Raja Narendralal Khan Women's College
(Autonomous)

Syllabus

Department of Nutrition (UG)

Programme under NEP-2020

w.e.f. 2024-2025 Academic Session

Raja N.L. Khan Women's College (Autonomous)
Department of Nutrition (UG)
Major Course

Full Marks=75(Theory- 40; Practical- 20; Cumulative Assessment-15(10+05)

Sl No	Paper Code		Title of the Paper	Sem	Cre -dit	Allot Class	
						Th	P
1	NUTMJ101		Basic Nutrition & Nutritional Physiology	I	04	03	01
2	NUTMJ201		Human Nutrition and Public Health	II	04	03	01
3	NUTMJ 301		Nutritional Biochemistry	III	08	03	01
4	NUTMJ302		Diet Therapy-1			03	01
5	NUTMJT 401		Food Microbiology	IV	12	03	01
6	NUTMJT 402		Food Processing, Preservation, Spoilage, and Adulteration			03	01
7	NUTMJ 403		Diet Therapy-II			03	01
8	NUTMJ 501			V	16	03	01
9	NUTMJT 502					03	01
10	NUTMJ 503					03	01
11	NUTMJT 504					03	01
12	NUTMJ 601			VI	16	03	01
13	NUTMJ 602					03	01
14	NUTMJ 603					03	01
15	NUTMJ 604					03	01
16	NUTMJ 701			VII	16	03	01
17	NUTMJ 702					03	01
18	NUTMJ 703					03	01
19	NUTMJ 704					03	01
20	NUTMJ 801			VIII	20	03	01
21	NUTMJ 802					03	01
22	NUT DSEIT	Re.Proj- I				03	01
23	NUT DSE2T	Re.Proj- II				03	01
24	NUT DSE3T	Re.Proj- III				03	01

Raja N.L. Khan Women's College (Autonomous)
Department of Nutrition (UG)
Minor Course

Full Marks=75(Theory- 40; Practical- 20; Cumulative Assessment-15(10+05)

Sl No	Paper Code	Title of the Paper	Sem		Cre -dit	Allot Class	
			1st Minor	2nd Minor		Th	P
1	NUTMI 101	Basic Nutrition & Nutritional Physiology	I	III	04	03	01
2	NUTMI 201	Human Nutrition and Public Health	II	IV	04	03	01

SEC Course

Full Marks=50(Theory- 20; Practical- 20; Cumulative Assessment-10(05+05)

Sl No	Paper Code	Title of the Paper	Sem	Cre -dit	Allot Class	
					Th	P
1	SEC-101	Food Safety and Food Standard	I	03	01	02
2	SEC-201	Community Nutrition	I	03	01	02
3	SEC-301	Food as medicine	I	03	01	02
		Total Credit		**09**		

Outcomes of the Academic Programme of B.Sc.(Major) in Nutrition

Semester-I
Course Structure

Sl. No.	Name of the Courses	No. of Papers	Credits	Full Marks
1	Major	01	04	75
2	Minor	01	04	75
3	IDC/MDC	01	03	50
4	AEC ENGLISH	01	02	50
5	SEC	01	03	50
6	VAC	02	04(02+02)	100(50+50)
Total=		***07***	***20***	***400***

SEMESTER- I

Major Course
NUTMJ101: Basic Nutrition &Nutritional Physiology
Credits:04
Outcomes :

Course objectives and expected outcome
The students will enrich their knowledge on the nutrition and its development though out the globe. To familiarize students with fundamentals of food, nutrients and their relationship to health. The students get the idea about the requirement of the different nutrients in different stages of life cycle. To enables the students to gain of knowledge on the molecular and cellular mechanisms that underlie the normal physiological processes of all human organ systems. The students can brush up their knowledge about functions of different parts of the human body, how the body maintains homeostasis, how different organs participate in it and many more. The students can understand the physiological processes and their role in health and disease. The students also get the practical experience of health assessment through different physiological methods.

