M. Sc. (Home Science - Foods and Nutrition)

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Correction in M. Sc. (Foods & Nutrition)

IInd semester

1. **MFN-204 FOOD QUALITY ANALYSIS- Changes in practical part only** (Page No.-18)

PRACTICALS- Following points deleted from practical.

1. Practical no. 2 **(Estimation of thiamin, riboflavin, niacin, and carotene)** is irrelevant from course content
2. Practical no. 3 **(Estimation of sugar in fruits and starch in cereals of foods)** is irrelevant from course content
3. Practical no. 4 **[Estimation of amino acid (lysine and available lysine)]** is irrelevant from course content
4. Practical no. 5 **(Estimation of tannins, phytates, oxalates and cyanogenic glycosides)** is totally irrelevant from course content.

IIIrd semester

1. **MFN-303 Food Biotechnology –Change in course title/ name** (page No.- 25)

Course name is totally different from course content therefore course name is changed into **MFN-303, FOOD MICROBIOLOGY.**

Kusum Lata

(Subject Specialist)

ANNEXURE-IV

SCHEME OF EXAMINATION FOR M.Sc. HOME SCIENCE in FOODS AND NUTRITION

FIRST SEMESTER

S. No.	Subject No.	Subject Name	Periods			Total Marks
			L	T	P	
1.	MFN-101	Advanced Human Nutrition	3	0	0	100
2.	MFN-102	Food Science	2	0	1	100
3.	MFN-103	Clinical Nutrition & Dietetics-I	2	0	1	100
4.	MFN-104	Nutritional Biochemistry	4	0	0	100
5.	MHS-105	Research Methodology	2	0	0	100
6.	BHS-102	Principles of Human Nutrition*	3	0	0	N/NS
7.		Practical based on MFN-102				100
8.		Practical based on MFN-103				100
					Total	**700**

S/NS- Satisfactory/Non-satisfactory * Deficiency course for ZBC group

SECOND SEMESTER

S. No.	Subject No.	Subject Name	Periods			Total Marks
			L	T	P	
1.	MHS-201	Statistical methods	3	0	0	100
2.	MFN-202	Clinical Nutrition & Dietetics-II	2	0	1	100
3.	MFN-203	Food Preservation & Processing	2	0	1	100
4.	MFN-204	Food Quality Analysis	2	0	2	100
5.	MFN-205	Advanced Community Nutrition	2	0	1	100
6.	BHS-202	Food Processing & Storage*	1	0	1	S/NS
7.		Practical based on MFN-202 & MFN-203				100
8.		Practical based on MFN-204 & MFN-205				100
					Total	**700**

S/NS- Satisfactory/Non-satisfactory * Deficiency course for ZBC group

THIRD SEMESTER

S. No.	Subject No.	Subject Name	Periods			Total Marks
			L	T	P	
1.	MFN-301	Food Product Development & Marketing	2	0	1	100
2.	MFN-302	Food Safety & Food Laws	2	0	0	100
3.	MFN-303	Food Biotechnology	2	0	0	100
4.	MFN-304	Recent trends in Food Science & Nutrition	2	0	0	100
5.	BHS-303	Community Nutrition*	2	0	1	S/NS
6.		Practical based on MFN-301				100
					Total	**500**

S/NS- Satisfactory/Non-satisfactory * Deficiency course for ZBC group

FOURTH SEMESTER

S. No.	Subject No.	Subject Name	Periods			Total Marks
			L	T	P	
1.	MFN-401	Seminar	0	0	2	100
2.	MFN-402	Thesis/project	0	0	15	Satisfactory/Unsatisfactory
					Total	**100**

SUMMARY OF MARKS

S. No.	Semester	Semester Total
1.	First	700
2.	Second	700
3.	Third	500
4.	Fourth	100
Total for M.Sc. Home Science in Foods and Nutrition		2000

M.Sc. FOODS & NUTRITION

SEMESTER I

Course Code	Course Title	L-T-P	Credits
MFN-101	Advanced Human Nutrition	3-0-0	3
MFN-102	Food Science	2-0-1	3
MFN-103	Clinical Nutrition & Dietetics-I	2-0-1	3
MFN-104	Nutritional Biochemistry	4-0-0	4
MHS-105	Research Methodology	2-0-0	2
BHS-102	Principles of Human Nutrition	3-0-0	3
	Total	**16-0-2**	**18**

SEMESTER II

Course Code	Course Title	L-T-P	Credits
MHS-201	Statistical methods	3-0-0	3
MFN-202	Clinical Nutrition & Dietetics-II	2-0-1	3
MFN-203	Food Preservation & Processing	2-0-1	3
MFN-204	Food Quality Analysis	2-0-2	4
MFN-205	Advanced Community Nutrition	2-0-1	3
BHS-202	Food Processing & Storage	1-0-1	2
	Total	**12-0-6**	**18**

SEMESTER III

Course Code	Course Title	L-T-P	Credits
MFN-301	Food Product Development & Marketing	2-0-1	3
MFN-302	Food Safety & Food Laws	2-0-0	2
MFN-303	Food Microbiology	2-0-0	2
MFN-304	Recent Trends in Food Science & Nutrition	2-0-0	2
BHS-303	Community Nutrition	2-0-1	3
	Total	**10-0-2**	**12**

