No.AC.2(S)/507/12-13  
Dated: 01-06-2013

NOTIFICATION


Ref: 1. Proceedings of Faculty of Science & Technology Meeting held on 21-02-2013.

The Board of Studies in Food Science & Nutrition (Combined) at its meeting held on 11-12-2012 has resolved

(a) To modify slightly the existing M.Sc. Food Science & Nutrition Syllabus in terms of revising the contents of few papers and providing an extended version of some papers.

(b) For the introduction of Specialization in Clinical Nutrition by suitably modifying the existing structure of M.Sc. Food Science & Nutrition from 2nd Semester onwards. Some papers will be common to both streams. The Eligibility Criteria is also modified.

The Faculty of Science and Technology and the Academic Council at their meetings held on 21-02-2013 and 27-03-2013 respectively approved the above proposals and the same is hereby notified.

The copy of modified syllabus is annexed herewith.

To

1. The Registrar (Evaluation), University of Mysore, Mysore.
2. The Chairperson, BOS/DOS in Food Science & Nutrition, MGM.
3. The Dean, Faculty of Science & Technology, DOS in Zoology, MGM.
4. The Director, College Development Council, UCM, Mysore.
5. Sri Narasimha Murthy, Statistician, E.B. UOM, Mysore.
6. The Deputy/Assistant Registrar (Evaluation), University of Mysore, Mysore.
7. The Supdt. AC.1 & AC.2, A.B., Academic Section, UOM, Mysore.
8. The P.A. to the Vice-Chancellor/Registrar/Registrar( Evaluation), UOM, Mysore.
9. The Case Worker, AC.7, Academic Section, University of Mysore, Mysore.
10. The Section Guard File(Supdt.AC.2), A.B., A.C., UOM.
11. The Schedule File.

AC2 Eng-25-4-R
Preamble

Department of Food Science and Nutrition is offering M.Sc. Degree in Food Science and Nutrition since inception with modifications in scheme and syllabus from time to time as needed to keep abreast with latest knowledge in the field. Since the subject has grown tremendously, there is a need to specialize within the subject and train students specifically for the job market. Clinical Nutrition is one such branch of nutrition which is in great demand because of job opportunities in hospitals, clinics, and health clubs. In view of this, it was found necessary to introduce a specialization in the existing course of Food Science and Nutrition in Clinical Nutrition. Students opting for this stream can branch out in the II semester into a second stream offering this specialization. In I semester all courses will be same for both streams. There are some common papers in II and III semesters also. It is also planned to give an internship exclusively for students of clinical nutrition for better and practical training and preparation in IV semester.

The eligibility criteria is revised as students opting for clinical nutrition are required to have a stronger background of nutrition.

ELIGIBILITY CRITERIA

1. B.Sc. - cognate subjects: Home science/ any one of the following subjects as one option at B.Sc. – Food Science and Nutrition / Human nutrition/ Nutrition & Dietetics/ Clinical Nutrition & Dietetics/ Food science & Quality control / Integrated Home science.
2. Candidates with Biochemistry / microbiology/ Biotechnology as majors /hard cores are also eligible for admission. (Non cognate subjects)
3. 50% of the seats are reserved for candidates with cognate subjects. Preference at every stage of seat matrix allocation will be given to students who have studied COGNATE subjects.
4. Candidates with Clinical Nutrition & Dietetics / Human nutrition/ Nutrition & Dietetics / Food Science & Nutrition/ Home science as one option at UG are eligible to opt for specialization in CND from 2nd semester onwards in PG program, while others will continue with Food science and Nutrition.
### Choice-Based Credit System Syllabi of M.Sc. Degree Program in Food Science and Nutrition

<table>
<thead>
<tr>
<th>No.</th>
<th>Paper Code</th>
<th>Title of course</th>
<th>HC/SC/ open elective</th>
<th>No. of credits</th>
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<td>I Semester</td>
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<tr>
<td>1*</td>
<td></td>
<td>Food Science and Food Processing- I</td>
<td>Hard [16 credits]</td>
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<tr>
<td>2*</td>
<td></td>
<td>Nutritional Biochemistry</td>
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<td>3*</td>
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<td>Human Nutrition</td>
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<td>4*</td>
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<td>Community nutrition</td>
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<td>5*</td>
<td></td>
<td>Basics of research designs in nutrition</td>
<td>Soft core [to choose 4 credits]</td>
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<tr>
<td>6*</td>
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<td>Food Hygiene and Sanitation</td>
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<td>7*</td>
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<td>Food Microbiology</td>
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<td>8*</td>
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<td>Assessment of Nutritional status</td>
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<td>Food Science and Food Processing- II</td>
<td>Hard core [14 credits]</td>
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<td>2*</td>
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<td>Vitamins in Nutrition</td>
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<td>3*</td>
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<td>Minerals in Nutrition</td>
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<td>4</td>
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<td>Food laws and food safety</td>
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<td>5*</td>
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<td>Term work in Nutritional assessment **</td>
<td>Soft core [to choose 4 credits]</td>
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<td>6</td>
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<td>Food packaging technology</td>
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<td>7*</td>
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<td>Neutraceuticals and health foods</td>
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<td>8</td>
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<td>Enzymes in food processing (self study)</td>
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<td>Food fortification (self study)</td>
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<td>10</td>
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<td>Healthy lifestyles and nutrition</td>
<td>Open elective</td>
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<td>Food Preservation</td>
<td>Hard [10 credits]</td>
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<td>Functional properties of foods</td>
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<td></td>
<td>Entrepreneurship and Marketing</td>
<td>Soft [to choose 6 credits]</td>
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<td>4*</td>
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<td>Quality control in food industries and foodservice institutions</td>
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<td>Food Additives</td>
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<td>6</td>
<td></td>
<td>Principles of Clinical Nutrition</td>
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<td>Term paper**</td>
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<td>Culinary Science- Principles &amp; Techniques</td>
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<td>Product Development &amp; sensory evaluation</td>
<td>Hard core [8 credits]</td>
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<td>Advances in Nutritional Science</td>
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<td>Diet in diseases</td>
<td>Soft core [to choose 6 credits]</td>
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<td>Project work</td>
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<td>5</td>
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<td>Storage and handling of fresh produce (self study)</td>
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<td>6</td>
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<td>Food Biotechnology (self study)</td>
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<td>7</td>
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<td>Foods in Indian Tradition</td>
<td>Open elective</td>
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Open elective papers are for students of other courses.
M.Sc. Degree Program in Food Science and Nutrition  
[Specialization in Clinical Nutrition and Dietetics]