NUTMJ101T: Basic Nutrition & Nutritional Physiology (Theory)
Credits:03
Course contents:

A. Food and Nutrition: Basic concepts

1. **Brief about nutrition pioneer:** Patwardhan, C. Gopalan, Rajammal P. Devdas and Swaminathan, M.S. on development of Nutrition and Research.
2. **Concept of nutrition:** Basic definition, function, Classification and dietary sources of food,Nutrition and dietetics.
3. **Concept of Diet:** Balance Diet, Adequate Nutrition, Optimal Nutrition, concept of good nutrition and malnutrition.

4. **Concept of health:** Basic concept of health, Interrelationship between food, nutrition & health, visible symptoms of good health.
5. **Minimum nutritional requirements and RDA:** Formation of RDA and dietary guidelines: Reference Manand Reference Woman.
6. **Energy in Human Nutrition:** Idea energy and its unit, energy balance, assessment of energyrequirements, deficiency and Excess, Determination of energy in food, B.M.R & influencing factors,S.D.A.
7. **Basic functions and sources:** Carbohydrate, Protein, Fat, Vitamins, Minerals, Functional food, Nutraceuticals.

B. Nutritional Physiology

1. **Cellular system:** Cell and sub cellular components prokaryotic cells, eukaryotic cells, comparison offeatures of prokaryotic and eukaryotic cells.
2. **Digestive system:** Structure and function - secretory, digestive and absorptive functions – stomach,intestine, liver, pancreas and gall bladder. Hormones of gastro intestinal tract.
3. **Endocrine system:** Structure and function of endocrine glands (pituitary gland, thyroid, parathyroid, islets of langerhans, adrenals, ovary and testis, thymus, pineal gland). Role of hormones, regulation ofhormonal secretion, stress hormones. Excess and deficiency symptoms of hormones.
4. **Reproductive system:** Structure of male and female reproductive system. Spermatogenesis, oogenesis, folleculogenesis.
5. **Blood and Body fluid:** Blood - formation, composition, clotting and haemostasis. Formation and function of plasma proteins. Erythropoiesis. Blood groups
6. **Excretory system:** Structure of kidney and nephron. Urine formation. Non-excretory function ofkidney.

Suggested Readings:

1. Srilakshmi, B. 2000. Dietetics. Wiley Eastern Ltd. 4835/24, Ansari Road, Daryaganj. New Delhi.
2. Swaminathan, H. 1995, Essentials of Food and Nutrition Vol I &Vol. II Bappco. Bangalore.
3. Mahan, L.K. and Escott-Stump, S. (2000): Krause's Food Nutrition and Diet- Therapy, 10th Edition, W- 13 Saunders Ltd.
4. Nutrition A life cycle approach Ravindenchadhe and pulkitmathur, published by Orient Black Swar.
5. Nutrition and Dietetics Shubangini A joshi, Mcwraw Hill
6. Text book of Human nutrition Agarwal of Udopd, Jay pee
7. Guyton,A.C.andHall,J.E.(1999):TextbookofMedicalPhysiology,9thEdition,
8. W.B.SaundersCo.StuartIraFox,HumanPhysiology11thEd.William FGanong,ReviewofMedicalPhysiology
9. TextBookofMedicalPhysiology,InduKhurana,Elsevier(2016).

NUTMJ101P: Basic Nutrition &Nutritional Physiology (Practical) Credits:01

1. Identification and characterization of various foods with local name, English name and scientific name from a market / field.
2. Measurement of weight and volume of different cooking food prepared in household for daily cooking.
3. Prepare a food nutritional chart using ICMR-NIN proposed portion size.(Note: using staple food(s) guide by food guide pyramid) [Any plate].
4. Calculation of a meal (breakfast/lunch/dinner).
5. Study on microscopes.
6. Identification of prepared slides: a) Thyroid, b) Pancreas, c) Ovary d) testes e) Kidney, f) Liver, g) Duodenum, h) Jejunum, i) Ilium.
7. Preparation of blood film and identification of WBCs.
8. Estimation of haemoglobin by cyanomethoglobin test.
9. Blood grouping.

