

**NATIONAL EDUCATION
POLICY-2020**

PROPOSED STRUCTURE

Of

**M.Sc. (Food & Nutrition)
SYLLABUS**

2023



Curriculum Design Committee, Uttarakhand

Sr.No.	Name & Designation	
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7.	Prof. K. D. Purohit Advisor, Rashtriya Uchchatar Shiksha Abhiyan, Uttarakhand	Member

SYLLABUS PREPARATION COMMITTEE

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Members of Board of Studies - M.Sc. HOME SCIENCE

S. N.	Name	Designation	Department	BOS	Sing.
1.	Prof. G.K. Dhingra	Professor & Dean	Botany	Convener	
2	Dr. Dimple Bhatt	Assistant Professor	Home Science	Member	
3	Dr. Anamika Chauhan	Assistant Professor	Home Science	Member	
4	Dr. Pooja Rani	Assistant Professor	Home Science	Member	
5	Prof. Pushpa Negi	Principal		Member	
6	Prof. Pankaj Pant	Principal		Member	
7	Prof. Kuldeep Negi	Principal		Member	
8	Director, USERC, Dehradun	Director		Member	

Semester-Wise Titles of the Papers in M.Sc. Food Science

Year	Sem	Course Code	Paper Title	Theory/Practical	Credits
Research In Food Science					
1	I	FN/C001	Advanced Nutritional Biochemistry.	Theory + Practical	4 + 1
		FN/C002	Fundamentals of Food Preservation and Processing	Theory + Practical	4 + 1
		FN/C003	Food and Food products	Theory + Practical	4 + 1
		FN/C004	Research Methods	Theory	5
		FN/C005	Basic Concepts of Nutrition	Theory	5
				Total :	25
	II	FN/C006	Food Microbiology	Theory + Practical	4 + 1
		FN/C007	Food ingredients, Additives and Nutraceuticals	Theory + Practical	4 + 1
		FN/C008	Statistics	Theory	5
		FN/C009	Food Safety and Quality Control	Theory	5
	FN/C010	Clinical nutrition & dietetics-I (Or) Project	Theory + Practical	4+1	
			Total :	25	
Masters in Food Science					
	III	FN/C011	Public Nutrition	Theory	5
		FN/C012	Project *	-	5
		FN/C013	Electives (Any One of the following)* 1. Nutrition Management and Health 2. Food Hygiene and Sanitation	Theory	5
		FN/C014	Industrial Tour Report*	Practical	5
		FN/C015	Clinical nutrition & dietetics-II	Theory + Practical	4+1

			Total :	25
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IV	FN/C016	Techniques in Food Analysis	Theory + Practical	4+1
	FN/C017	Seminar + Review Paper*	-	5
	FN/C018	Institutional Food Management	Theory	5
	FN/C019	Dissertation *	Theory	10
			Total:	25

*Electives (Any **One** of the following)

1. Nutrition Management and Health
2. Food Hygiene and Sanitation

Total Credits = 25x4=100

Total Number of hours = T-60, P-40/Paper

Program Objectives (POs)

Students will be practitioner Food scientist and researchers; they will function in their field with ethical awareness and responsibility. They will interact with their peers in an interdisciplinary way in their work place and society and contribute to sustainable growth of the country. They will pursue higher studies and choose their career paths in teaching or research.

Program's Outcomes

PO 1. Students will develop professional skills through scientific attitude and values. Students will have foundation in the fundamentals and applications of the Food science applications required for different jobs.

PO 2. They will be able to demonstrate knowledge for in-depth research to formulate and solve the issues related to Food science and food industry research.

PO 3. Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.

PO 4. Students will be able to explore new areas of research in both Food Microbiology, Food Biotechnology and allied fields of science and technology.

PO 5. Students will be able to demonstrate skills they will acquire during their study to use modern analytical tools/software/equipment and analyze and solve problems in various courses of Food Science.

Specific Learning Outcome:

- Students will have a thorough understanding of various cereals, legumes and their value added products after processing.