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<td>Neutraceuticals and health foods</td>
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<td>8</td>
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<td>Endocrinology</td>
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<td>9</td>
<td></td>
<td>Public health nutrition (Self-study)</td>
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| III Semester |           |                                               |                      |    |    |    |        |
|--------------|------------|-----------------------------------------------|----------------------|    |    |    |        |
| 1            |            | Principles of diet therapy                    | Hard                 | 2  | -  | -  | 2     |
| 2            |            | Clinical nutrition & dietetics-I              |                      | 2  | 1  | 2  | 5     |
| 3            |            | Food service management                       |                      | 2  | 1  | -  | 3     |
| 4*           |            | Quality control in food industries and foodservice institutions | Soft | 2  | -  | -  | 2     |
| 5            |            | Sports nutrition                              |                      | 2  | -  | -  | 2     |
| 6            |            | Food and nutrition services in hospitals      |                      | -  | 2  | -  | 2     |
| 7            |            | Drug and nutrient interactions and Nutrigenomics |                  | 2  | -  | -  | 2     |
| 8            |            | Preparation of Audio-visual Aids **           |                      | -  | 2  | -  | 2     |
| 9            |            | Nutrition and health problems of vulnerable population (self-study) |                  | -  | 2  | -  | 2     |

| IV Semester |           |                                               |                      |    |    |    |        |
|--------------|------------|-----------------------------------------------|----------------------|    |    |    |        |
| 1            |            | Clinical nutrition & dietetics-II             | Hard                 | 1  | 1  | 2  | 4     |
| 2            |            | Internship ***                                |                      | -  | 6  | -  | 6     |
| 3            |            | Nutrition counseling                          | Soft core            | 1  | 1  | -  | 2     |
| 4            |            | Nutrition in critical care                    |                      | 2  | -  | -  | 2     |
| 5            |            | Medical ethics & laws                         |                      | 2  | -  | -  | 2     |
| 6            |            | Inborn errors of metabolism                   |                      | 2  | -  | -  | 2     |
| 7            |            | Nutrition in emergencies (Self-study)         |                      | -  | 2  | -  | 2     |

*: Papers common to two streams.
**: To be assessed as Internal Assessment only. For all others, distribution of IA and Exam marks are 50% each. Total credits needed for M.Sc. 76, [I year: 40, II year 36] Min credit per semester 18, Maximum, credit per semester - 24. Open elective papers equal to 8 credits to be chosen from other courses during II, III, IV Semesters.

***Internship in Hospitals / Foods service institutions + hospital / clinics.

Important Note for Stream 2. Specialization in Clinical Nutrition and Dietetics:
During the first half of IV semester all the hard core and soft core papers, which are taught in the department will be completed. The second half will be entirely devoted to Internship, for which students need to go outside the department for five days a week. Accordingly C1 and C2 component marks will be submitted at the end of IV semester.
I SEMESTER

1. Hard core: FOOD SCIENCE AND FOOD PROCESSING- I * [2+1+2/week]

1. A. Processing of foods: Primary, secondary and tertiary processing, historical perspective, traditional technologies used in food processing.
   B. Effects of processing on components, properties and nutritional value of foods.
2. Processing of wheat: Structure, composition, primary processing, functionality in food system, study of preparation/ manufacture of common unleavened and leavened products like chapathi, bread, cake etc.
   B. Millets: Types, composition, malting, other food uses.
4. A. Legumes - Types, composition, milling, germination, cooking & processed products.
   B. Oilseeds -: Use of oilseeds and oilseed meals, soya bean and groundnut - composition, processing and food uses.
   C. Fruits and vegetables: Composition, pectins, plant acids, types of pigments, effect of cooking on colour and texture of vegetables.

PRACTICAL SESSIONS

Study of preparation variables and quality factors of products from the following food commodities
1. Wheat
2. Rice and millets
3. Legumes
4. Vegetables

2. Hard Core: NUTRITIONAL BIOCHEMISTRY * [2+1+2/week]

5. Carbohydrates: Classification, structural features, physico-chemical properties. Monosaccharide and related compounds, disaccharides, polysaccharides. Inter conversion of hexoses, sugar derivatives of biomedical importance.

PRACTICAL SESSIONS

Techniques used in biochemical analysis:
- Determination of PH: in acids, alkalis and buffers using PH meter and indicators.
- Colorimeters: use of colorimeter in UV and visual range, Flame Photometer, flourimeter (principle to be explained and demonstrated with one example for each).
- Separation techniques: Chromatography- paper and column, Centrifugation, Electrophoresis and Dialysis. (One example for each may be demonstrated).
- Enzyme Assays - Amylase, protease, lipase or alkaline phosphatase using suitable substrates, Effect of pH, temperature & substrate concentration on any one enzyme activity may be included.
3. Hard Core: HUMAN NUTRITION * [2+1+0]

1. Basis for computing nutrient requirements, latest concepts in dietary recommendations, RDA- ICMR and WHO: their uses and limitations.
8. Regulation of food intake- role of hunger and satiety centers, effect of nutrients.

4. Hard core Paper: COMMUNITY NUTRITION * [2+1+0=3]

1. Nutrition during life span-
   b. Lactation- physiology of lactation, Factors affecting lactation, nutritional requirements. Effect of lactation on maternal malnutrition and fertility
   c. Infancy- Growth and development, nutritional requirements. Feeding pattern, compositional differences between human milk and milk substitute and their suitability for infant feeding. Weaning practices, weaning and supplementary foods.
   d. Preschool age- Growth and development, nutritional requirements, special care in feeding them, nutritional problems specific to this age.
   e. School age and adolescent children- Growth and development, nutritional requirements, special care in feeding preschoolers, nutritional problems specific to this age.
   f. Young adults- Nutritional requirements, Nutrition status of Indian adult population, nutritional problems common to this age.
   g. Elderly- Nutritional requirements, Special needs, Nutritional problems


3. Nutrition policy and programs-
   a. National nutrition policy- need for nutrition policy, policy strategies and their implementation.
   b. Nutrition programs – National anemia prevention, Prevention of night blindness, National iodine prophylaxis program, ICDS,
   c. National nutrition surveillance system. Food for work etc.
   d. NGO in community development operations.

5. Soft Core: BASICS OF RESEARCH DESIGNS IN FOOD AND NUTRITION

1. Research Methodology- Meaning, objectives and Significance of research. Types of research, research approaches and scientific methods. Research process and criteria of good research.
2. Definition and identification of a research problem- Selection of research problem, Justification, development of hypothesis, basic assumptions. Limitations and delimitations of the problem.
3. Research design- Meaning and needs, Features of a good design, important concepts relating to research design, variables, experimental and control groups. (Use examples from epidemiology and clinical trials). Different research designs- exploratory, descriptive and diagnostic (epidemiology and clinical trials). Pilot studies. Qualitative vs quantitative research.
4. Sampling design- Population and sample, Steps in sampling design, Criteria for selecting a sampling procedure, Different types of sampling techniques- probability sampling and non-probability sampling. Merits and demerits of sampling. Power analysis and sample size calculation in experimental design.
5. Methods of data collection- Schedules and questionnaires; Interview, Case study, Home visits, scaling methods, Reliability and validity of measuring instruments.
6. Statistical issues: effect of measures- formulation of hypothesis and testing of hypothesis, Confidence level and Bayesian statistics. Concepts and characteristics of a normal distribution
7. Basic principles and regulations in humans and animal research.
8. Analysis and reporting of data-
   a. Graphical and diagrammatic presentation, Measures of central tendencies (Mean, median and mode), Measure of dispersion (Range, Mean deviation and standard deviation) and their relative measures. Qualitative and quantitative methods of data analysis.
   b. Interpretation of – Meaning of interpretation, Technique of interpretation,
   c. Precaution in interpretation- Interpretation of tables and figures.
   d. Report writing – Significance of report writing, Different steps in writing report, Types of reports, Mechanics of writing reports and precautions to be taken while writing research reports.