Minor Course

NUTMI101: Basic Nutrition & Nutritional PhysiologyCredits: 04

Outcomes :

Course objectives and expected outcome
The students will enrich their knowledge on the nutrition and its development though out the globe. To familiarize students with fundamentals of food, nutrients and their relationship to health. The students get the idea about the requirement of the different nutrients in different stages of life cycle. To enables the students to gain of knowledge on the molecular and cellular mechanisms that underlie the normal physiological processes of all human organ systems. The students can brush up their knowledge about functions of different parts of the human body, how the body maintains homeostasis, how different organs participate in it and many more. The students can understand the physiological processes and their role in health and disease. The students also get the practical experience of health assessment through different physiological methods.

NUTMI101T: Basic Nutrition & Nutritional PhysiologyCredits:03

Course contents:

A. Food and Nutrition: Basic concepts

1. **Brief about nutrition pioneer:** Patwardhan, C. Gopalan, Rajammal P. Devdas and Swaminathan, M.S. on development of Nutrition and Research.
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6. **Energy in Human Nutrition:** Idea energy and its unit, energy balance, assessment of energyrequirements, deficiency and Excess, Determination of energy in food, B.M.R & influencing factors,S.D.A.
7. **Basic functions and sources:** Carbohydrate, Protein, Fat, Vitamins, Minerals, Functional food, Nutraceuticals.

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1. **Cellular system:** Cell and sub cellular components prokaryotic cells, eukaryotic cells, comparison offeatures of prokaryotic and eukaryotic cells.
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8. W.B.SaundersCo.StuartIraFox,HumanPhysiology11th Ed.William FGanong,ReviewofMedicalPhysiology
9. TextBookofMedicalPhysiology,InduKhurana,Elsevier(2016).

NUTMI101P: Basic Nutrition & Physiology (Practical) Credits:01

1. Identification and characterization of various foods with local name, English name and scientific name from a market / field.
2. Measurement of weight and volume of different cooking food prepared in household for daily cooking.
3. Prepare a food nutritional chart using ICMR-NIN proposed portion size.(Note: using staple food(s) guide by food guide pyramid) [Any plate].
4. Calculation of a meal (breakfast/lunch/dinner).
5. Study on microscopes.
6. Identification of prepared slides: a) Thyroid, b) Pancreas, c) Ovary d) testes e) Kidney, f) Liver, g) Duodenum, h) Jejunum, i) Ilium.
7. Preparation of blood film and identification of WBCs.
8. Estimation of haemoglobin by cyanomethoglobin test.
9. Blood grouping.

NUTMI101T: Fundamental Nutrition (Theory) Credits 04 (3)
Course Learning Outcome:

- **Importance of food and nutrition everyday life**
- **To know the importance of nutritional status for maintain good health**

NUTMI101T
Course Contents:

1. **Basic concept of food and Nutrition**
   a) Concept and definition of nutrition, nutrients, nutritional status, Malnutrition and Health. Interrelationship in maintaining good health and well being.
   b) Food as source of nutrients, classification of food, food groups, food pyramid.
   c) Definition, Classification, source, function of carbohydrate, protein, lipids, vitamins and Minerals
   d) Minimum Nutritional Requirement and RDA: Dietary Guidelines for Indians. Reference Man and Reference Women.
2. **Management of Undernutrition**
   a) PEM in the context of stunting, wasting, underweight
   b) Integrated Child Development Service (ICDS), Mid Day Meal Programme, Vit. A prophylaxis programme, Anaemia Prophylaxis Programme, Iodine deficiency disorders control programs.

NUTMI101P: Fundamental Nutrition (Practical) Credits-01

1. Nutritional Status assessment using weight, height measurement, BMI, Waist to Hip Ratio, MUAC.
2. Identification of Nutrients (Carbohydrate, protein, fat) from unknown sample

SEC Course

NUTSEC101: Food Safety and Food Standard **Credits: 03**

Outcomes:

Course objectives and expected outcome
To enable the students to gain knowledge about food laws and standards for food quality. They can get the idea about the regulatory authorities. They can acquire skills in food sanitation and safety. They have to be trained in food safety and food standard from authorized trainers.