- The students will know the specifications of various products, their variation in composition basis and nutritional details after certain processing.
- Students will have a thorough understanding of various factors responsible for food spoilage.
- The students will know the specifications of various contamination sources and disease developed in certain processed products.
- Students will have a thorough understanding of importance of hygiene and sanitation in during food processing
- Students will have a thorough understanding of structure and classification various minor components of food.
- The students will know the process of nutritional need during growth and ageing process in detail.
- The student will have thorough understanding of various procedures followed for nutritional status of and individual and role of certain agencies and NGO's in combating malnutrition.
- Students will have a thorough understanding on properties of food.
- The students will know the important nutritional component for therapeutic aspect of food.
- The student will have thorough understanding of various types of additives to be added and their role in respective food items.
- Students will have a thorough understanding on the quality attributes, their measurement principle and instrumentation of various instruments used in food quality analysis.
- The students will know the importance of various methods to identify any adulteration aspect of food.
- Students will have a thorough understanding on various food laws with their amendments and regulation guidelines followed in national and international level.
- Students will have a thorough understanding of various food processing techniques.
- The students will know the importance of various preservation techniques.
- Students will have a thorough understanding the arrangement of data to draw an analytical conclusion.
- The students will know the importance of various methods to design the research work.
- Students will have a thorough understanding on relation, deviation and accuracy of their experimental data.
- The students will know the importance of research work and have some contribution towards science.
- Students will have a thorough understanding the processing and preservation of appetizers.
- The students will know the importance of various fermentation methods used for beverage preparation for respective Flavors development.
- Students will have a thorough understanding on effect of blending and baking on final product of bakery items.
- The students will know the various extruded product development.

SEMESTER I

Paper 1

Title: Advanced Nutritional Biochemistry FN/C001 (Advanced Nutritional Biochemistry)

Unit-1

Carbohydrates:- classification, structure and biological importance.

Metabolism:- glycolysis, gluconeogenesis and citric acid cycle.

Unit-II

Protein-classification and biological importance.

Amino acid: - classification & structure.

Unit-III

Lipids:- classification and biological importance.

Metabolism of lipid.

Unit-IV

Energy metabolism:- respiratory quotient, calorimeter, basal metabolism, specific dynamic action of food.

Unit-V

Vitamins:- chemistry, food sources and functions.

Unit-VI

Nucleic acid:- structure and importance of base, nucleotides, nucleosides, DNA and RNA.

Reference:

- Principles of biochemistry- Nelson and M.cox (Lehninger).
- Text book of biochemistry –West and Todd.
- Fundamentals of biochemistry- A.C Deb.
- Review and physiological chemistry- H.Harper
- Experimental biochemistry- J.M.Clark

Practical

- Structure of DNA, RNA,
- Structure and metabolism of any two nutrient

Paper -2

Title: Food Processing and Preservation FN/C002 (Food Processing and Preservation)

UNIT-I

Basic concept of food processing and preservation: Reason of food Spoilage and Scope of food processing preservation; principles of food processing and preservation. Principle and preservation by low temperature: (refrigeration, freezing, and dehydro freezing; cold storage, frozen food), changes during freezing-physical and chemical changes. Processing and preservation by drying: factors affecting drying rate, types of dryer – (kiln, tray, drum, spray, tunnel, fluidized bed drying), types of drying technique (freeze drying, vaccum drying),

UNIT-II

Processing and preservation by heat: (blanching, pasteurization, sterilization, UHT processing, heating, dehydration, canning, Microwave cooking-(principle, changes during microwave cooking, advantages), difference between microwave and conventional heating, Use of Nano technology in food. Concentration and evaporation-(flash evaporator, falling film evaporator and multiple effect evaporators), changes during Concentration

UNIT-III

Processing and preservation by non-thermal method: irradiation, high pressure, pulsed electric field, high hydrostatic pressure, Hurdle technology: concept of hurdle technology and its application, Ultrasonic processing: Properties of ultrasonic, application of ultrasonic as processing techniques, ohmic heating, IR heating;

UNIT-IV

Food processing equipments: material handling, cleaning and grading, conveyors, size reduction, food grain storage, milling, Separation Technique: filtration, agitation and mixing. Baking, Roasting, Frying. Extrusion Technology-(principle, types of extruders).