6. Soft core: FOOD HYGIENE AND SANITATION

1. General principle of food hygiene, Hygiene in rural and urban areas in relation to food preparation, personal hygiene and food handling habits. Place of sanitation in food plants. Sanitary aspects of building and equipment: Plant layout and design.
2. A. Safe and effective insect and pest control: Extraneous materials in foods, Principles of Insects and pets control.
   B. Physical and chemical control. Effective control of micro-organisms: micro-organisms important in food sanitation, micro-organisms as indicator of sanitary quality.
   B. Sanitary aspects of waste disposal. Establishing and maintaining sanitary practices in food plants, role of sanitation, general sanitary consideration and sanitary evaluation of food plants.
7. Soft Core: FOOD MICROBIOLOGY * [2+0+0]

1. Micro-organisms of importance in food - Factors affecting the growth of micro organisms in food - Intrinsic and Extrinsic parameters that affect microbial growth.
2. Contamination and spoilage of Cereal, pulses and their processed products
3. Contamination and spoilage of Vegetables & fruits and their products
4. Contamination and spoilage of Flesh foods, Eggs and poultry, Milk & milk products

8. Soft Core: ASSESSMENT OF NUTRITIONAL STATUS * [2+0+0]

1. Indirect methods - Demography, population dynamics and vital events and their health implications, indicators of health and nutrition (IMR, TMR, MMR)
   - Anthropometry – methods, reference standards in children and adults, scales of comparison (percentiles, Z score), classification and interpretation of somatic data, somatic indicators of PEM
   - Biochemical - use of specimen types, indicators of protein-energy status, anemia, immune function, CVD risk, oxidative stress. Urine and stool analyses.
   - Dietary- methods, nutrient intake analysis, dietary assessment in special populations and specific situations, Dietary reference intakes
   - Clinical- components of clinical assessment, associations with nutrient deficiencies and biochemical status
3. Assessing food and nutrition security – Definition and assessment schedules, National and household food security. Factors affecting food security system. National and International systems to improve food security.

II SEMESTER

1. Hard Core: FOOD SCIENCE AND FOOD PROCESSING- II * [2+1+2]

2. A. Milk and milk products: Composition, functionality in food system, processing of different products like ghee, butter, milk powders, khoa, paneer, cheese, milk products and ice creams.
3. A. Flesh foods: Types, composition, structure of muscle, conversion of muscle to meat-physico-chemical changes, cooking and processing.
   B. Marine foods: Types, composition, cooking and processing.
4. A. Sugar and jaggery: Principles of sugar crystallization, stages of cookery and role in Indian traditional sweet preparations, manufacturing of candies and sweets.
   B. Brief manufacturing process of coffee, tea, cocoa, alcoholic beverages (fruit wines).
   Ready to serve beverages.
PRACTICAL SESSIONS
Study of preparation variables and quality factors of products from the following food commodities
1. Fats and oils
2. Milk and egg
3. Flesh foods
4. Sugar and jaggery

2. Hard Core: VITAMINS IN NUTRITION * [1+1+2/week]

1. Fat soluble Vitamins: Vitamin A, Vitamin D, E & K.
2. Water soluble vitamins: Vitamin C, Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B_{12}, Vitamin B_{6}

Note: All the nutrients will be dealt with Digestion, absorption and transport and excretion, functions, interaction with other nutrients (if any), RDA, Deficiency and toxicity, major sources, Assessment of nutriture and analysis in food material.

PRACTICAL - For Stream 1. FOOD SCIENCE AND NUTRITION

FOOD ANALYSIS
a) Determination of moisture, Ash - total, acid soluble and insoluble.

b) Determination of Protein in foods.

c) Determination of Fat – Crude fat.

d) Carbohydrates – Free sugars, Starch (Total & available), Dietary fiber.

e) Mineral estimation – Dry and wet ashing, calcium, iron, phosphorous.

f) Vitamin estimation – Ascorbic acid, thiamine, riboflavin and β carotene.

PRACTICAL – For Stream 2. SPECIALIZATION IN CLINICAL NUTRITION AND DIETETICS

Diagnostic Techniques: BLOOD AND URINE ANALYSIS
a) Collection and storage of biological samples for clinical use. Commonly used tests for diagnosis of various diseases and their interpretation (Indices will have to be calculated using analyzed values of each student for interpretation)

b) Blood and urine analysis: a. Total blood count including ESR, b. Total serum proteins and their fractions. c. Blood glucose (GTT), (Fasting and post-prandial), d. Serum lipid fraction – Cholesterol, triglyceride, LDL and HDL, e. Blood urea, f. Serum calcium. (GTT to be conducted at any clinic/hospital)

c) Urine: Creatinine, Glucose and protein (albumin).

3. Hard Core: MINERALS IN NUTRITION * [1+1+0/week]

1. Macro minerals: Calcium, Phosphorus Magnesium, Sodium, Potassium chloride.


Note: All the nutrients will be dealt with Digestion, absorption and transport and excretion, functions, interaction with other nutrients (if any), RDA, Deficiency and toxicity, major sources, Assessment of nutriture and analysis in food material.
4. Hard Core: FOOD LAWS AND FOOD SAFETY [2+1+0]

1. A. Concept and meaning of Food quality and food Safety, food adulteration, food hazards.
   B. Natural toxins.
2. Food laws and regulations – National and international food laws, Governing bodies.
3. Exposure, estimation, toxicological requirements and risk assessment.
4. Safety aspects of water and beverages such as soft drinks, tea, coffee, cocoa.
5. A. Safety assessment of food contaminants and pesticide residues.
   B. Safety evaluation of heat treatments and related processing techniques.

5. Soft core: Term Work in Nutritional Assessment * [0+2+0]

1. Tools and Techniques of nutritional and dietary assessments:
   - Preparation of assessment schedules
   - Nutritional anthropometry, Use of Reference standards.
   - Standardization of raw and cooked weights, use of nutritional composition tables.
   - Dietary survey techniques-intakes of individual/family/inmates of institutions.

2. The candidate has to undertake a minor project work in aspects related to assessment of nutritional status (field work/laboratory-based work) and submit a report.

6. Soft core Paper: FOOD PACKAGING TECHNOLOGY [2+0+0]

2. Food packaging systems, product characteristics and package requirements: Different forms of packaging such as rigid, semirigid, flexible forms and different packaging system for (a) dehydrated foods (b) frozen foods (c) dairy products (d) fresh fruits and vegetables (e) meat, poultry and sea foods.
3. Types of packaging materials (metals, glass, paper and plastics), their characteristics and uses.
   - Paper: pulping, fibrillation and beating, types of papers and their testing methods;
   - Glass: composition, properties, types of closures, methods of bottle making;
   - Metals: Tinplate containers, tinning process, components of tinplate, tin free steel (TFS), types of cans, aluminum containers, lacquers;
   - Plastics: types of plastic films, laminated plastic materials, co-extrusion.
4. A. Package accessories and advances in packaging technology (active packaging, modified atmosphere packaging, aseptic packaging, packages for microwave ovens, biodegradable plastics, edible gums and coatings).
   B. Packaging equipment and machinery: Vacuum, CA and MA packaging machine; gas packaging machine; seal and shrink packaging machine; form and fill sealing machine; aseptic packaging systems; retort pouches, bottling machines; carton making machines, package printing.