SEMESTER IV

Course Code	Course Title	L-T-P	Credits
MFN-401	Seminar	0-0-2	2
MFN-402	Thesis/project	0-0-15	15
	Total	**0-0-17**	**17**

Total Credits = 65

Semester I

Course Code	Course Title		Credits
MFN-101	Advanced Human Nutrition		3
MFN-102	Food Science		3
MFN-103	Clinical Nutrition & Dietetics-I		3
MFN-104	Nutritional Biochemistry		4
MHS-105	Research Methodology		2
BHS-102	Principles of Human Nutrition		3
		Total	**18**

ADVANCED HUMAN NUTRITION

Course Code: MFN-101 **Credits 3(3-0-0)**

Course Outline

THEORY

1. Basis for computing nutrient requirements: latest concepts in dietary recommendations, RDA- ICMR and WHO: their uses and limitations.
2. Body fluids and water balance: Body water compartments. Regulation of water balance, disorders of water balance.
3. Body composition: Methods of study, compositional changes during life cycle, nutritional disorders and their effect body composition.
4. Energy metabolism: Basal and resting metabolism- influencing factors. Methods to determine energy requirements & expenditure. Thermo genesis, adaptation to altered energy intake, latest concepts in energy requirements and recommendations for different age groups.
5. Carbohydrates: Occurrence and physiological functions, factors influencing metabolism. Lactose intolerance. Dental caries. Artificial sweeteners. Role of dietary fiber in health and disease. Disorders related to carbohydrate metabolism. Glycemic index of foods and its uses.
6. Lipids: Concepts of visible and invisible fats. EFA, SFA, MUFA, PUFA- sources and physiological functions. Role of lipoproteins, cholesterol and triglycerides in health and disease.
7. Proteins: Concepts of essential and non-essential amino acids- their role in growth and development. Physiological functions of proteins. Requirements, nitrogen balance concept. Methods for evaluating protein quality. Protein energy malnutrition-clinical features and biochemical changes.
8. Regulation of food intake: role of hunger and satiety centers, effect of nutrients.

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.

9. Macro minerals: Calcium, Phosphorus Magnesium, Sodium, Potassium chloride.
10. Micro minerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluoride.

11. Ultra trace minerals: Arsenic, Boron, Nickel, Silicon, Vanadium & cobalt: Digestion & absorption, Functions, Toxicity, interaction with other nutrients.
12. Fat soluble Vitamins: Vitamin A, Vitamin D, E & K.
13. Water soluble vitamins: Vitamin C, Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, VitaminB6.

REFERENCES

1. Christian, J. L. and Gregor, J. L. 1985. Nutrition for Living. The Benjamin. Cummings Publishing House, Inc. 600p.
2. Groff, J. L. and Gropper, S. S. 2000. Advanced Nutrition and Metabolism. Wadsworth Thompson Learning, Australia. 584p.
3. Smolin, L. A. and Grosvenor, M. B. 1999. Nutrition: Science & Applications. Saunders College Publishing, New York. 597p.
4. Stipanuk, Martha. 2006. Biochemical, Physiological and Molecular Aspects of Human Nutrition. 2nd edition. Elsevier. New York. 1232p.
5. Bamji, M.S.; Rao, N.P. and Reddy, V. 1996. Textbook of Human Nutrition. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.

FOOD SCIENCE

Course Code: MFN-102 **Credits 3(2-0-1)**

Course Outline

THEORY

1. Introduction to Food Science.
2. Carbohydrates: Functional role of sugars in foods- sweetness, texture, preservation, preservation, fermentation, appearance, maillard reaction, caramelization, freezing point, antioxidant activity, miscellaneous activity; sweetness; invert sugar.
3. Proteins: Functional properties of protein- hydration properties, precipitation, viscosity, gelation, texturization, dough formation, surface properties.
4. Lipids: Functional properties of lipids, deep fat frying, deteriorative changes in fats/ oils, antioxidants.
5. Food polysaccharides: Functional properties of starch; hydrocolloids, non-starch polysaccharides, gums.
6. Sols, gel, emulsion; colloids, colloidal system, properties of solutions, foams.
7. Properties of foods- Functions, measurement and factors affecting appearance, taste, texture, flavor, color.
8. Changes during food processing and storage in fruits and vegetables; milk and milk products; meat and poultry; fish, eggs, cereals and legumes; nuts; oilseeds and spices.
9. Enzymes and pigments: Biotechnological applications of enzymes; Natural pigments-sources and uses.
10. Role of water in foods: free water and bound water, functional properties, water activity and intermediate moisture foods.
11. Sensory evaluation: importance, sensory panel, sample preparation, hedonic scale.

PRACTICALS

1. Sensory Analysis: Different types of sensory tests for basic tastes and sensory attributes of products.
2. Starch gelatinization: factors affecting and measurement of viscosity.
3. Functional properties of proteins: Water and fat absorption, emulsion and foaming properties, (preparation of cakes).

4. Fermentation: Fermented wheat and wheat based products.
5. Sugar cookery: stages and use in Indian sweet preparations.
6. Use of oils and fats: as shortening and as frying media, effect of frying on physico-chemical properties.

