processing and preservation  
- Processing and preservation by Heat - Principles of thermal processing, blanching, pasteurization, UHT processing, thermal sterilization, canning, extrusion, Different time-temperature-combinations, Thermal Death Curves, Margin of safety.  
- Processing and preservation by Cold- Refrigeration and freezing, freezing time and rate, methods of freezing, effect on quality of foods.  
- Processing and preservation by Dehydration and concentration – Types, Methods and their suitability for different food products, effect of dehydration and concentration on quality of foods- Low, High, and Intermediate Moisture foods.

UNIT III: Processing and preservation by Fermentation  
- Definition, types, Importance, Technology, Benefits and Limitations.
- Processing and preservation of fermented foods - Cereal and pulse products
  Vegetables, Milk products, Beverages, meat products

UNIT IV: Processing and preservation by Novel methods
  Irradiation, high Pressure and ultrasonic, high intensity light, pulse electric field,
  ohmic heating, inductive heating and pulsed X-rays, Microwave and radio frequency,
  Minimal Processing, membrane processing, hurdle technology, Nanotechnology and
  applications in foods

PRACTICALS
  1. Market survey of processed and preserved foods and to study the methods of processing,
     preservation, Additives and preservatives used, shelf life, cost and form of availability.
  2. Preservation of food by traditional methods using sugar, salt and turmeric powder etc.
  3. Preservation by using Chemical preservatives.
  5. Pickling with a variety of foods - Shelf life study.
  6. Drying and dehydration of foods.
  8. Extrusion processing.
 10. Visits to different commercial food processing units and Industries.

REFERENCE BOOKS & TEXT BOOKS
  1. Anuradha Subramanian, "Concise Food Science", Soundariya Publication, Erode,
     Tamil Nadu. 1998.
  3. Fellows, P. and Ellis H. 1990. Food Processing Technology: Principles and
     Practice, New York.
     Distributors, New Delhi. 1996.
     Woodhead, UK.
  7. Rama swamy, H and Marcote, M, 2005. Food processing- principals and applications,
     Taylor and francis.
  8. Vijayakhader, "Text book on food storage and preservation", Kalyani Publishers,
 10. Heather Hedrick Fink, Alan E. mike sky “Practical Applications in Sports Nutrition,
     2012
 11. Michelle McGuire, Kathy A Beer man Nutritional sciences From Fundamental to Food,
     Jaypee Brothers Medical Publishers (P) LTD 2014.
 15. MadhuSharma Pediatric Nutrition in Health and Disease, Jaypee Brother’s Medical
 16. Nutrient Requirements and Recommended Dietary Allowance for Indians A Report of The
     Expert Group of Icmr.2010.
FSND 404-B : GERIATRIC NUTRITION

THEORY:

UNIT-I: The process of Ageing – Physiological biochemical and body compositional changes – Theories of ageing. Socio-cultural and psychological aspects of ageing – Health seeking behaviour of the elderly.

UNIT-II: Food and Nutritional needs of the elderly – Dietary management – Special problem of women – menopausal, post-menopausal. Problems; Early nutrition and nutrition and health in later years.

UNIT-III: Chronic degenerative diseases and nutrition and health problems of the elderly – their etiology – genesis life style and living condition, management, prevention and control.


PRACTICALS:

1. Assessment of Nutritional status of the aged
2. Planning and preparation of diets for the aged from different sections and living in different situations
3. Assessment of nutritional and health problems of the aged and planning counseling programmes
4. Visits to different old age home and evaluations of food intakes

REFERENCE:


FSND 404-C: IMPROVING HEALTH AND NUTRITION: IEC APPROACHES

THEORY:
UNIT-I
Introduction to IEC - Information, Education and Communication
Aims and Objectives: Importance of IEC, relevance to programmes.
IEC for Behavioural changes: Behaviour and determinants of behaviour, need for IEC

UNIT-II
i. Communication and Media
- Concept of communication and mass communication
- Scope of Communication
- Elements of Communication
- Models of Communication
- Communication Process
- Approaches to Communication
- Barriers to Communication
- Communication for Extension Education and Development

ii. **Different Media, their characteristics and use**
- Audio visual aids (Graphics aids, puppets and other three dimensional aids, display boards and projected and non-projected aids)

**UNIT-III**
Development of IEC programs. Planning effective IEC Programmes – Board-based strategy and for specific objective. Identification of key messages for re-inforcement, preparation of IEC material. Refining of IEC messages. Social Mobilisation, social marketing and role of community. Training to use IEC.
Implementation to use of IEC, training supportive supervision and monitoring
IEC for different target groups:
- Policy makers
- Managerial level and middle level official from Government donor agencies and NGO’s
- Grassroot functionaries
- Community

**UNIT-IV**
Impact Assessment
Case Studies of various IEC programmes specific National Programmes and IEC – Influence at mass level

**PRACTICALS**
i. Field work: study of existing IEC approaches and materials in various programmes at micro and macro levels. Appraisal of techniques, tools, messages, coverage and outreach, costs and impact
ii. Planning and implementation of a Project: Identification of a problem/area for IEC Preparation of suitable IEC material for one-to one, group and mass communication including implementation, monitoring and evaluation.

**REFERENCES:**
5. ASPEN Reference Group(1997): “Community Health Education and Promotion”: A guide to program design and evaluation, Gaithersburg, M.A. Author
25. Roadbent, K.P. “New information communication technologies in scientific communication”; Implication for third world users.
FSND:405- HUMAN VALUES AND PROFESSIONAL ETHICS - II
(Revised Syllabus with effect from 2015-16)

Unit-I:
Value Education- Definition - relevance to present day - Concept of Human Values - self introspection – Self-esteem - Family values-Components, structure and responsibilities of family- Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

Unit-II:
Medical ethics- Views of Charaka, Sushruta and Hippocrates on moral responsibility of medical practitioners. Code of ethics for medical and healthcare professionals. Euthanasia, Ethical obligation to animals, Ethical issues in relation to health care professionals and patients. Social justice in health care, human cloning, problems of abortion. Ethical issues in genetic engineering and Ethical issues raised by new biological technology or knowledge.

Unit-III:
Business ethics- Ethical standards of business-Immoral and illegal practices and their solutions. Characteris of ethical problems in management, ethical theories, causes of unethical behavior, ethical abuses and work ethics.

Unit-IV:
Environmental ethics- Ethical theory, man and nature- Ecological crisis, Pest control, Pollution and waste, CI mate change, Energy and population, Justice and env iron mental health.

Unit-V:

REFERENCES:
2. The Ethics of Management” by Larue Tone Hosmer. Richard D. Irwin Inc.
6. Introduction to Ethics Sinha: A Manual of Ethics Manu:
14.I.C Sharma Ethical Philosophy of India. Nagin& co Julundhar