7. Soft core Paper: NEUTRACEUTICALS AND HEALTH FOODS * [2+0+0]

1. Nutraceuticals: (a) Use of nutraceuticals in traditional health sciences. Their role in preventing /controlling diseases.
(b) Definition, Classification, food and non food sources, mechanism of action. Role of omega-3 fatty acids, carotenoids, dietary fiber, phytoestrogens; glucosinates; organosulphur compounds as nutraceuticals.

2. **Prebiotics and probiotics**: Usefulness of probiotics and prebiotics in gastrointestinal health and other benefits. Beneficiary microbes; prebiotic ingredients in foods; types of prebiotics and their effects on gut microbes.

3. **Functional foods** Definition, development of functional foods, benefits and sources of functional foods in Indian diet. Effects of processing conditions and storage; Development of biomarkers to indicate efficacy of functional ingredients; Research frontiers in functional foods.


8. **Self -study soft core : ENZYMES IN FOOD PROCESSING [0+4+0]**

1. Enzymes- Review of classification, specifications, factor affecting rate of enzyme catalyzed reactions, enzyme inhibitors, enzymic browning, immobilized enzymes.
2. A. Application of enzymes in food processing: Need for enzyme usage, sources of enzymes.
   B. Application of enzyme in industrial production of starch, high fructose corn syrup, enzymes in sucrose industry.
3. Use of enzyme in beverages- fruit juices, beer, wine, and distilleries; dairy, baking, oils and fats, plantation products, animal products.
4. Malting and germination of grains – process, characteristics, nutritional benefits and uses.

9. **Self -study soft core : FOOD FORTIFICATION [0+4+0]**

1. Food fortification – Needs, objectives, principles and rationale, selection and basis of fortificants.
2. Technology of fortifying cereal products.
   - Characteristics of nutrients used in cereal fortification
   - Types and levels of micronutrients to be added
   - Fortification methods
   - Fortification premixes, Design and composition of premixes and quality control
   - Fortification of bread, pasta, noodles, biscuits, and breakfast cereals.
3. Technology of fortifying beverages, candies, snack products.
   a) Technology of fortifying beverages - Importance of beverage fortification, Health benefits of fortification, Selection of nutrients for fortification, Levels to be added, Characteristics of fortificants and method of fortification, Bioavailability, Organic Vs inorganic salts.
   b). Technology of fortifying candies - Product formulation, Factors to be considered in selecting fortificants, Nutrient bioavailability and its interactions, Packaging, storage, shelf life and cos.,
   c) Snack products - Rationale for micronutrient fortification of snack products, Merits and demerits of fortification, Choice of products and selection of micronutrients, Setting level of fortification, Safety limits, Technological and cost limits, Challenges in fortifying snack products, Nutrient interaction and bioavailability.
4. Other special fortified products - salt, sugars, oils, Nutri-bars, Granola bars, health foods.
a). Salt :: Technology of fortifying salt with iron and iodine, Iodine stability and quality of double fortified salt, Safety issues, Levels to be added.
b). Sugars :: Fortification with iron and vitamin A, Premix formulation, Fortification level, Packaging.
c) Oils:: Fortification with vitamin A, Rationale of vitamin A fortification, Stability of vitamin A in oil during storage and cooking, Effects of frying on Vitamin A content, Efficacy and safety of vitamin A added to oil, Technology of fortifying, Packaging.
d). Nutri bars :: Selection of nutrient, Advantages and disadvantages of fortification, Technology of fortification, Packaging.
e) Granola bars:: Production of the product, Physical parameters of bars, Incorporation of fortificants, Technology of fortification, Packaging.
f) Health foods:: Selection of nutrients, Technology of incorporation, Bioavailability, Packaging.

OPEN ELECTIVE FOR OTHER STUDENTS

10. HEALTHY LIFESTYLES AND NUTRITION [2+0+0]

1. Factors affecting food habits, choices and dietary patterns – Definition of Food, Nutrition, Health, Fitness. Interrelationship between nutrition and health, concept of a desirable diet for optimum nutrition, health and fitness.
2. A brief review of nutrients in general –
   • Energy and macronutrients – Carbohydrates, Protein, Fat - functions, sources deficiency disorders and recommended intakes.
   • Vitamins – A, D, E, K, B-complex , Vitamin C.
3. Basic principles of planning diet – Nutritional assessment, RDA for Indians, Food groups, Dietary guides and balanced diets.
5. Nutrition and physical fitness:
   • Exercise and Fitness- Definition, benefits, components and indicators of fitness.
   • Nutritional requirements of exercise – fluids, vitamins and minerals, energy, macronutrient needs and distribution, body adaptation.
   • Approaches to the management of fitness and health in weight management.
6. Alternative systems for health and fitness – Ayurveda, yoga and meditation and other methods.

III SEMESTER

1. Hard Core: FOOD PRESERVATION [2+1+2]

1. A. Classification of food in relation to shelf life-Spoilage in food and its control : spoilage caused by microorganism (bacteria, fungi and virus), enzymes, pets and rodents.
   B. Food dehydration and concentration : methods of drying and concentration, types of dryers, factors affecting drying process.
3. Cold preservation ; refrigeration, freezing, freeze drying, refrigerated gas storage.
4. A. Food irradiation: technology, application and safety assessments
   B. Chemicals in food preservation, safety of preserved foods.
PRACTICAL SESSIONS

Food preservation techniques (use of different techniques in product formulation and analysis of product for quality standards).

1. Sun drying and dehydration - cereals, legumes, vegetable based.
2. Preservation with sugar - jams, jelly, preserves, etc.
4. Preservation of foods using chemicals - tomato ketchup, squash.

2. Hard Core: FUNCTIONAL PROPERTIES OF FOODS [2+3+0]

1. Physico-chemical properties of foods - Organic food components, colloids, osmotic pressure, food dispersions (sols, gels, emulsion, foam), Hydrogen ion concentration etc.
2. Role of water in foods, free water and bound water, functional properties, water activity and intermediate moisture foods.
3. Functional properties of proteins, modified proteins, application in product formulation
4. A. Carbohydrates: Starch, cellulose, hemicelluloses, hydrocolloids and gums: occurrence, functions in food systems, properties, gelatinization, retrogradation and modified starches.
   B. Browning in foods: Enzymatic and non enzymatic - mechanism, method of prevention, relationship to health.

PRACTICAL TUTORIAL SESSIONS

1. Water activity - water sorption isotherms of different foods.
2. Functional properties of proteins - Water and fat absorption, emulsion and foaming properties, protein gels, (application in food products)
3. Starch Gelatinization and retrogradation - factors affecting and measurement of viscosity of starch gels, use of hydrocolloids/gums.