References

1. Arsdel WB, Copley MJ & Morgan AI. 1973. *Food Dehydration*. 2nd Ed. Vols.I, II.AVI Publ.
2. Desrosier NW & James N.1977. *Technology of Food Preservation*.4th Ed. AVI.Publ.
3. Fellows PJ. 2005. *Food Processing Technology: Principle and Practice*. 2nd Ed. CRC.
4. Jelen P. 1985. *Introduction to Food Processing*.Prentice Hall.

Practical

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

- Sun drying and dehydration-cereals, legumes, vegetable based.
- Preservation with sugar-jams, jelly, preserves, etc.

- Preservation - salt, oil, vinegar-pickling.
- Preservation of foods using chemicals –tomato ketchup, squash.

Paper -3

Title: Food and Food Products FN/C003 (Food and Food Products)

UNIT-I

Cereals: Structure of cereal grains, composition, processing and storage of some common cereals (Rice, Wheat, Maize, Oats) ;Pulses: composition, nutritive value, processing and storage of some common pulses(Bengal gram, Black gram, Horse gram, Green gram); Nuts & plantation crop: processing, nutritional value of some common nuts(Coconut, Ground nut, Almond, Cashewnut), tea, coffee and cocoa.

UNIT-II

Fruits: Composition, Processing, nutritive value, fruit ripening and storage of fruits, processing of juices, candy, preserve, dried powder, ketch up, sauce, jam and jellies; Beverages: Composition, classification and Processing of Carbonated Beverages Vegetables: Classification, composition, processing of some common vegetables like pickles, potato chips; Spices: Composition, flavoring compounds, processing, nutritive value, adulteration of some common spices of India.

UNIT-III

Meat: Structure, composition, Slaughtering types, post-mortem changes and grading of meat, tenderization and curing of meat; Poultry: composition, classification, nutritive value and processing; Egg: Structure, composition, classification, nutritive value and processing; Fish: composition, classification, nutritive value and processing.

UNIT-IV

Milk and milk products: composition, physic-chemical properties of milk and nutritional importance of milk, processing of milk, Classification and study of milk products- Cream, Butter, Ghee, Khoa, Chhanna, Paneer, Cheese, Ice-cream, Fermented milk products. Various defects in milk products.

References:

1. Food Facts and Principles -N. ShakuntalaManay& M. Shadaksharaswamy, New Age International (P) Limited, New Delhi.
2. Food Science – B.Srilakshmi, New Age international (P) Limited, New Delhi.
3. Essentials of Food & Nutrition-M.Swaminathan-vol I &vol II.

Practical

- Processing of cereals and dairy product
- Identification of product, selection of one product and its standardization

Paper -4
Title: Research methodology
FN/C004 (Research methodology)

Unit-I

Science, scientific methods, scientific approach.

Research, definition, nature, role, need, step.

Types of research: Historical, descriptive, experimental, case study, social research, participatory research.

Unit-II

Definition and identification of research problem, selection of a problem nature, type and function of hypothesis. Types of variables.

Unit-III

Research design- definition, types, basic principles and purpose. Population and sample. Probability sampling, non probability sampling.

Unit-IV

Sources of data. Different type of Data, Importance of Data, Data Collection Techniques

References:

- Research Methodology, Methods and Techniques – C.R. Kothari Wiley Eastern Limited New Delhi
- Elements of Statistics, Theory & Practice – M.Singhal. Lakshmi Narain Agarwal, Educational Publisher – Agra
- An Introduction to Statistical Methods – C.B.Gupta & V.Gupta- Vikas Publishing House PVT Ltd. New Delhi.
- Research Methods & Measurements in Behavioural & Social Sciences – G.L.Bhatnagar– Agri. Cole. Publishing Academy, New Delhi.
- Statistical Methods – S.P.Gupta, Sultan Chand & Sons Publisher- New Delhi
- Research Methodology, Methods and Techniques – C.R. Kothari Wiley Eastern Limited – New Delhi
- An Introduction to Statistical Methods – C.B.Gupta&V.Gupta- Vikas Publishing House PVT Ltd. New Delhi.

Paper -5

Title: Basic Concepts of Nutrition FN/C005 (Basic Concepts of Nutrition)

UNIT-I

Food as a source of nutrients: classification of nutrients; functions, recommended dietary allowances, BMR, SDA. Vitamins: (A, B complex, C,D, E & K)& all major and minor mineral elements with their role in body , importance of Roughages in the diet. Water& electrolytes balance.