Course Content:

NUTSEC101T: Food safety and food standard (Theory) Credits (1)

1. **Food safety:** Concept of food safety, factors affecting food safety.Food safety measures: basic concept of HACCP, Safe food handling practices and storing food safely.
2. **Food laws and regulatory authority:** Prevention of Food Adulteration (PFA) Act.Regulating authority-Codex Alimentarius, ISI, Agmark, Fruit Products Order (FPO), Meat Products Order(MPO), Bureau of Indian Standards (BIS), MMPO, FSSAI.
3. **Evaluation of food quality:** Sensory characteristic of food, Sensory tests,

NUTSEC101P: Food safety and food standard (Practical) Credits (2)

1. A Report to be submitted on a training programme (Food safety and food standard) from authorized trainers.
2. Determination of total Ash content, moisture content and p^H content, and rancidity of food.
3. Detection of adulterants in food: Detection of Vanaspati in Ghee, butter, Detection of khesari flour in Besan, Detection of argemone oil in edible oil, Detection of metanil yellow in Turmeric.

Suggested Readings:

Semester-II
Course Structure

Sl. No.	Name of the Courses	No. of Papers	Credits	Full Marks
1	Major	01	04	75
2	Minor	01	04	75
3	IDC/MDC	01	03	50
4	AEC MIL (Beng./ Hindi)	01	02	50
5	SEC	01	03	50
6	VAC	02	04(2+2)	100(50+50)
7	CESR	01	02	50
Total=		***08***	***22***	***450***

SEMESTER- II

Major Course

NUTMJ201: Human Nutrition and Public Health Credits: 04

Outcomes :

Course objectives and expected outcome
To enable students to understand the nutritional demands in various stages of life cycle. They can acquire skills in planning adequate meals in different stages of life cycle to maintain health

NUTMJ201T: Human Nutrition and Public Health(Theory)

Credits:03

Course contents:

A. Human Nutrition

1. **Nutrition during Pregnancy:** Nutritional requirements during pregnancy and dietary management. Deficiency of nutrients and impactenergy, iron, folic acid, protein, calcium, iodine.
2. **Nutrition during Lactation:** Nutritional requirements during lactation, dietary management, food supplements, galactogogues. Care and preparation of nipples during breast feeding.
3. **Nutrition during infancy:** Breast feeding - colostrums, itscomposition and importance in feeding. Advantages of exclusive breast-feeding, Nutritional and other advantages of breast-feeding. Introductionof complementary foods, initiation of management of weaning, breast feeding etc.
4. **Nutrition to toddlers, preschool, school going children and adolescent:**Diet andNutritional requirement and Dietary guidelines, and health problems.
5. **Geriatric nutrition** – Dietary requirement, Geriatric health problems, Nutritional care.

B. Public Health Nutrition

1. **Concept of Public health**:Definition, determinants of public health. Surveillance of public health.

2. **Behaviour Change:** Definition and importance. Nutrition Education: Need, Scope and Importance. Formal education, Informal education and Non-formal education.
3. **Concept of communication:**Type, process and media of communication. Interpersonal, Group and Mass communication. Importance and relevance of Information.
4. **IEC**- Definition, Importance and various concepts.
5. **Concept of Nutrition education:** Various Methods of imparting nutrition education (Individual, Group, and mass approach) Types (Interpersonal communication: Individual and group approach; Mass Media, Traditional Media).
6. KAP and BAP model of nutritional awareness generation process.
7. **Strategies for nutritional awareness generation**: Various strategies for nutritional awareness generation on public health at rural sectors; child to child strategy, child to parent strategy, women to women strategy.
8. **National Nutritional Intervention Programmes:** Objective, Target group, Scheme details - Integrated Child Development Services (ICDS), Mid Day Meal Programme (MDMP), Vit A prophylaxis Prophylaxis programme, Anemia prophylaxis programme, Iodine deficiency disorders control programme. ANP, SNP, CNP, BFP – Aims and Objectives, Target group, Service provided, Advantages, Limitation, Concept on public distribution system.
9. **Concept of Surveillance systems:**Role of international and national organizations and agencies (WHO, FAO, UNICEF, CARE, NIN, CFTRI, ICMR).