3. Soft Core: ENTERPRENEURSHIP AND MARKETING [2+0+0]

1. Starting and managing an enterprise,
2. Entrepreneurship,
3. Marketing and advertising

4. Soft core: QUALITY CONTROL IN FOOD INDUSTRIES AND FOODSERVICE INSTITUTIONS * [2+0+0]

2. Quality management systems in India; Sampling procedures and plans; Food Safety and Standards Act, 2006; Domestic regulations; Global Food safety Initiative; Various organizations dealing with inspection, traceability and authentication, certification and
quality assurance (PFA, FPO, MPO, AGMARK, BIS); Labeling issues; International food standards.
3. Use of hazard analysis and critical control points in processing of foods.
4. Quality assurance, Total Quality Management; GMP/GHP; GLP, GAP; Sanitary and hygienic practices; Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex; Export import policy, export documentation; Laboratory quality procedures and assessment of laboratory performance; Applications in different food industries.
5. Quality control in foodservice institutions.

5. Soft core paper: FOOD ADDITIVES [2+0+0]

1. Food additives: Definitions, functions and uses in processed food products.
2. Chemical, technological and toxicological aspects of acid, base buffer systems, salts and chelating/sequestering agents, leavening agents, antioxidants, emulsifying and stabilizing agents, anti-caking agents, thickeners, firming agents, flour bleaching agents and bread improvers.
   B. Natural and synthetic colors
4. Food Flavors: Spices and flavoring constituents, flavors in food industries.


3. Assessment of nutritional status - in clinical situations and development of nutrition care plan for hospitalized and out patients. Somatic, biological, clinical and dietary assessment, environmental and behavioural data analysis and interpretation.
5. A. Objectives of diet therapy- Regular diet and rationale for modifications in energy and other nutrients, texture, fluid, soft diets etc.
   B. Enteral and parenteral feeding-principles, types, methods of administration, monitoring and complications.
6. Dietary principles and management of special conditions
   a. Surgical conditions, burns and organ transplants
   b. Protein and energy malnutrition (hospital and domiciliary treatment)
   c. Nutrient deficiencies - Vitamin A, iodine, osteoporosis.
   d. Children with special needs- spastic, polio affected
   e. Food allergy- causes, methods of detection and preventive measures
   f. Febrile diseases- tuberculosis, typhoid, pneumonia, measles, malaria and chicken pox.
   g. Nutrition counseling: definition, concept, role of clinical dietician, the recipient and counseling environment and goals of counseling. An overview of systems approach to nutritional care and its components (planning, implementation and evaluation).
7. **Drug and nutrient interaction** – drug - drug / drug-nutrient interaction - effect on ingestion, digestion, absorption and metabolism of nutrients, effect on nutritional status, effect on organ function, drug dosage and efficacy, drug abuse and drug resistance.

7. **Soft core: TERM PAPER [0+2+0]**

The term paper shall be submitted at the end of semester as project report and evaluated. The topic will be selected by the student under the guidance of an advisor, can either be an independent study based on research [experimental, clinical, survey, case study, etc] or a term paper based on exhaustive review of literature.

**OPEN ELECTIVE PAPER FOR OTHER STUDENTS**

8. **CULINARY SCIENCE- PRINCIPLES AND TECHNIQUES [2+2+0]**

1. Introduction to cookery, Culinary history, aims and objectives of cooking.
2. Food ingredients and their nutritional value – Bulk/staple foods, (cereals, legumes, fruits and vegetables, eggs, fish and marine foods, milk and milk products) fats and oils, spices, flavoring agents, additives, beverages.
3. Methods of cooking – Pre-processing of foods, cooking, roasting, frying, grilling, baking, boiling, microwaving, solar, infra-red cooking.
4. Principles of cooking and role of food components – using specific examples for different types of foods such as
   - Cereal and legume based dishes.
   - Preparation of gravies and curries
   - Spices and flavouring ingredients
   - Baked products,
   - Egg cookery, meat and fish
   - Indian sweets and snacks
   - Preserved products.

**PRACTICAL TUTORIAL SESSIONS**

**Demonstration and preparation of common recipes**

1. Cereal based products
   - Wheat products – Chapathi, poori, upma.
   - Rice dishes and fermented foods
2. Food Accompaniments
   - Cooking of legumes, dhals, and vegetables
   - Preparation of gravies and curries.
3. Appetizers, sweets and snacks
   - Soups and puddings
   - Indian sweets and snacks
   - Baked products
4. Animal foods and preserved products
   - Egg cookery, Cooking of meat and fish
   - Preparation of preserved products.
IV SEMESTER

1. **Hard Core: PRODUCT DEVELOPMENT AND SENSORY EVALUATION** [2+3+0]

   1. **Sensory evaluation of foods:**
      a. Importance and application for product formulation,
      b. Basic tastes, threshold tests for basic tastes,
      c. Requirements for sensory analysis,
      d. Sensory panel, type, selection and training,
      e. Subjective and objective sensory evaluation,
      f. Different types of sensory tests
      g. Instrumental tests for sensory attributes – colour, texture and odour.

   2. **Product Development**
      a. Designing new product – types and drawing forces
      b. Need for product development
      c. Stages of product development
      d. Success in product development
      e. Consumer research
      f. Role of sensory evaluation in consumer product acceptance

   3. **Consumer Behavior** in purchasing foods, Factors influencing product acceptance and purchasing trends. Market place changes in processed foods.

   4. **Special food processing technologies and novel food ingredients** – Membrane technology (reverse osmosis and ultra filtration), agglomeration, agitation, air classification, extrusion, automation in food industries.

**PRACTICAL TUTORIAL SESSIONS**

1. Sensory analysis: Different types of sensory tests for basic tastes and sensory attributes of products.
2. Project on different sensory techniques and responses utilizing prepared food products, analysis and presentation of sensory data.
3. Stepwise development of a new food product, standardization, acceptability studies and submission of project report.
4. Survey on types of convenience foods / consumer behavior / analysis of food labeling.

2. **Hard Core: ADVANCES IN NUTRITIONAL SCIENCE** [2+1+0]

   1. Methods of research used in human and animal studies related to nutrition (cross sectional Longitudinal, Retrospective, Prospective, cohort etc.) Available sources of information to review the literature for research).
   2. Nutrition and mental development
   3. Nutrition and work performance including exercise and sports
   4. Nutrition for space, mines, underwater
   5. Nutrition and Infection
   6. Recent concepts in Human Nutrition: Nutrigenomics, Metabolomics.

3. **Soft Core: DIET IN DISEASES** [2:2:0]

   1. **Overweight & Obesity** - classification, causative factors (behavioral risk factors), overview of approaches to treatments and interventions.
2. **Cardiovascular disease** -- aetiology, incidence, symptoms, long-term and short-term treatment in coronary disease (myocardial & cerebral infarction), congestive heart failure and hypertension.

3. **Diabetes** - Etiology, symptoms, classification, Metabolism, nutrition therapy (OHA and Insulin), prevention, monitoring criteria. Short term and long term complications and management.


5. **Renal disease** - Nephrotic syndrome, Acute and Chronic renal failure- diagnostic procedures and principles of dietary management. Dialysis, medical nutrition therapy.


8. **Case studies** - Select any two conditions and collect patient’s details and feeding care offered in hospital.

4. Soft Core: Project work [0+8+0]

An independent research project work undertaken by student under the guidance of an advisor, can either be a survey or Laboratory oriented research. The research should be submitted at the end of semester in the form of a thesis. The project work can be undertaken at University departments, affiliated research institutions, quality control laboratories, food industries or other institutions with prior approval.