UNIT-II

Nutritional Needs: Nutrition during infancy, childhood, adolescence and adult, nutrition during pregnancy& lactation, nutrition in later maturity period, nutrition and infection, nutrition and immunity, nutrition & stress.

UNIT-III

Nutritional Assessment: Assessment of nutritional status by direct & indirect methods, use of various methods for the assessment of nutritional status, anthropometric assessment, clinical examination, bio-physical or radiological measurement, functional assessment, laboratory & biochemical assessment, dietary assessment, vital health statistics.

UNIT-IV

Nutritional problems: food intake and its regulation, food pattern, population and food production, malnutrition, background problem of malnutrition in India ecology of malnutrition, effect of malnutrition on vulnerable society, impact of malnutrition on national development, major to combat malnutrition, national nutrition policy and programmes, National and International agencies in combating malnutrition.

References:

1. Human Nutrition and Dietetics – S. Davidson & R. Passmars.
2. Essentials of Food and Nutrition – M. Swaminathan, vol. I & II, The Bangalore printing and Publishing Co. Ltd.
3. Human Nutrition and Dietetics – Davidson, Passmore, East wood, English Language Book Society (ELBS).
4. Dietetics – B.Srilakshmi; New age International (P) Limited, New Delhi.
5. Nutrient Requirements and Recommended Dietary Allowances for Indians – Indian Council of Medical Research, National Institute of Nutrition, Hyderabad.

6. Text Book of Human Nutrition – Mahtab. S. Bamji; N.Pralhadrao&Vinodini Reddy, Oxford & IBH Publishing Co. Pvt.Ltd
7. Principles of Nutrition – Fisher and Fuqua, wiley eastern Private Limited, New Delhi.

SEMESTER II

Paper 1

Title: Food Microbiology

FN/C006 (Food Microbiology)

UNIT-I

Introduction to food microbiology

Micro-organisms of importance in food- bacteria, yeast and moulds, morphology, primary sources and biochemical activities.

Factors affecting the growth of micro-organism.

UNIT-II

Contamination, Preservation and Spoilage of different kind of foods-cereal, Pulses, Fruit and Vegetable, Meat, fish egg, poultry and their processed products, Milk and milk Products, Canned foods and Beverages.

UNIT-III

Food toxicology & food borne illness: Food hazards microbiological, nutritional, environmental, natural toxicants, pesticides, food additives, preservatives, food borne illness: (Clostridium, botulinum, Escherichia coli, Brucella, Bacillus, Salmonella, Staphylococcus) Non bacterial agent & food borne illness, (Helminths & Nematodes, protozoa, toxic algae, fungi & food borne viruses

UNIT-IV

Microbial Food hygiene and sanitation: Method for microbial examination of food: indicator organisms, direct examination, cultural techniques, Rapid methods in detection of microorganisms. Contamination during handling, processing and its control.

References:

1. Food Microbiology – M.R.Adams&M.O.Moss, New Age International (P) Limited, New Delhi.
2. Food Facts and Principles -N. ShakuntalaManay& M. Shadaksharaswamy, New Age International (P) Limited, New Delhi.
3. Food Microbiology – William C.Frazier, Tata McGraw Hill publishing Company limited, New Delhi.

Practical

- Staining of Bacteria: Gram's staining, acid-fast, spore, capsule and flagellar staining, Motility of bacteria, Staining of yeast and molds.

- Bacteriological analysis of Foods: Both processed and unprocessed like vegetables and fruits, cereals, spices and canned foods, using conventional methods, yeast and mold count in foods

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Paper -2

Title: Food Ingredients, Additives & Nutraceuticals FN/C007 (Food Ingredients, Additives & Nutraceuticals)

UNIT-I

Properties of solid and liquid foods: Physical properties (solutions, vapor pressure, boiling point, freezing point, osmotic pressure, viscosity, surface and interfacial tensions, specific gravity), Dispersion systems in of foods-Sol, Gel, Foam, Emulsion; Food preparation: Objective and method of cooking, cooking media, changes during cooking,

UNIT-II

Food pigments and colors: Some common pigments used in food industry (chlorophylls, myoglobin, anthocyanin, betalain, carotenoids, synthetic colors & lake /dye colors and other colourants); Flavors: types of flavor, flavor compounds, extraction principles of flavor, Sensation- smell sensation, texture sensation, visual appearance and sensation of taste.