NUTMJ201P: Human Nutrition and Public Health (Practical) Credits:01

a) Planning and preparation of balanced diet for adult men and women of different Physical activity and economic status.
b) Planning and preparation of balanced diet for a pregnant women, lactating women pre-school children, school going child, adolescents, senior citizen

c) Visit an anganwadi centre/ICDS centre. Prepare a report.
d) Visit an Midday Meal Programme. Prepare a report.

Minor Course
NUTMI201T: Human Nutrition and Public Health Credits 04

Outcomes :
(Please write here Outcomes of the entire paper)

SEC Course

NUTSEC201: Community Nutrition Credits: 03

Outcomes: (Please write here Outcomes of the entire paper)

NUTSEC201T: Community Nutrition: (Theory) Credits 01

1. **Community:** Concept of community, types of community, factors affecting health of Community.
2. **Community survey:** Concept of community survey, types of community survey. Diet survey- Need and importance, methodsof dietary survey with merit and demerits. Concept of consumption unit. Clinical Signs-Need &Importance's, identifying signs of PEM, vitamin A deficiency and iodine deficiency,Interpretation of descriptive list of clinical signs.

NUTSEC201P: Community Nutrition: (Practical) Credits:02

1. Clinical assessment and signs of nutrient deficiencies specially PEM (Kwashiorkor,marasmus) I vitamin A deficiencies, Anaemia, Rickets, B-Complex deficiencies.
2. Estimation of food and nutrient intake - Household food consumption data, adultconsumption unit, 24 hours dietary recall, 24 hours record. Weighment method, food diaries,food frequency data, use of each of the above, information available through each individual,collection of data, estimation of intakes.
3. Community field survey-A report submission on and b separately.

Semester-III
Course Structure

Sl. No.	Name of the Courses	No. of Papers	Credits	Full Marks
1	Major	02	08(4+4)	150(75x2)
2	Minor	01	04	75
3	IDC/MDC	01	03	50
4	AEC MIL (Beng./ Hindi)	01	02	50
5	SEC	01	03	50
Total=		***06***	***20***	***375***

SEMESTER- III

NUTMJ301: Nutritional Biochemistry Credits: 4

Course outcome

- The students will be able to demonstrate a sound knowledge of the chemical properties of food components (carbohydrates, proteins, lipids, vitamins, minerals etc.).
- They relate the properties and structures of chemical components and ingredients to the functional and chemical properties of foods.
- The students can describe details of the physical and chemical interactions between food components and their impact on quality.

NUTMJ301T: Nutritional Biochemistry (Theory) Credits:03

Course contents

1. **Carbohydrates-** Sources, functions, recommended dietary allowances (RDA), nutritional importance. Isomers of monosaccharides, Sterioisomerism, Epimers, Anomers, Tautomerism, Mutarotation, Carbohydrates with different bonds, Glycosidic bond, structure and functions of modified monosaccharide, disaccharides, polysaccharides and mucopolysaccharides. Glycemic Index, Glycemic load.
2. **Dietary fibre-** Sources, classifications and functions. Resistance starch.
3. **Proteins-** Sources, classifications, properties, functions, recommended dietary allowances (RDA), protein quality (BV, PER, NPU), and nutritional importance. Classification of amino acids and their functions. Structure of proteins (primary, secondary (alfa helix, beta pleated sheet, beta bend and omega loop and Triple helix supercoil, tertiary super secondary motifs with domain). Ramachandran plot.

Membrane protein. First class protein and Second class Protein.