REFERENCES

1. Desroiser N. W. & Desroiser J. N. 1977. The Technology of Food Preservation. AVI Publication.
2. Potty V. H. and Mulky M. J. 1993. Food Processing. Oxford & IBH Publishing House.
3. Srilakshmi B. 2001. Food Science. New Age International.
4. M. Shadakhsharaswamy and N. Shakuntala Manay. Food Facts and Principles, Mohindra Singh Sejwal for Wiley Eastern Limited, Ansari Road Daryaganj, New Delhi.
5. Mudami, S. 1997. Food Science. New Age International (P) Limited Pub.

CLINICAL NUTRITION & DIETETICS-I

Course Code: MFN-103 **Credits 3(2-0-1)**

Course Outline

THEORY

1. Introduction to Clinical Nutrition and Dietetics; Definition and role of dietitian in Health Care; The Nutritional Care Process (NCP) - Nutrition assessment, Nutrition diagnosis, Nutrition intervention, Nutrition monitoring and evaluation, Documentation, Importance of Coordinated Nutritional and Rehabilitation Services; Patient Care and Counseling.
2. Adaptation of therapeutic diets- Therapeutic diets, types of dietary adaptations for therapeutic needs, normal nutrition: a base of therapeutic diets; diet prescription, routine hospital diets- normal or generic diets, liquid diets, soft diets; Mode of feeding- oral feeding, tube or enteral feeding, peripheral vein feeding, total parenteral nutrition.
3. Nutritional management of infections and fevers: defense mechanism in the body, nutrition and infection, metabolic changes during infection, classification and etiology of fever/infection, typhoid, tuberculosis, HIV infection and AIDS.
4. Nutrition during stress: The stress response; Surgery- physiological response to surgery, dietary management during surgery; Burns- classification, complications, dietary management, mode of feeding, non-dietary treatment; Trauma- physiological response, metabolic response, hormonal response, dietary management; Sepsis- systemic metabolic responses, catabolic responses, dietary management of sepsis with or without MODS.
5. Nutritional management of food allergies and food intolerance; adverse food reactions- food allergy and food intolerance, adverse food reactions- The diagnosis process, treatment, management and prevention.
6. Nutritional management of eating disorders- anorexia nervosa, bulimia nervosa, binge eating, management of eating disorders.
7. Pediatric problems and nutritional management- congenital heart disease, preterm/low birth weight, lactose intolerance, celiac disease; Geriatric nutrition- physical and physiological changes and requirements, nutritional assessment, health and feeding problems among elderly, nutrition support- parenteral/enteral/oral.

8. Nutrient and drug interaction: basic concepts, effect of nutrition on drugs, effect of drugs on nutritional status, drug and drug interaction, clinical significance and risk factors for drug-nutrient interaction, guidelines to lower risk and wise use of drugs.

PRACTICALS

1. Planning and preparation of liquid diet
2. Planning and preparation of soft diet.
3. Planning and preparation of diet in fevers.
4. Planning and preparation of diet for children.
5. Planning and preparation of diet for old age person.
6. Preparation of dietary guide to be used for assessment and developing Nutrition Care Plan (NCP).
7. Basic principles in planning diets for individual, families and institution: Review of existing situations-hospitals, hostels, hotel, boarding home and industrial canteen. (At least one of each type).
8. Visits to local hospitals: at least one outside having well developed diet/nutritional unit to observe the food service, intensive care units, non-invasive techniques etc.

REFERENCES

1. Anderson L., Dibble M. V., Turkki P. R., Mitchel H. S. & Rynbergen H. 1982. Nutrition in Health and Disease. JB Lippincott Co.
2. ICMR 1998. Recommended Dietary Allowance for Indians. ICMR.
3. Khanna K., Gupta S., Seth R. & Puri S. 1997. Text Book of Nutrition and Dietetics. Phoenix Publ.
4. Srilakshmi B. 2002. Nutrition Science. New Age International.
5. Swaminathan M.1988. Principles of Nutrition and Dietetics. BAPPCO.

NUTRITIONAL BIOCHEMISTRY

Course Code: MFN-104 **Credits 4(4-0-0)**

Course Outline

THEORY

1) Cell structure and Function- component, fluid mosaic model, cell cycle-mitosis and meiosis, tissues and their function; Blood- composition and their functions, erythropoiesis, blood groups, homeostasis.
2) Physiological basis of nutritional biochemistry: Digestive system, structure of digestive tract, enzymes in digestion, role of liver in processing and distribution of nutrients absorbed from small intestine, inter relationship of major metabolism in liver, excretory functions and storage.
3) Carbohydrates: classification, structural features, monosaccharides, oligosaccharides, polysaccharides, digestion, absorption, transport and metabolism- glycolysis, citric acid cycle, gluconeogenesis, glyconeogenesis, HMP shunt, glycogenesis, glyogenolysis, electron transport chain, regulation of blood glucose level.
4) Proteins and amino acids: structure, classification and chemical properties of fatty acids, neutral fats, phospholipids, steroids, eicosanoids, digestion, absorption, transport and metabolism- transamination, deamination, urea cycle, biosynthesis of non essential amino acids, synthesis of specialized product from amino acids, biogenic amines.
5) Lipids: structure, classification and chemical properties of fatty acids, neutral fats, phospholipids, steroids, eicosanoids, digestion, absorption, transport and metabolism of eicosaniods, triacylglycerol, cholesterol, lipoprotein, oxidation of fatty acids, MUFA, PUFA, lipogenesis, synthesis of phospholipids.
6) Nucleic acids: component, structure and level of organization, physic-chemical properties, biological importance, purine nucleotide synthesis, salvage pathway, degradation of purines, pyrimidine synthesis, regulation of deoxyribonucleotide synthesis.
7) Enzymes and coenzymes- nomenclature, classification, specificity, mechanism of action, enzyme kinetics, factors affecting enzyme activity, enzyme inhibition, role of enzymes and coenzymes in metabolisms, isozymes, enzymes in clinical diagnosis, stereoisomerism, and optical activity.