UNIT-III

Food additives: definition, need and classification of food additives, preservatives-Natural and Artificial, antioxidants, chelating agents, coloring agents, curing agents, Emulsions, flavors and flavor enhancers, leavening agents, nutritional supplements, non-nutritive sweeteners, pH control agents, stabilizer and thickeners, humectants, anti-caking agents, firming agent, clarifying agent, flour bleaching agents.

UNIT-IV

Nutraceuticals and phytochemicals: definition, Classification. Dietary supplements, Functional foods- their legislation and health claims, Natural occurrence of certain photo-chemicals. Antioxidants and flavonoids: omega – 3 fatty acids, carotenoids, dietary fiber, phytoestrogens; Nutraceuticals for effective control of disease or health benefit with adequate safety.

References:

1. Food Facts and Principles -N. ShakuntalaManay& M. Shadaksharaswamy, New Age International (P) Limited, New Delhi.
2. Branen AL, Davidson PM &Salminen S. 2001. *Food Additives*. 2nd Ed.Marcel Dekker.
3. Gerorge AB. 1996. *Encyclopedia of Food and Color Additives*. Vol. III.CRC Press.

Practical

- Sugar and jaggery cookery: relative sweetness, solubility and size of sugar, stages of sugar cookery, caramelization, crystallization, factors affecting crystal formation.
- Difference sensory test type Single sample, Paired comparison, Duo-trio test, Triangle test, Rank order, Descriptive test

Paper -3

Title: Statistics

FN/C008(Statistics)

UNIT-I

Meaning and uses of statistics, classification and tabulation of data construction of frequency distribution table.

UNIT-II

Diagrammatic representation of data- single dimensional diagram (line and bar), two-dimensional diagram(pie)

Graphical representation of data- Graphs of frequency distribution. (Histogram, frequency polygon, frequency curve)

UNIT-III

Descriptive statistics: Measure of central tendency: (Arithmetic mean, mean, median, mode), relation between mean median and mode ;Measure of dispersion: Range, Mean deviation & Standard deviation; Skewness and Kurtosis .

UNIT-IV

Theoretical Probability Distribution: Binomial, Poisson and normal distribution; Testing of Hypothesis: Null and Alternative Hypothesis, level of significance, Student‘t’ distribution and its application, Chi-square(χ^2) test & its application, ‘f’ test and its application.

UNIT-V

Correlation, Regression and ANOVA analysis: Types of correlation; simple, partial and multiple correlation, Method of study & testing the significance of correlation coefficient, Rank Correlation, Regression analysis: regression equations and regression lines, Properties of regression lines, regression coefficient, testing the significance of regression coefficient. Analysis of variance (ANOVA): One way and two way classification and their applications.

References:

1. Statistical Methods – S.P.Gupta, Sultan Chand & Sons Publisher- New Delhi

2. Research Methodology, Methods and Techniques – C.R. Kothari Wiley Eastern Limited – New Delhi
3. Elements of Statistics, Theory & Practice – M.Singhal. Lakshmi Narain Agarwal, Educational Publisher – Agra
4. An Introduction to Statistical Methods – C.B.Gupta & V.Gupta- Vikas Publishing House PVT Ltd. New Delhi.

Paper -4

Title: Food Safety and Quality Control FN/C009 (Food Safety and Quality Control)

UNIT-I

Concept of quality: quality attributes: physical, chemical, nutritional and microbial evaluation and measurement, physiochemical method, microscopic examination and physical method; Sensory evaluation: Sensory characteristics of food, sensory requirements, Types of sensory evaluation.

UNIT-II Objective evaluation: Tests used for objective evaluation, application and limit, Instruments used for quality assessment-colour & gloss, size & shape, defects, texture, Viscosity & consistency, Food Toxicology: Dose-response, Measurement of toxicants and toxicity, Assessment of toxicity of evaluation of limits of contaminants in contexts of food safety. Food associated carcinogenesis, Food chemical carcinogens-sources and mechanism, food allergens, Industrial food processing and Packaging contaminants.