5. Soft core-Self study paper: **STORAGE AND HANDLING OF FRESH PRODUCE** [0+4+0]

1. Storage and handling of food grains.
   - Foodgrains and their characteristics, Commercial importance of grains, and standards for foodgrains.
   - Insects and mites of food gains - types, and control measures [storage facility, warehousing practices, physical, chemical, biological, and other methods of insect control]
   - Storage structures of grains.

2. Storage and handling of fruits and vegetables - Vegetables as living products- Respiration and heat production.
   - Harvesting practice and equipment, Preparation for market, Shipping containers and Consumer package
   - Commodity requirements – leafy vegetables, unripe fruits, ripe fruits, underground structures
   - Treatment prior to shipment and storage, Ventilated storage, refrigerated storage
   - Transportation by Rail, Highway, Air and Sea
   - Market disorders, physical injuries and diseases of fruits and vegetables
• Protection during wholesale and retail distribution.

3. Storage and handling of milk and milk products
   • Milk – sources, contamination, chemical composition, keeping quality, grading of milk, microbiology of milk and its products.
   • Milk products – Butter, cheese, curds, fermented dairy products.
   • Spoilage and preservation of dairy products.
   • Microbial changes and types of spoilage – souring, gas formation, proteolysis, ropiness, alkali production, changes in butter fat, flavor changes, colour changes.
   • Preservation techniques – pasteurization, UHT, cooling, chilling and freezing, use of preservatives – added and developed.

4. Storage and handling of flesh and marine foods.
   • Meat – Classes of meat, spoilage of fresh and cured meats, types of spoilage, aerobic and anaerobic. Sources of contamination, control measures – hygiene, biological control, use of antibodies, ionizing radiations. Packaging of meat.
   • Fish – Characteristics – appearance, chemical composition, spoilage, enzymic, microbial and chemical action. Transportation – by sea, rail, railroad container, mechanical refrigerators, cars, packing fresh fish and frozen fish. Refrigeration and freezing of fish and other shell fish.

6. Soft core-Self study paper: FOOD BIOTECHNOLOGY [0+4+0]

1. A. Use of Biotechnology for food processing.
   B. Indian fermented foods – Historical perspective, Mechanism of fermentation, effect on nutritional value.
2. Genetically modified foods - Need for GM foods – The food challenges, Potential benefits in agriculture, Crop engineered for input and output traits, nutritional improvement, animal foods, issues of concern – safety of GM foods.
3. Technology for production of alcoholic beverages
4. A. Fermented cereal and legume based products, traditional and yeast leavened products.
   B. Fermentation of vegetables and fruits – lactic acid fermentation.
   C. Fermented milk products – yoghurt, butter- milk, cheese.
   D. Fermentation of meat and fish.

OPEN ELECTIVE PAPER FOR OTHER STUDENTS

7. FOODS IN INDIAN TRADITION [2+0+0]

1. History of Indian foods - Ancestral legacies, Food and culture, Indian food ethos.
2. Traditional Indian Dietary patterns and Indian ethnic cuisines
3. Nutritional/medicinal quality of traditional foods - Traditional food beliefs, foods in Ayurveda.
4. Traditional food processing technologies
STREAM 2. SPECIALIZATION IN CLINICAL NUTRITION AND DIETETICS
II SEMESTER

1. Hard Core: FOOD SCIENCE AND FOOD PROCESSING- II * [2+1+2]
   [Common paper]
2. Hard Core: VITAMINS IN NUTRITION * [1+1+2/week]
   [Common paper]
3. Hard Core: MINERALS IN NUTRITION * [1+1+0/week]
   [Common paper]
4. Hard Core: BASICS OF HUMAN PHYSIOLOGY [2+1+0/week]

1. **Cell physiology**- Overview: molecular structure of cell and its components; chemical nature, type of cells and their functions. Different tissues and their characteristics.
2. **Organ systems- overview of physiological functions.**
   b. Nervous system: nervous system - peripheral and autonomic nervous system, structure and functions of neurons, excitatory and inhibitory process, generation and propagation of action potential.
   c. Respiratory system: breathing mechanism, respiratory systems, homeostasis and gas exchange.
   d. Renal system: organs in the urinary system, nephrons, formation of urine, maintaining fluid and electrolyte balance.
   f. Muscular system: types of muscle system and their importance, chemical, electrical and molecular involvement in muscle contraction.
   g. Skeletal system: structure- macroscopic and microscopic, osteocytes, osteoclasts and osteoblasts, functions, metabolism, role of hormones.
   h. Senses- physiology and function: chemoreception- olfactory and gustatory system, vision, hearing and touch.
3. **Reproductive system**
4. **Immune system:** immune response, CMI and Humoral immunity

5. Soft core: Term Work in Nutritional Assessment * [0+2+0]
   [Common paper]
6. Soft core: NUTRIENT METABOLISM [2+0+0]

1. **Metabolic pathways of macronutrients:**
   - **Carbohydrates:** Aerobic and anaerobic degradation, glycogenesis, glycogenolysis, gluconeogenesis, HMP shunt pathway. Alcoholic fermentation. Hormonal regulations of blood glucose.
   - **Protein and amino acids:** protein degradation, metabolism of aromatic, sulfur containing, BCAA and other amino acid pool, fate of nitrogen (urea cycle). Glutamine and alanine cycle, protein biosynthesis.
• **Lipids**: Metabolic pathways of triacylglycerol, fatty acids, cholesterol and lipoproteins. Regulation of lipid metabolism and ketone bodies.

2. **Bioenergetics and oxidative metabolism** - Concept of energy and its conversion, energy producing and utilizing systems, thermo dynamic relationships and energy-rich components. Sources of and fates of acetyl co A, The Kreb’s cycle, structure and role of mitochondria, Electron transport chain, oxidative phosphorylation.

3. **Nucleic acid, Iron and Heme Metabolism**: metabolism of nucleic acid components, biosynthesis of nucleotides. Iron metabolism, iron containing proteins, intestinal absorption of iron, heme biosynthesis.

4. **Integration and regulation of metabolism**: Interrelationship of carbohydrate, protein and lipid metabolism, importance of Krebs cycle, role of liver, muscle and adipose tissues; Metabolic adaptation during starvation, exercise, stress and diabetes mellitus.


7. **Soft core Paper**: NEUTRACEUTICALS AND HEALTH FOODS *     [2+0+0]  
   [Common paper]

8. **Soft core**: ENDOCRINOLOGY  [2+0+0]

1. **Hormones**: Introduction to endocrinology, messengers- neuronal and chemical signals. General characteristics - Neuroendocrine relationship, mechanisms of hormonal action, control of hormone secretion.

2. **Classification** - Basis and types of classification - i) Paracrine, Autocrine, Intracrine, ii) Anatomical and iii) chemical nature

3. **Steroid hormones**

4. **Peptide hormones**

5. **Derivatives of amino acids**

   Note: for chapter 3, 4 and 5 to cover structure, biosynthesis, metabolism, regulation, functions and disturbances in synthesis and functions.

9. **Soft core (Self Study)**: PUBLIC HEALTH NUTRITION (Self-study)  [0+2+0]

1. Concept of public health nutrition- relationship between health and nutrition, role of public health nutritionists in the health care delivery.