4. **Lipids**-Sources, classification, functions, recommended dietary allowances (RDA). Fatty acids- Classifications and nutritional importance. Structure and function of cis, trans fatty acids, substituted fatty acids, cyclic fatty acids, PUFA, MUFA, fatty acid derivatives. Phospholipids and its types, micelle, liposome, steroids and sterols. Ketone body
5. **Enzymes:** Definition, classification & nomenclature, isoenzyme, coenzyme, enzyme kinetics including factors affecting enzyme activity, enzyme inhibition. Allosteric Modulation.
6. **Nucleic acid:** Nucleotides and their bases, Deoxyribonucleic acid, Ribonucleic acid, Genetic Code.

NUTMJ301P: Nutritional Biochemistry (Practical) Credits 1

1. Identification of unknown nutrients from an unknown sample.
2. (Note: Any one nutrient like: Cholesterol, Albumin, Gelatin, Peptone, Starch, Dextrin, Glucose/ Galactose, Fructose, Lactose/ Maltose, Sucrose, Glycerol etc).
3. Identification of quality of fats/oils(rancidity) by quantify the acid number (Note: supply various types of oil/ fat by food groups
4. Estimation of carbohydrate content in food in terms of total content of glucose by Benedict Quantitative reagents using titration method. (Note: Using various type of cereals/millets etc)
5. Estimation of protein content in food by Biuret method.
6. (Note: Using various types of foods like–Milk, Legumes or other protein rich foods)
7. Estimation of fat percentage in food. (Note: Fishes, nuts, oils)

8. Quantify the total Ash content in foods.
9. Quantify the total moisture content in food.
10. Extraction method of various macronutrients from foods by various solvents.

NUTMJ302: Diet Therapy-1Credits: 04

Course outcome

- Students able to understand principles of diet therapy, modification of normal diet for therapeutic purposes and the role of dietitian.
- They gain knowledge of different plant and animal derived foods and their nutritive values and properties. Explains diet for various gastrointestinal disease conditions, liver diseases/disorders and malabsorption syndrome.

NUTMJ302T: Diet Therapy-1 (Theory) Credits:03

Course contents

1. **Therapeutic diet-** Role of Dietetian, Principle of therapeutic diet. Transformation of Normal to Therapeutic Diet.Clear fluid, full fluid, soft, atkin, acid & alkaline, low fat with cholesterol restricted, bland, purine restricted, high & low protein, renal, sodium restricted, diabetic, high fibre, low residue and regular hospital diet, Ketogenic diet, Mediterranean diet, Kempner diet. Emergency situation-par-enteral and enteral nutrition, types, nutritional composition etc.
2. **Diabetes**- Classification, symptoms, oral hypoglycemic agents, insulin therapy and dietary management.
3. **Hyerlipidemias& dyslipidemia**-Causes, Symptoms, classifications and dietary management.
4. **Hypertension**- Causes, classifications and dietary management with emphasis on DASH diet and NCEP.
5. **Renal Diseases**- Causes, classifications and dietary management.
6. **Fever, allergies**: Causes, classifications and dietary management.

NUTMJ302P: Diet Therapy-1 (Practical) Credits 1

Course contents

1. Planning and preparation of diets for diabetes mellitus

2. Planning and preparation of diet for hypertension and hyperlipidemia.
3. Planning the preparation of diets for nephritis and nephritic syndrome
4. Planning the preparation of diets for fever

NUTSEC301: Foods as medicine Credits 03
Course outcome

NUTSEC301T: Foods as medicine (Theory) Credits 01
Course contents

1. **Vitamins**: Sources, medicinal (therapeutic) roles vitamin A, D, E, K, B1, B2, B3, B5, B6, B9, B12, C with recommended dietary allowances (RDA). Vitamin act as co-enzyme with specific example.
2. **Minerals**: Sources, medicinal (therapeutic) roles iron, calcium, iodine, magnesium, zinc, sodium, potassium, phosphorus, copper, manganese and selenium with recommended dietary allowances (RDA). Mineral act as co-factor with specific example.
3. **Functional foods**: Definition, foods that contain functional components with roles.
4. **Nutraceuticals**: Definition and clinical applications.
5. **Probiotics and prebiotics**- Definition & functions.
6. **Nutrigenomics and Foodomics**: Nutrient gene interaction, and Nutrient food interaction.
7. **Vitamin and Minerals act as health sensor**: Vitamin A, Vitamin C, Vitamin B6, Vitamin B12, Vitamin B1, Vitamin B2, Vitamin D, and Folic Acid. Iron, Calcium, Iodine, and Zinc.
8. **Fortified food and Ultra processed food**