8) Hormones: classification, synthesis, regulatory functions and mechanism of hormone action; prostaglandin- structure, biosynthesis, metabolism and biological action and their role in pathology.

9) Detoxication: Definition, xenobiotics, enzyme systems involved, mechanism of detoxification.

10) Oxidative stress and Antioxidants: Free radicals: definition, formation in biological systems, defense against free radicals. Role of free radicals and antioxidants in health and disease. Determination of free radicals, lipid peroxides and antioxidants.

11) Bioenergetics: Principles of bioenergetics, free energy -endergonic and exergonic process, role of high energy compounds in energy storage, formation of ATP.

REFERENCES

1. Nelson, David L. and Michael M. Cox. Principles of Biochemistry. W.H. Freeman & Co.
2. Bamji, M.S.; Rao, N.P. and Reddy, V. 1996. Textbook of Human Nutrition. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.

RESEARCH METHODOLOGY

Course Code: MHS-105 **Credits 2(2-0-0)**

Course Outline

THEORY

1. Need for social science research: definition on scope in human ecology. Research approaches and types; historical, case study, descriptive and experimental, ex-post-facto, field experiments, field studies, survey research, evaluation, exploratory, action research, cross- sectional and longitudinal studies, participatory approach, rapid rural appraisal techniques.
2. Research design; defining concepts hypotheses formulation, randomness, basic assumptions and the limitations of the problems. Conceptualization of study, operationalisation of variables and types of variables.
3. Sample and sampling techniques; steps in sampling design, criteria for selecting a sampling procedure, characteristics of a good sample design. Methods of data collection: questionnaire, interview schedule, observation, base- line data, secondary data. Instruments; concepts of measurement, reliability and validity of instruments. Data processing methods and data analysis.
4. Scientific reporting: Interpretation and generalization, general guidelines for presenting data, tables, graphs and illustrations, summary techniques, conclusions and recommendations, presentation of report format, foot notes, bibliographical citations. Preparation of an abstract.

PRACTICALS:

1. Project proposal formulation.
2. Review of literature.
3. Hypothesis formulation and testing.
4. Methods of data collection.
5. Data processing and report writing.

REFERENCES:

1. Badarkar, P.L. and Wilinson, T. S., *Methodology and Techniques of Social Research.* Himalaya Publishing House. Mumbai.
2. Bhatnagar, G. L. *Research Methods and Measurements in Behavioural and Social Sciences.* Agri. Cole Publishing academy, New Delhi.
3. Kothari, C. R. How to write and publish a scientific paper. Surjeet book Depot. Nai sarak Delhi.

PRINCIPLES OF HUMAN NUTRITION

Course Code: BHS-102 **Credits 3(3-0-0)**

Course Outline

THEORY

1. Food, Functions of food, nutrients and non-nutrients in foods, food groups.
2. Composition and importance of following foods: Cereals, legumes and oilseeds, Fruits and vegetables, Milk and milk products, Eggs, meat, fish and poultry, Sugar and fats
3. Nutritional value of foods, balanced diet, meeting nutrient needs, meal planning.
4. Physiology of nutrition, digestive system, phases of digestion and absorption, metabolism as continuous life sustaining cellular process, delivering of nutrients through circulatory and lymphatic system, excretion of waste products via several routes, body composition
5. Macronutrients: Building blocks and energy sources, Water- its metabolism, distribution of body water, structural and regulatory functions.

a. Proteins and amino acids: Classification, sources, functions and requirements, nitrogen balance, Deficiency of protein.
b. Carbohydrates: Classification, sources, functions and requirements
c. Lipids and fatty acids: Classification, sources, functions ad requirements.
d. Energy sources: Dietary carbohydrates, proteins, fats and alcohol. Food energy value. Three basic types of functions of energy: Basal metabolism, physical activity and thermogenesis and factors influencing them, Energy imbalance and weight.

REFERENCES

1. Groff, J. L. and Gropper, S. S. 2000. Advanced Nutrition and Metabolism. Wadsworth Thompson Learning, Australia. 584p.
2. Smolin, L. A. and Grosvenor, M. B. 1999. Nutrition: Science & Applications. Saunders College Publishing, New York. 597p.
3. Bamji, M.S.; Rao, N.P. and Reddy, V. 1996. Textbook of Human Nutrition. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.
4. Swaminathan M.1988. Essentials of Foods and Nutrition. BAPPCO.