UNIT-III

Quality assurance, Quality Control, Total Quality Management; GMP, GHP, GLP,GAP; Sanitary and hygienic practices; HACCP; Quality manuals,documentation and audits;

UNIT-IV

Food laws and regulation: Mandatory and voluntary food laws, International quality systems and standards like ISO and Food Codex, BRC; International trades & federal agencies, Indian act- Food Safety and Standards Act, 2006, Various food acts- PFA,FPO,AGMARK, MMPO,MFPO, edible oil acts, standard weight acts.

References:

1. Subash. C Jain, International Marketing, 6th edition.
2. Varshney, R.L and Bhattacharya, B International marketing management and Indian perspective, Sultan chand and sons, New Delhi.
3. Kohler P, Keller K.L, Koshy A, Jha M, 13th edition 2009, Marketing Management- A South Africa Perspective, Pearson Education, New Delhi.

4. Ramaswamy, V.S and Namakumari ,S.; 4th edition Marketing Manangement –Global Perspective- Indian Content, McMillan Publishers India Ltd, New Delhi.
5. Saxena, Rajan, 3rd edition; Marketing management, Tata McGraw Hill Publishing Company Ltd, New Delhi

Paper: 5

**Title: CLINICAL NUTRITION AND DIETETICS- I
FN/C010- CLINICAL NUTRITION AND DIETETICS- I**

UNIT-1. Dietary principles and management Gastro-Intestinal Disorders –Etiology, symptoms, treatment and prevention of the following:

- a. Gastritis
- b. Peptic ulcer
- c. Diarrhoea
- d. Constipation
- e. Malabsorption syndromes- Sprue/ Tropical sprue
- f. Ulcerative colitis and Crohn's disease
- g. Diverticulosis
- h. Hernia. Irritable bowel syndrome.

UNIT-2. Upper gastrointestinal diseases: Gastroesophageal reflex and esophagitis.

Disorders of stomach- indigestion, dyspepsia, gastritis, (causes, pathology, management).

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

UNIT_4.

Rheumatic disorders: Arthritis – Osteo and Rheumatoid, Gout: Symptoms, causes, treatment prevention

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

Pancreatitis. Functional tests and dietary management.

PRACTICAL

- Practical experience in weighing and measuring food items
- Preparation of clear and full liquid diets and soft diet.
- Dietary principles and management of, . Liver diseases, . Peptic ulcer, Fatty liver, Constipation

SEMESTER III
Paper 1
Title: Public Nutrition
FN/C011(Public Nutrition)

UNIT-1. Concept of public nutrition-

1. Relationship between health and nutrition, role of public nutritionists in the health care delivery.
2. Sectors and public policies relevant to nutrition.
3. Primary health care of the community
4. National health care delivery system.
5. Determinants of health status
6. Indicators of health.

UNIT-2 Population Dynamics: demographic transition, population structure, fertility behavior, population policy, fertility, nutrition and quality of life inter- relationship.

UNIT-3 Major nutritional problems- etiology, prevalence, clinical manifestation, preventive and therapeutic measure of:

- Macro and micro nutrient deficiencies
- Other nutritional problem like lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis.
- Over weight, obesity and chronic degenerative diseases.

UNIT-3 Approaches and strategies for improving nutritional status and health: programmatic option- their advantages and demerits. Feasibility, political support, available resources (human, financial, infrastructural) case study of selected strategies and programme: their rationale and context, how to select intervention from a range of possible option:

UNIT- 4 : Health-based interventions, food based interventions including fortification and genetic improvement of foods, supplementary feeding, nutrition education for behavior change.

References:

1. Owen. A.Y and Frankle, R.T(1986): nutrition in the community, the art of delivering services, 2nd edition times mirror/mosby.
2. Park, K (2000): Park's textbook of preventive and social medicine, 18th edition, M/s. Banarasidas bhanot, Jabalpur.
3. SCN News, UN ACC/SCN subcommittee on nutrition.
4. State of the world's children, UNICEF

Elective Papers
(Any One of the following)

FN/C013(Nutrition Management and Health)

- Principles and basic concept of diet therapy.
- Normal diet as the basis of therapeutic diets.
- Assessment of patient needs based on anthropometric, clinical, biochemical and dietary data.
- Team approach to health care.
- Planning, implementation, evaluation and dietary counseling in nutrition care.
- Application of computer in health care delivery.
- Role of nutritionist in health care delivery.
- Introduction to enteral and parenteral feeding.
- Progressive diets- clear fluid, full fluid, soft, bland and regular diet.
- Therapeutic adaptation of the normal diet.
- Recommended daily allowances of nutrient by ICMR. Role of nutrition during different life cycle:- infancy, preschool, school going children pregnancy, lactation and old age.