NUTSEC301P: Foods as medicine (Practical) Credits 02

1. Identification of unknown functional components in functional foods from an unknown sample.
   (Note: Identify presence(+) or absence(-) of functional components from supplied solvent extraction of a functional food.
   [Functional components include:Alkaloid, Glycosides, Flavonoids, Tanins etc.]
2. Identification of antioxidant potential of a food or food

mixture. (Extraction of food(s) by various solvents by DPPH or other any one method).

3. Estimation of vitamins, and minerals in food by various method

Semester-IV
Course Structure

Sl. No.	Name of the Courses	No. of Papers	Credits	Full Marks
1	Major	03	12(4x3)	225(75x3)
2	Minor	01	04	75
3	AEC ENGLISH	01	02	50
4	Professional Course	01	02	50
Total=		***06***	***20***	***400***

SEMESTER-IV

NUTMJ401: Food MicrobiologyCredits:04

Course outcome

- To enable students to understand about morphological characteristics of different microorganism associated to food.
- The student will able to get an overall idea about the spoilage and factors affecting the growth of microorganisms in food.
- They will also impart the knowledge about the role of micro-organisms in fermentation of foods. They will aware about hygiene and sanitation in food industry.
- To enable students to develop skills in performing various microbiological tests and update the knowledge in identifying the important microorganism present in food.

NUTMJ401T: Food Microbiology (Theory) Credits: 03

Course contents

1. **Basic concept of Microbiology**- General Characteristics of fungi, protozoa and algae. Structure and various types of bacteria, bacterial spores, plasmid.
2. **Nutrition and culture of bacteria**- Bacterial growth-extrinsic and intrinsic factors affecting growth. binary fission of bacterial growth, bacterial growth curve, types of culture media, Methods of isolation.
3. **Fermented Foods-** Bacterial cultures, yeast cultures, mold cultures. Beneficial effect of microorganisms-concept of probiotics and related factors. Dietary different fermented products, importance of fermented foods.
4. **Virus-** Types, role of RNA and DNA virus in pathogenesis, viroids and prions.
5. **Antibiotics and antivirals-** Antibiotics and their classification, mode of action. Anti-virals and mode of actions.

NUTMJ401P: Food Microbiology (Practical)Credits:01

1. Study of equipments in a microbiology lab.
2. General procedures for aseptic work.
3. Staining of bacteria (gram staining).
4. Preparation of nutrient broth and media with agar
5. Preparation of bacterial smears.
6. Culture transfer techniques
7. Technique for isolation of pure culture, plating by pour plate and streak plate methods.
8. Bacteriological examination of water, milk, dried fish and fish meal and canned foods.

NUTMJ402: Food Processing, Preservation, Spoilage, and AdulterationCredits:04

NUTMJ402T: Food Processing, Preservation, Spoilage, and Adulteration (Theory) Credits:03

Course outcome

- Student will learn different methods of cooking and also know which methods of cooking responsible for minimum and maximum amount nutrient loss.
- They learn about the different methods of preserve foods and prevent them from spoiling the food production chain.
- Student will learn the ecology to determine how the microorganisms get into foods, what can be done to control microbial growth in foods or why pathogenic microorganisms are a problem in particular foods.