Semester II

Course Code	Course Title		Credits
MHS-201	Statistical Methods		3
MFN-202	Clinical Nutrition & Dietetics-II		3
MFN-203	Food Preservation & Processing		3
MFN-204	Food Quality Analysis		4
MFN-205	Advanced Community Nutrition		3
BHS-202	Food Processing & Storage		2
		Total	**18**

STATISTICAL METHODS

Course Code: MHS-201 **Credits 3(3-0-0)**

Course Outline

THEORY

1. Introduction; Discrete and continuous Random variables, Probability
2. Binomial, Poisson and normal distributions with application
3. Sampling distribution of mean, Chi square, t-test and F-test. Standard error
4. Statistical hypotheses, two types of errors, critical region, test statistics, level of significance, power of a test.
5. Test based on normal deviate, t, F and chi- square distributions
6. Analysis of variance for one way and two way classified data.
7. Scatter diagram, definition of correlation, Pearson's product moment correlation coefficients with its properties. One- two and more than two sample tests for correlation coefficients, Regression, fitting of linear regression equation using least squares method, tests of significance for regression coefficients, Test of comparison of two regression coefficients.
8. Fitting of multiple linear regression equation, Calculation of multiple and partial correlation coefficients with associated test of significance. Non- linear regression analysis, fitting of some simple non- linear regression functions.
9. Sampling Versus complete Enumeration, simple Random sampling with and without replacement, Procedure of drawing a Simple Random Sample. Stratified Random Sampling, Estimation of population mean along with its standard error.

REFERENCES

1. Snedecor G.W. and Cochran W.G. 1999. Statistical Methods. Iowa State University Press

CLINICAL NUTRITION & DIETETICS-II

Course Code: MFN-202 **Credits 3(2-0-1)**

Course Outline

THEORY

1. Nutritional care in weight management: weight imbalance- prevalence and classification, calculation of ideal body weight; obesity- etiology, energy balance, metabolic changes and clinical manifestations, consequences, management of obesity- dietary and lifestyle modifications, pharmaceutical management, surgical management, preventive aspects; underweight- etiology, metabolic changes and clinical manifestations, dietary management.
2. Nutritional management of coronary heart disease (CHD): prevalence, etiology and pathophysiology of CHD; common disorders of CHD and their management- dyslipidemia, atherosclerosis, hypertension, angina pectoris, hypertension, myocardial infarction, congestive cardiac failure, rheumatic heart disease; prevention of CHD.
3. Nutritional management of metabolic diseases: diabetes mellitus- prevention, classification, etiology, metabolic changes, symptoms, diagnosis, complications and management; gout- role of protein and purines, etiopathology, clinical features and complications, management; inborn errors of metabolism- phenylketonuria, tyrosinemia, maple syrup urine disease, homocystinuria, galactosemia.
4. Nutritional management of gastrointestinal diseases and disorders: Diarrhoea, constipation, oesophagitis, gastrooesophageal reflux disease, dyspepsia, gastritis, diverticular disease, steatorrhoea, lactose intolerance, inflammatory bowel disease.
5. Nutritional management in liver, gall bladder and pancreatic diseases: Liver disease- viral hepatitis, liver cirrhosis, hepatic encephalopathy; gall bladder and billiary tract disease; acute and chronic pancreatitis.
6. Nutritional management of renal diseases- etiology, clinical and metabolic manifestations and dietary management of acute and chronic nephritis, nephrotic syndrome, acute and chronic renal failure, end stage renal disease and renal calculi.
7. Nutritional management of neurological disorders- etiology, clinical features and nutritional management of dysphagia, alzheimer's disease, parkinson's disease, epilepsy, neuro trauma and spinal trauma.

8. Nutritional management of cancer: Development, characteristics and identification of cancer cells, etiology factors, clinical manifestation, nutritional requirement, dietary management and prevention.

PRACTICALS

1. Planning and preparation of diet for an obese person.
2. Planning and preparation of diet for an underweight person.
3. Planning and preparation of diet for a high BP patient.
4. Planning and preparation of diet for a heart disease patient.
5. Planning and preparation of diet for a diabetic patient.
6. Planning and preparation of diet for a patient suffering from peptic ulcer.
7. Planning and preparation of diet for a patient suffering from liver disease.
8. Planning and preparation of diet for a patient with renal failure.
9. Planning and preparation of diet for a patient with renal calculi.
10. Work experience in hospitals (special units- ICU)/ emergency relief camps and health oriented camps and presenting as seminar/ report.

REFERENCES

1. Anderson L., Dibble M. V., Turkki P. R., Mitchel H. S. & Rynbergen H. 1982. Nutrition in Health and Disease. JB Lippincott Co.
2. ICMR 1998. Recommended Dietary Allowance for Indians. ICMR.
3. Khanna K., Gupta S., Seth R. & Puri S. 1997. Text Book of Nutrition and Dietetics. Phoenix Publ.
4. Srilakshmi B. 2002. Nutrition Science. New Age International.
5. Swaminathan M.1988. Principles of Nutrition and Dietetics. BAPPCO.

FOOD PRESERVATION & PROCESSING

Course Code: MFN-203 **Credits 3(2-0-1)**

Course Outline

THEORY

1. Classification of food in relation to shelf life: Spoilage in food and its control: Spoilage caused by microorganisms (bacteria, fungi, and virus), enzymes, pets and rodents.
2. Contamination and spoilage of: Cereals and pulses; sugar and sugar products; vegetables and fruits; flesh foods; eggs; milk and milk products.
3. Principles of food preservation and their application: concept of hurdle technology.
4. Food dehydration and concentration: methods of drying and concentration, equipment for drying / dehydration, factors affecting drying process.
5. Heat preservation: Heating processing, sterilization, pasteurization, blanching and canning.
6. Cold preservation: refrigeration, freezing, freeze drying, refrigerated gas storage.
7. Food irradiation and microwave heating.
8. Chemicals in food preservation.
9. Fermentation: type of fermentation and fermented foods.