FN/C013 (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 **pests control**.
B. **Physical and chemical control**. Effective control of micro-organisms: micro-organisms important in food sanitation, micro-organisms as indicator of sanitary quality
3. **Sanitary aspects of water supply**: Source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water preventing contamination of potable water supply.
4. A. **Effective detergency and cleaning practices**: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices.
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

Paper -5

Title: Clinical Nutrition and Dietetics- II

FN/C015-(Clinical Nutrition and Dietetics- II)

UNIT-1. Dietary management of diseases of renal system: etiology, symptoms, nephritis and nephrosis-metabolic and Nutritional implications in acute/ chronic renal failure, kidney, transplant. Renal calculi.

UNIT-2. Dietary management of Cardio vascular 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).

UNIT-3. Obesity: genetics, diet and physical activity, control of body weight, risk of diabetes and cardiovascular diseases.

UNIT-4. Dietary principles and management of Diabetes mellitus: Incidence, aetiology, classification, therapy, diagnostic/monitoring criteria, long term and short-term management. Hypoglycemia of non-diabetic origin.

UNIT-5. General principles of diet for the following condition: Gout, Cancer(Home/ Hospital Management), Effect of cancer therapy on nutrition of the patient. AIDS (Home/hospital Management)

References:

1. Mahan. L.K. and Escott-stump, S. (2000): Krause's food nutrition and diet therapy, 10th edition, W.B. Saunders Ltd.
2. Shils, M.E., Olson, J.A. Shike, M. and Ross. AC(1999) Modern nutrition in health and disease, 9th edition Williams and wilkins.
3. Escott-stump, S.(1998): nutrition and diagnosis related care, 4th edition, Williams and wilkins.

PRACTICAL

1. Identifying a specialty care unit: diabetic clinic/ weight management center/ health clubs/ hospitals/ nursing homes- select at least 3-4 patients
2. **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/ cerebral infarction, renal failure, calculi and nephritic syndrome, feverchronic and acute.
3. Diet planning and preparation.
4. Preparation of enteral feeds

SEMESTER IV

Paper 1

Title: Techniques in Food Analysis

FN/C016 (Techniques in Food Analysis)

UNIT-1

Nature and Concept of Food analysis, Basic instrumentation: Principle for pH meter, Dialysis, ultra filtration, Reverse osmosis. Centrifugation: Principle, Theory (RCF, Sedimentation coefficient) and types of Rotors, Ultracentrifugation, Calorimetry: Bomb calorimeter, Principle of Rheological Analysis- Rheological parameters, rheological methods, instruments and application, Texture profile analysis, Densimetry, Refractometry,

UNIT-II

Spectroscopic analysis of food components, Principle, instrumentation & application of Colorimetric (colorimeter, colourflex), UV-Vis spectrophotometer, Spectrofluorometer, IR, Atomic Absorption Spectroscopy, Mass spectroscopy, NMR and ESR.

UNIT-III

Chromatography: Theory & Principle, chromatographic parameter (partition coefficient, capacity factor, retention & dead time, Resolution & their calculation), components of chromatography & types (paper, thin layer, partition) Advance chromatography

UNIT-IV

Isotopic & immune techniques: Principle & theory of isotopic method, types, measurement & detection of radioactivity, Autoradiography, Immuno-techniques, Principle, antigen-antibody interaction, enzymatic immune assay- ELISA and its types.

References:

1. Bioinstrumentation by .Veerakumari,
2. Biochemical & Molecular biology techniques. by Wilson & Walker,
3. Food Chemistry, Aurand, L.W. and Woods, A.E. 1973. AVI, Westport.
4. Principles of Food Science: Part-I Food Chemistry. Fennema, O.R. Ed. 1976 Marcel Dekker, New York.