2. Public health and nutrition policies- plan of action and programs.

3. Food and nutrition security- food production, distribution, access, availability and consumption. Socio cultural aspects and dietary patterns: their implication for nutrition and health.

4. Health care facility- primary health care of the community, health care delivery system.

5. Determinants of nutrition and health status- socio cultural, biologic, environmental and economic factor, indicators of health and malnutrition. Economics of malnutrition- impact on productivity and national development.

6. Socio demographic, health and nutrition transitions

7. Approaches and strategies for improving nutritional status and health: national and international contributions, role of government and non government organizations. Case studies of selected strategies and programs: their rationale and context- health based, intervention, food based interventions including fortification, genetic improvement of foods, supplementary feeding, and nutrition education for behavior change.
III Semester

1. Hard Core: PRINCIPLES OF DIET THERAPY [2+0+0/wk]

1. **Introduction to Clinical Nutrition and Dietetics**: Definition and history of dietetics. Dietetics in contemporary medical management. Inter relationship between food, nutrition and health. Factors affecting food choices. **Basic principles of planning a normal diet**: characteristics of a normal diet, meeting nutrient requirements of individuals and family. Use of Dietary guidelines for Indians.

2. **Objectives of diet therapy**: Regular diet and rationale for modifications in energy and other nutrients, texture, fluid, soft diets. Principles of enteral and parenteral nutrition.

3. **Assessment of nutritional status in clinical situations and development of nutrition care plan**: Assessment nutritional status in hospital setup-dietary, clinical, biological, somatic, behavior methods. Psychological factors affecting food intake. Data analysis and interpretation. Medical records-types, uses. Factors to be considered for counseling –Nutritional and health conditions including body care- skin, hair, face, hands, feet etc. Aging, gender related and other problems. Medical terminology.

4. **Dietary management for nutritional disorders**-
   a. Protein and energy malnutrition (hospital and domiciliary treatment), Vitamin A deficiency, Other deficiencies- osteoporosis, iodine and iron deficiency disorders etc

5. **Feeding of Special groups**: spastic, polio affected children, preterm infants and other conditions.

6. **Dietary management of febrile diseases** – Fever-acute and chronic (Tuberculosis, poliomyelitis, typhoid, pneumonia, measles, chicken pox, malaria) problem with resistance virus, chikungunea, H1N1.

7. **Food allergy and poisoning**: Definition, development, causes, methods of detection and preventive measures and course of nutritional management.

8. **Nutritional factors in tooth development**: dental caries, pathophysiology and dental decay, effect of fluoride and preventive care.

2. Hard Core: CLINICAL NUTRITION AND DIETETICS- I [2+1+2/week]


2. **Upper gastrointestinal diseases**: Gastroesphophageal reflex and esophagitis. **Disorders of stomach**: indigestion, dyspepsia, gastritis, (causes, pathology, management).

3. **Nutritional management in pulmonary diseases**: Chronic obstructive Pulmonary disease, cystic fibrosis, pneumonia, tuberculosis; causes, pathology, effect of malnutrition, nutritional management.


5. **Liver diseases**: Hepatitis (A, B, C). Cirrhosis, Cholecystisis, Cholelithiasis. alcoholic liver disease, cholestatic liver disease, inherited disorders

6. **Pancreatitis**: Functional tests and dietary management.

7. **Neurological diseases**: [Stroke, epilepsy, migraine, Parkinson’s neurotrauma myasthenia gravis], causes, effect of malnutrition, feeding problems, effect of nutrients.

**Note**: each chapter should be dealt under cause, etiology, symptom and management.

**PRACTICAL SESSIONS** [4 hrs/wk]

1. Visit to the hospitals- learn to use medical record and obtain required information.

2. Identify and collection of case studies- at least 3-4 cases in every condition.
3. Develop NCP, plan course of action.
4. Prepare for counseling aids.
5. Demonstration of any instrument to measure body component.

3. Hard core: FOOD SERVICE MANAGEMENT [2+1+0/wk]

1. Food service Institutions- Definition and importance, various types of food service institutions like hospitals, school meals, hostels, industrial canteens, commercial hotel/ canteens etc. Institutions catering to different types of handicapped personnel.
2. Theories about approaches to food service management -
3. Developing objectives and goals- Definition and importance, types of goals Policies, procedures and rules.
4. Principles and procedures of management- Managerial roles and responsibilities, the manager and leadership quality. Tools of management - organization chart, types, structure, function; work improvement techniques.
5. Personnel management - recruitment, training, placement, promotion, personnel records, work appraisals,
   Quantity food preparation and service- Factors in menu planning for large groups, systems for maintaining quality in food preparation and service. Kitchen control and maintenance of Kitchen records.

PRACTICAL SESSION* Report submission (internal valuation)
1. Standardization of recipes- costing of recipes.
2. Survey of hostels and cafeteria to assess various aspects of food service management. Submit a report.

4.Soft core : QUALITY CONTROL IN FOOD INDUSTRIES AND FOODSERVICE INSTITUTIONS * [2+0+0]
[Common paper]

5. Soft Core: SPORTS NUTRITION [2+0+0/wk]

3. Nutrition in sports: Sports specific requirements- Importance of carbohydrate loading, pre game and post game meals, Diets for persons with high energy requirements, stress, fracture and injury.
4. **Dietary supplements and Ergogenic aids**: Definitions, Use of different nutragenic / ergogenic aids and commercial supplements, Sports drinks, sports bars etc.

6. **Soft core: FOOD AND NUTRITION SERVICES IN HOSPITAL** [0+2+0]

1. Scope for food and nutrition services in hospitals- importance of nutritional care and foods service in hospitals.
2. Role of nutrition support team- dietetic interns, dietitians (therapeutic, administrative and consultant dietitian) medical doctors and nurses. Team approach in patient care, Psychological considerations in patient care, Inter personal relationship with patients.
3. Types of services- services in primary, secondary and tertiary health care setup, patients in different critical care centers, Post natal, pediatric and geriatric patients.
4. Basic quality management in nutrition services- total quality, structuring quality program in health care, assessment of quality of services.
5. Patient satisfaction- meeting patient needs and wants, managing customer’s expectations, assessing patient’s satisfaction as a mark of quality.
6. Continuous quality improvement- strategies, training and monitoring.

7. **Soft Core: DRUG NUTRIENT INTERACTION AND NUTRIGENOMICS** [2+0+0/wk]

1. **Drugs and pharmaceutical compounds**- natural and synthetic, use of excipients.
2. **Characteristics of drugs ACTION**: Pharmacodynamics, pharmacokinetics, route and form of excretion. Drug abuse and drug resistance
3. **Drug-nutrient interactions** – effect of drugs on ingestion, digestion, absorption and metabolism of nutrients, effect on nutritional status, effect on organ function, drug dosage and efficacy.
4. **Nutrient effects on drug therapy** – effects of dietary composition, interactions between medication and milk, iron, fruit juices, antacids.