PRACTICALS

1. Study of changes in fruits/vegetables during storage
2. Blanching and dehydration of seasonal fruits and vegetables.
3. Preparation of fruit bars/candy
4. Freezing of seasonal vegetables, meat and fish products
5. Preparation of Jam, Jelly & squash
6. Pickle preparation
7. Preparation of ice-cream
8. Visit to any Food Processing industry

REFERENCES

1. Desroiser N. W. & Desroiser J. N. 1977. The Technology of Food Preservation. AVI Publication.
2. Frazier, W.C. 1988. Food Microbiology. Tata McGraw Hill.
3. Srilakshmi B. 2001. Food Science. New Age International.
4. Mudami, S. 1997. Food Science. New Age International (P) Limited Pub.

FOOD QUALITY ANALYSIS

Course Code: MFN-204 **Credits 4(2-0-2)**

Course Outline

THEORY

1. Chemical changes in foods during processing.
2. Physical and rheological properties of foods.
3. Changes in flavor components and natural food pigments during processing and storage.
4. Bioavailability of micronutrients: vitamins and minerals.
5. Sensory evaluation methods for foods.
6. Food intoxicants: Enzyme inhibitors; lathyrogens; goitrogens; cyanogenic glycosides; phenolics; oxalates; phytates; alkaloids; carcinogens; polycyclic aromatic hydrocarbons; allergens.

PRACTICALS

1. Bioavailability of iron
2. Estimation of ascorbic acid
3. Estimation of dietary fibers content of foods.
4. Estimation of protein.
5. Sensory evaluation of foods: Selection of panel, training of panel members, objective tests of sensory evaluation and consumer acceptability.
6. Physical test of grain quality and texture evaluation of foods.

REFERENCES

1. AOAC. 1975. Official Methods of Analysis of the Association of Official Analytical Chemists. 12th edition, Washington. D. C.
2. Raghuramulu, N.; Nair, K.M. and Kalyanasundaram, S. 2003. A Manual of Laboratroy Techniques. National Institute of Nutrition. ICMR. Hyderabad.
3. Ranganna , S. 1986. Handbook of Analysis and Quality Control for Fruit and Vegetable Product. Tata McGraw Hill Pub. Co. Ltd., New Delhi

ADVANCED COMMUNITY NUTRITION

Course Code: MFN-205 **Credits 3(2-0-1)**

Course Outline

THEORY

1. Methods for assessing nutritional status: indirect methods- demography, population dynamics and vital events and their health implications, indicators of health and nutrition (IMR, TMR, MMR); direct methods- anthropometry, biochemical, clinical, dietary and functional methods of assessments.
2. Nutrition during life span.
3. Pregnancy: physiological adjustments, nutritional requirements, nutritional status of Indian pregnant women, effect of malnutrition on outcome of pregnancy.
4. Lactation: physiology of lactation, factors affecting lactation, nutritional requirements, effect of lactation on maternal malnutrition and fertility
5. 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.
6. Preschool age: growth and development, nutritional requirements, special care in feeding them, nutritional problems specific to this age.
7. School age and adolescent: growth and development, nutritional requirements, special care in feeding preschoolers, nutritional problems specific to this age.
8. Young adults: nutritional requirements, nutritional status of Indian adult population, nutritional problems common to this age.
9. Elderly: nutritional requirements, special needs, nutritional problems.
10. Major nutritional problems prevalent in India: prevalence, causes, manifestation and prevention.
11. Food security: definition, national and household food security, factors affecting food security system, national and international systems to improve food security.
12. Nutrition policy and programs: national nutrition policy, need for nutrition policy, policy strategies and their implementation; nutrition programs- National Anemia Prevention, prevention of night blindness, National Iodine Prophylaxis Program, ICDS, national nutrition surveillance system, food for work etc; NGO in community development operations.
13. Nutrition education- rationale, planning, execution and evaluation.

PRACTICALS

1. Planning and conducting diet survey in a rural / urban area (different age groups and Socioeconomic status may be included)
2. Planning and organizing nutrition education programs in the community.
3. Processing of the data- data entry using statistical package and formulation of tables.
4. Application of statistical methods - Mean, frequency, SD, chi-square and F- test.
5. Interpretation of results and preparation of reports using different graphical and tabular presentation.

REFERENCES

1. Gopaldas, T. & Seshadri, S. 1987. Nutrition Monitoring and Assessment. Oxford University Press.
2. Jeanette B Endres. 1990. Community Nutrition Challenges and Oppurtunities. Merill.
3. Mclaren D. S. 1977. Nutrition in the Community. John Wiley& Sons.
4. Shukla, P. K. 1982. Nutritional Problems of India. Prentice Hall of India.

FOOD PROCESSING & STORAGE

Course Code: BHS-202 **Credits 2(1-0-1)**

Course Outline

THEORY

1. Role of processing and storage of foods in human nutrition.
2. Processing of cereals, millets and legumes by traditional and unconventional methods. Changes in nutritional quality as affected by pounding, milling, puffing, faking, cooking, parboiling, fermentation, sprouting malting.
3. Processing ad packaging of milk products and their effect on nutritional quality characteristics.
4. Processing of oilseeds for extraction of oils and use of oilseed cakes in human nutrition.
5. Different methods of cooking and preservation of meat, fish and poultry; effects on nutritional quality and merits and demerits of various methods.
6. Domestic food preservation- principles and methods. Choice of preserving methods: bottling and canning, dehydration and drying; pickling, brining and salting; preserving in syrup, freezing, sterilization, pasteurization, blanching, fermentation, irradiation, use of chemical preservatives.
7. Traditional methods for storage of food grains viz. cereals, millets, legumes and oilseeds, limitations, losses in nutritional quality as influenced by insect and fungal infestation.
8. Current strategies for storage of food grains.