Practical

ELISA test, Centrifugation test, Bomb calorimeter, Spectroscopic analysis of Different food components .

Paper -2

Title- Institutional Food Management FN/C017 (Institutional Food Management)

UNIT I- Food Services- Concept, Principle and Objective, Type of food services (hospital, hostel, school meal, industrial canteen, commercial hotels). Food Services in hospitals- Requirement of equipments for food preparation, Distribution, Storage and Services. Food Service management- Menu planning, Receipt of food and its storage, Principles and Techniques in quantity food production.

UNIT II - Theories of Management and Approaches- Classical Theory, neoclassical approach, Quantitative approach, MBO approach, System approach, Behavioral and Human relation approach, Contingency approach, JIT approach, TQM approach. Developing objective and goals- Definition, Importance, Types of goal, Policies, Procedures, Rules. Principles and procedures of management-Definition of management, Organization Interaction at work, Principles, Functions of management, Role and responsibilities.

Unit III - Tools of management –Definition, classification, Organization chart, Structure, Function, Work improvement techniques. Personnel management -Definition, Scope, Concept of personnel management, Approaches of personnel management, Personnel policies, Training, Placement, Promotion, Personnel records, Work appraisals financial management in food service institutions-Methods of food purchasing,

Unit IV - Inventory management, Maintaining quality in food production and services. Financial management-Definition, Scope of financial preparation and serving area – Personal hygiene, Types, Sources of contamination, Prevention, Safety measures, Methods of controlling infestation, Methods of dish washing.

Reference Books

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

FN/C012	Project *	-	5
FN/C014	Industrial Tour Report	Practical	5
FN/C017	Seminar + Review Paper	Practical	5
FN/C018	Dissertation	Project+ Viva	10

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Program/Class: Bachelor (Research) in Food Science		Year: First	Semester: I & II
Course Code: FN/C001 - FN/C010		Course	
Credits: 25x 2= Total 50		Compulsory	
Max. Marks: T= 100 P = 50		Min. Passing Marks:.....	

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Program/Class: Master in Food Science		Year: Second	Semester: III& IV
Course Code: FN/C011 - FN/C018		Course	
Credits: 25x 2= Total 50		Compulsory	
Max. Marks: T= 100 P = 50 Viva-50		Min. Passing Marks:.....	

Total Number of hours = T-60, P-40/Paper

SPECIAL FEATURE OF THE COURSE:

M.Sc. in Food Science programme focuses on the Food Science, an area of increasing importance to Consumers, Government and the Food Industry. This M.Sc programme is interdisciplinary in nature and is a challenging and practical course which demands a good grasp of knowledge in science.

This programme will enable to develop:

- An understanding of the subjects at the interface between human nutrition and food science.
- An understanding of food constituents in the context of their manufacture and storage, particularly from the stand points of safety and nutritional attributes.
- One's capacity to undertake research in food science.
- Skills in critical appraisal of data, presentational and inter personal skills.

CAREER PROSPECT:

This M.Sc .programme is for those wishing to develop a career in food-related research or the food industry. It is designed to meet the increasing demand for nutrition scientists experienced in human nutritional trials and in the evaluation of physiological, biochemical and molecular basis for effects of diet on human health. As a food nutritionist, one is endowed with the skills and knowledge to improve another's quality of life. Right from providing assistance in planning meals in times of old age, sickness or extreme stress, to advising them with regards to healthy eating-selection. The main area of a food scientist cum nutritionists' work is Food Service Industry, Institutional Catering, Research and Development and Social Welfare, Health Care field etc. Food service consists of Restaurants and Catering service where nutritionists need to plan the menu and monitor food preparation. Same as Food service, Institutional Catering even requires dietetics professionals to plan, administer and arrange nutritious balanced diets for cafeterias of schools, colleges, offices, factories etc. Apart from that, their work might include evaluation and acquisition of food materials and equipment, checking and receiving inventories of supplies etc. Professionals carrying on such work are recognized as Administrative or Management Nutritionists. Nutritionists involved in Social Welfare activities, often called as Community dietitian or Public Health Nutritionists are mostly attached to government-aided public health divisions to improve the mass food habits and public health. Our postgraduates can therefore expect to find themselves in demand from employers and often have to choose from several excellent job offers.