Course contents

1. **Methods of cooking-** Types of cooking**,** Dry, moist, frying and microwave cooking. Effect of various methods of cooking on foods, nutrient losses in cooking. Objectives of cooking, preliminary preparation (cleaning, peeling and straining, cutting and grating, sieving, soaking, processing, blanching, marinating, sprouting or germination, fermentation, drying, filtering, grinding, roasting). Implementation of cooking in therapeutic field.
2. **Food processing-** Principles of different methods of food processing, thermal processing, moist heat, dry heat, combination method of cooking, blanching, pasteurization, sterilization, canning. Principles of microwave cooking and solar cooking.
3. **Food preservation-** General principles of food preservation, food preservation by use of high temperature, low temperature, irradiation, preservatives etc.
4. **Food Spoilage-**Contamination of microorganisms in the spoilage of different kinds of foods, such as cereal and cereal

products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and milk products, canned foods.

5. **Food additive & Food adjuncts and preserved products, Food adulterants:-**Food additives-various types and their effects on health. Spices (Chilies, Turmeric, Garlic and Ginger), use and nutritional aspect. Jams, Jellies, Pickles, Syrup, Squashes – uses and nutritional aspects. PFA definition of food adulteration, adulterants in commonly consumed food items. Common adulterants in food and their effects on health. Common household methods to detect adulterants in food.

NUTMJ402P: Food Processing, Preservation, Spoilage, and Adulteration (Practical) Credits:01

1. **Detection of adulterants in food**
   i) Detection of vanaspati in Ghee.
   ii) Detection of vanaspati in Butter.
   iii) Detection of Khesariflourin Besan.
   iv) Detection of Argemone oil in Edible oil.
   v) Detection of Metanil yellow in Turmeric.

2. **Post-harvesting food process for later use**
   i) Foods include vegetables and fruits (Beans, Radish, cabbage, potato, cauliflower, leafy vegetables and pickle, squash.) dried by sun drying and mechanical drying.
   ii) To determine the moisture content in fresh and processed products.
   iii) To determine the ash content in fresh and processed products.
   iv) To determine the pH of food samples.
   v) To estimate the salt contents in given samples by using Mohrmethod.
   vi) Estimation of sodiumBenzoate in Food Sample.

vii) Estimation of Sulphur Dioxide.

NUTMJ403: Diet Therapy-II Credits:04

Course outcome

- To enable students to apply the principles of diet for the management of endocrine pancreas, cardiovascular system.
- The students will learn the use the nutrition care process for special conditions like allergy, febrile conditions, infections and surgical conditions.
- The students can develop the dietary models for patients suffering from cancer and immune system dysfunction. To enable students to acquire skills to plan a diet for renal diseases based on the dietary modification. They can evaluate the related food source for the special conditions.
- The students get the chance to visit the hospital to enable students to evaluate the patient's medical records and interpret their medical history related to the conditions. They analyze the food habits and bring about the dietary changes.
- They gain experience to plan and calculate the modified diet. They acquire skill to supervise and handle the food preparation and service in the dietary department of the hospital.

NUTMJ403T: Diet Therapy-II (Theory) Credits: 03

Course contents

1. **Inborn error of metabolism**–Galactosamia, Phenylketonuria, Maple syrup urine disease, lactose intolerance, arthritis and its dietary management.
2. **Etiology, symptoms and dietary management of intestinal diseases-** Diarrhea, steatorrhoea, diverticular disease, inflammatory bowel disease, Flatulence, Constipation, Irritable Bowel Syndrome.
3. **Etiology, symptoms, and dietary management of malabsorption syndrome-** Malabsorption of any

nutrientsdisorders**, c**eliac sprue, tropical sprue.

4. **Disease of the liver-** Jaundice, liver cirrhosis, viral hepatitis, diet therapy and nutritional care in any liver diseases. Gall bladder diseases and dietary management. Wilson's diseases and dietary management.

NUTMJ403P: Diet Therapy-II (Practical) Credits:01

1. Planning and preparation of clear fluid/full fluid diet for diarrhea patient.
2. Planning and preparation of soft/semisolid diet for Steatorrhoea patient.
3. Planning and preparation of diet for Diverticular disease patient.
4. Planning and preparation of diet for Flatulence patient.
5. Planning and preparation of diet for Constipation patient.
6. Planning and preparation of diet for Irritable Bowel Syndrome patient.
7. Planning and preparation of diet for Celiac sprue patient