PRACTICALS

1. Preparation of popped corn and sorghum.
2. Preparation of wheat malt.
3. Dehydration and drying of vegetables: green leafy vegetables, tubers and others.
4. Preparation and bottling of tomato sauce.
5. Preparation and bottling of fruit jam and jellies and squash.
6. Preparation of fermented food- *dhokla, idli*

REFERENCES

1. Srilakshmi B. 2001. Food Science. New Age International.
2. M. Shadakhsharaswamy and N. Shakuntala Manay. Food Facts and Principles, Mohindra Singh Sejwal for Wiley Eastern Limited, Ansari Road Daryaganj, New Delhi.

Semester III

Course Code	Course Title	Credits
MFN-301	Food Product Development & Marketing	3
MFN-302	Food Safety & Food Laws	2
MFN-303	Food Microbiology	2
MFN-304	Recent Trends in Food Science & Nutrition	2
BHS-303	Community Nutrition	2
	Total	**12**

FOOD PRODUCT DEVELOPMENT & MARKETING

Course Code: MFN-301 **Credits 3(2-0-1)**

Course Outline

THEORY

1. Product development – need for product development, factors influencing product development, consumer oriented product development, development of new product-statistical experimental methods, modeling for process and recipe, acceptance tests, sensory evaluation during product life cycle, new product and ingredients, shelf-life.
2. Changing food trends and consumer behavior in purchasing foods: life style changes-economic, socio-cultural, psychological influences and marketing influences.
3. Introduction to advanced technologies used in food processing - agglomeration, agitation, air classification, membrane technology (reverse osmosis and ultra filtration), high pressure, surface heat exchanger, ohmic resistance heating, super critical extraction.
4. Food fortification - objectives, principles, and technologies.
5. Food packaging- principles in the development of safe and protective packing, packaging materials (metals, glass, paper and plastics) use of packaging in extending shelf life of unprocessed foods (modified atmosphere packaging, Biodegradable plastics).
6. Sweetening agents: natural and artificial sweeteners, composition, use.
7. Food additives, functions and uses in processed food products; chemical, technological and toxicological aspects.
8. Food Flavors: spices and flavoring constituents, flavors in food industries.
9. Entrepreneurship and marketing - starting and managing an enterprise, entrepreneurship, advertising, marketing.

PRACTICAL

1. Project: A project will be done on Product Development and submitted as a report at the end of the semester.

REFERENCES

1. Marcel Dekker Goldberg I. 1994. Functional Foods: Designer Foods, Pharma Foods, Neutraceuticals.
2. Springer. Matz SA. 2004. Formulating & Processing Dietetic Foods. CHIPS Publ.

FOOD SAFETY & FOOD LAWS

Course Code: MFN-302 **Credits 2(2-0-0)**

Course Outline

THEORY

1. Food safety and importance of safe food; factors affecting food safety- physical hazards, biological hazards, chemical hazards; micro-organisms in foods; recent concerns of food safety.
2. Food adulteration, foods commonly adulterated, common adulterants and their classification and harmful effects, methods for detection of some adulterant.
3. Food contaminants: naturally occurring toxicants in animal foods, plant foods; environmental contaminants- biological contaminants, pesticide residues, veterinary drug residues, heavy metals, miscellaneous.
4. Food standards, food laws and regulations: PFA, Essential Commodity Act, FPO, MPO, MMPO, BIS, Agmark, Export Quality Control and Inspection Act, Standards of Weight and Measures Act, Consumers Protection Act, Vegetable Oil Products (Regulation) Order, Edible Oil Packaging Order, regulations related to genetically modified foods, misbranding.
5. GMP, GAP, use of hazard analysis and critical control points in processing of foods.
6. International organizations and agreement in the area of food standardization and quality control- Codex Alimentarius, Codex India, WTO, SPS, TBT, ISO, FAO, WHO.
7. Safety aspects of water
8. Safety of beverages, soft drinks, tea, coffee, cocoa.
9. Safety assessment of food packaging material.
10. Safety evaluation of food irradiation heat treatment and related processing techniques.
11. Waste disposal in food industries.