8. **Soft Core: PREPARATION OF AUDIO VISUAL AIDS** (Self-study) [0+2+0]

1. Audio-Visual Aids : Meaning, importance and Types;
2. Need for Audio-Visual Aids: Audio-Visual Aids as a Means of Communication, as a Means for Retention; as a Means to Save Time.
3. Audio Aids : Importance and Types- Record Player; Radio Programmes; Non-electronic Equipment; Other Equipments. Printed materials, charts, pamphlets, etc.
4. Preparation of audio visual aids for nutrition counselling for
   - Specific disease conditions
   - Public health programs.

Students are expected to prepare different types of materials, demonstrate and submit a report which will be valued internally.
9. Soft core: NUTRITION & HEALTH PROBLEMS OF VULNERABLE POPULATION [2+0+0/wk]


2. Normal nutrition throughout the life cycle: Nutrition in adolescence, diet, Adolescent pregnancy, eating disorders, food consumption patterns in women, nutritional needs of elderly women, Nutrition for female athlete.

3. Nutrition and reproduction: Diet, menstrual cycle and sex steroid hormones, nutrition concern during pregnancy and lactation, nutritional concerns in pre and post menopausal phase, hormone replacement therapy, use of oral contraceptives and nutrition.

4. Psychosocial aspects of woman’s health

5. Preventive nutrition throughout the life cycle: Preventive nutrition in adolescent girls, obesity, cardiovascular disease, osteoporosis, diabetes, cancer.

IV Semester

1. Hard Core CLINICAL NUTRITION and DIETETICS-II [1+1+2/week]

NOTE: theories, etiology, symptoms, assessment and dietary management of each disease condition to be included.


- Dietary management of Cardiovascular diseases: Role of specific nutrients in cardiac efficiency-aetiology, incidence, symptoms, long-term and short-term treatment in Coronary disease. Myocardial infarction, cerebral infarction (atherosclerosis as one of the causative factor). Other acute and chronic conditions: congestive heart failure, hypertension, dyslipidemia (genetic hyperlipidemia).


- General principles of diet for the following conditions: gout, Cancer (home/hospital management), Effect of cancer therapy on nutrition of the patient. AIDS (home/hospital management).

PRACTICAL SESSION -

- Identifying a specialty care unit: diabetic clinic/weight management center/health clubs/hospitals/nursing homes-select at least 3-4 patients

- Case studies: Obtaining patient’s medical history, planning for assessment and counseling for the following conditions (at least 2 to 3 cases to be taken up by each student). Obesity, diabetes mellitus (NIDDM and IDDM), hepatitis and cirrhosis, myocardial/ cerebrovascular infarction, renal failure, calculi and nephritic syndrome, fever-chronic and acute.

- Diet planning and preparation.

- Preparation of enteral feeds
2. Hard Core : 

**INTERNSHIP**

[0+6+0/week]

1. Internship in hospitals or Food Service Institutions & Hospitals / Clinics
2. Submission of project work / report on case studies on a minimum of 10 patients in any disease condition
3. Report on internship will be evaluated as stated under project work regulations.

3. Soft Core :

**NUTRITION COUNSELING**

[1+1+0/week]

1. **Nutrition Counseling:** Definition, concept, the role of clinical dietician, the recipients, counseling environment.
2. **A systems approach to nutritional care:** overview of the system, components of the system.
3. **Factors to be considered for counseling:** Nutritional and health conditions, including body care, skin, hair, face, hands, feet etc. Psychological conditions, food allergies, aging, gender related and other problems.
5. **Planning component:** Designing of counseling plans – goals & objectives, classifying objections, resource planning – client care plan and designing evaluation instruments.
6. **Implementation component:** Counseling the client/patient – client concurrence, co-ordination of care plans-the provision of learning experience.
7. **Evaluation component:** Measuring the success of performance of client and evaluating the counseling process.
8. Hand on experience: Preparation of counseling aids for any two disease conditions and conduct counseling sessions.

4. Soft core :

**NUTRITION IN CRITICAL CARE**

[2+0+0]

- **Nutritional care:** of hospitalized patients-Hospital malnutrition, impetus for improved Nutritional care of patients, nutritional screening, assessment of the critically ill. Preparation of nutritional care plan.
- **Nutritional support systems:** and other life saving measures for the critically ill- Monitoring nutrient intake and providing nutrition support service, role of immuno enhancers, conditionally essential nutrients, immuno suppressants and special diets.
- **Planning, monitoring and management of Enteral and parenteral feeding:** Designer feeds, commercial feeds, techniques, applications and complications.
- Management of high risk conditions: including patho-physiological clinical and metabolic aspects in the following conditions: Burns, CV complications and surgery, cancer, AIDs, multiple organ failure, chronic renal failure (CRF), dialysis, transplant, GI tract surgery, hepatic failure and transplants, neuro surgery, fractures and other conditions of stress, trauma and sepsis, dumping syndrome.
- **Home care for critically ill and requiring long term nutrition support**.
- **Complications of nutritional support systems:** including re-feeding syndrome, palliative care, rehabilitation diets (stages).

**Practical Experience:**
Visits to hospitals (special units- ICU)/ emergency relief camps and health oriented camps and presenting as seminar/report.
5. Soft Core: MEDICAL ETHICS AND LAWS [2+0+ 0/wk]

1. Meaning and definition of clinical nutritionists and dietetic practices
2. Registered dieticians- rights and duties of medical professionals and dieticians.
3. Rights and obligations of patients.
4. Medical profession and consumer protection- medical negligence, standards of proof, individual and joint liability.
5. Health care workers and the law- pharmacist, nurses and other paramedical staff.
6. Nutritional and medical ethics- autonomy of the patients, medical confidentiality of medical records, patients and physician interaction and decision making- judicial trends.
7. Role of Indian dieticians Association (IDA) and its power and functions- registration as registered dietician.
8. Ethical issues in human and animal research.

6. Soft Core: INBORN ERRORS OF METABOLISM [2+0+ 0/wk]

1. Introduction- definition, occurrence, types, causes, detection techniques - newborn screening (NBM), goals of nutrition therapy, role of nutritionist. Prevention strategies – genetic counseling.
2. Carbohydrate metabolism - G6PD deficiency, galactosemia, fructose intolerance, glycogen storage disease, pentosuria - prevalence, clinical and biochemical features, dietary management.
3. Amino acid metabolism - Phenylketonuria, tyrosinemia, homocystinuria, BCAA Maple syrup urine disease argininemia- prevalence, clinical and biochemical features, dietary management.
5. Other disorders - hypothyroidism, sickle cell anemia, cystic fibrosis, lysosomal storage disease (Tay-Sachs, Gaucher's) and gout - prevalence, clinical and biochemical features, dietary management.

7. Soft Core: NUTRITION MANAGEMENT DURING EMERGENCIES [Self-study] [2+0+0]

1. Natural/man made disasters: resulting in emergency situations-Famine, drought, flood, earthquake, cyclone, war, civil and political emergencies. Factors contributing to the rise and development of emergency situations (Use illustrations from Indian case studies).
4. Nutritional relief and rehabilitation: Assessment of food needs, food distribution strategy, targeting food aid, mass and supplementary feeding, special foods/ rations for nutritional relief, organizations for mass feeding/ food distribution, transportation and storage, feeding centers, sanitation and hygiene and public nutrition approach to tackle nutritional and health problems in emergencies, ethical considerations.