REFERENCES

1. Srilakshmi B. 2001. Food Science. New Age International.

FOOD MICROBIOLOGY

Course Code: MFN-303 **Credits 2(2-0-0)**

Course Outline

THEORY

1. Microbiology of foods: basic concepts, role of micro-organisms in fermented foods.
2. Micro-organisms in foods: bacteria, fungi, yeasts, moulds, viruses, parasites.
3. Occurrence and growth of micro-organisms in food: microbiology of air, water and soil, sources of food contamination, factors affecting the growth of micro-organisms- nutrition, oxygen, temperature, moisture, osmotic pressure, pH, light, control and destruction of micro-organisms.
4. Food spoilage: Factors responsible for food spoilage, chemical changes due to spoilage, spoilage of meat, poultry and fish; fruits and vegetables; cereals and cereal products; milk and milk products; soft drinks; fruit juices, fruit preserves; miscellaneous products.
5. Food hazards of microbial origin: food borne diseases; food borne intoxications- staphylococcal poisoning, *bacillus cereus* poisoning, botulism; food borne infections- Salmonellosis, Shigellosis, *Vibrio Parahaemolyticus* gastroenteritis, *E. coli* Diarrhoea, Hepatitis A, Shellfish poisoning; Food borne toxic infections- *clostridium perfringens* gastroenteritis, *E. coli* gastroenteritis, cholera, listeriosis, Yersinia *Enterocolitica* gastroenteritis, *Campylobacter Jejuni* Diarrhoea; mycotoxins

REFERENCES

1. Frazier, W.C. 1988. Food Microbiology. Tata McGraw Hill

RECENT TRENDS IN FOOD SCIENCE & NUTRITION

Course Code: MFN-304 **Credits 2(2-0-0)**

Course Outline

THEORY

1) Methods of research used in human and animal studies related to nutrition. (cross sectional, longitudinal, retrospective, prospective, cohort and so on, available source 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 and mines/under water
5) Nutrition and Infection.
6) Nutrition and phyto-chemicals.
7) Recent concepts in Human Nutrition. nutrigenomics, metabolomics, neutraceuticals, phytochemicals.
8) Recent concepts in Food Science: genetically modified foods, functional foods, health foods and novel foods, organically grown foods, Emerging technologies in food processing, Application of nano-technology in food processing.
9) Newer packaging materials: edible gums and coatings, automation in food processing operation available India

REFERENCES

1. Debasis Bagehi. Nutraceuticals and Functional Food Regulations if the United States and around the World. Academic Press.

COMMUNITY NUTRITION

Course Code: BHS-303 **Credits 3(2-0-1)**

Course Outline

THEORY

1. Role of nutrition education programme in eradication of malnutrition: improving amount and variety of food supplies, improving family income and its influence on nutritional status, improving food consumption to meet individual needs in the family, improving environmental hygiene.
2. Community nutrition as a field, public health nutrition, goals for nutrition programmes, dietary guidelines, present rends ad focus for community nutrition.
3. Planning, implementation and evaluation of a nutrition education programme.
4. Assessment of nutritional knowledge by informal discussion and by simple questionnaire and rapid rural appraisal.
5. Introduction to national nutrition programmes and policies programmes for improving nutritional status at national level, ICDS, NRDP, NREP, miscellaneous monofocal programmes.
6. Role of international agencies and programmes in community nutrition, FAO, WHO, UNICEF; other voluntary and government agencies.
7. Food production systems in India; Their influence on food supply; major foods and their statewise production in India.
8. Food distribution system: Public Distribution System, Food Corporation of India, intra household distribution and per capita availability of food.
9. Food consumption pattern in different parts of India.
10. Magnitude of nutrition problem in India: PEM, vitamin A deficiency, endemic goiter, flourosis and lathyrism, strategies for control of malnutrition.
11. Vicious cycle of low food production: Poverty and malnutrition in subsistence agricultural families.
12. Food security and poverty, augmenting food supplies for population groups.

PRACTICALS

1. Identifying nutritional problems in a community.
2. Formulation of nutrition and health related messages for presentation to the community through radio script, popular article, charts/posters; leaflets, games.
3. Organization of a campaign in the community through prepared nutrition education media.
4. Evaluation of the programme in the community.
5. Visit to an ICDS block/ongoing project site where nutrition education is a part of programme.

RFERENCES

1. Gopaldas, T. & Seshadri, S. 1987. Nutrition Monitoring and Assessment. Oxford University Press.
2. Jeanette B Endres. 1990. Community Nutrition Challenges and Oppurtunities. Merill.
3. Mclaren D. S. 1977. Nutrition in the Community. John Wiley& Sons.
4. Shukla, P. K. 1982. Nutritional Problems of India. Prentice Hall of India.

SEMESTER IV

Course Title		Credits
Seminar		2
Thesis/ Research		15
	Total	**17**

THESIS/ PROJECT

Course Code: MFN-402 **Credits 15 (0-0-15)**

I. Every student shall be required to conduct research on a topic selected in consultation with the Advisory Committee constituted for the purpose.

II. The Advisory Committee for guiding the student's research shall be appointed by the HOD/Principal of the College and shall comprise of at least three members from the concerned and related departments.

III. The students shall be required to submit the results of research in the form of a Thesis dissertation. The thesis shall be forwarded to the External examiner for evaluation at least twenty days before the date of the Viva-voce examination. The external examiner shall be appointed by the Kumaun University. If the examination report of the dissertation is satisfactory, the external examiner shall be invited to conduct viva- voce examination. The grading of the thesis shall be done satisfactory or unsatisfactory by the external examiner. In case the result of thesis dissertation is unsatisfactory, the thesis shall be revised as per recommendation of the external examiner and resubmitted within 30 days by concern student.

IV. There will be an option for students to do project work in lieu of thesis research. Each student's project shall be guided by an advisory committee consisting of at least three members and the student will have to submit report on their project work. The evaluation of the project work shall consist of evaluation of the project report and viva-voce examination to be conducted by external examiner. The grading for the project and the viva-voce shall be satisfactory or unsatisfactory as in case of thesis dissertation.