VIDYASAGAR UNIVERSITY

Midnapore, West Bengal

PROPOSED CURRICULUM&SYLLABUS (DRAFT) OF

BACHELOR OF SCIENCE (HONOURS)

MAJOR IN NUTRITION

4-YEAR UNDERGRADUATE PROGRAMME

(w.e.f. Academic Year 2023-2024)

Based on

Curriculum & Credit Framework for Undergraduate Programmes

(CCFUP), 2023& NEP, 2020

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VIDYASAGAR UNIVERSITY
BACHELOR OF SCIENCE (HONOURS) MAJOR IN NUTRITION
(under CCFUP, 2023)

Level	YR.	SEM	Course Type	Course Code	Course Title	Credit	L-T-P	Marks		
								CA	ESE	TOTAL
B.Sc. (Hons.)	3rd	V	SEMESTER-V							
			Major-8	NUTHMJ08	T: Fundamentals of Diet Therapy; P: Practical	4	3-0-1	15	60	75
			Major-9	NUTHMJ09	T: Clinical Diet therapy-1; P: Practical	4	3-0-1	15	60	75
			Major-10	NUTHMJ10	T: Food Microbiology; P: Practical	4	3-0-1	15	60	75
			Major Elective-01	NUTHDSE1	T: Nutrition and Immunity; P: Practical	4	3-1-0	15	60	75
			Minor-5 (Disc.-I)	NUTMIN05	T: Nutrition in Special Physiological Phases; P: Practical *(To be taken by the other Discipline)*	4	3-0-1	15	60	75
					Semester-V Total	20				375
		VI	SEMESTER-VI							
			Major-11	NUTHMJ11	T: Food Preservation and Processing; P: Practical	4	3-0-1	15	60	75
			Major-12	NUTHMJ12	T: Nutrition, Education and Communication; P: Practical	4	3-0-1	15	60	75
			Major-13	NUTHMJ13	T: Clinical Diet Therapy-2; P: Practical	4	3-0-1	15	60	75
			Major Elective-02	NUTHDSE2	T: Sports nutrition and adaptive nutrition; P: Practical	4	3-0-1	15	60	75
			Minor-6 (Disc.-II)	NUTMIN06	T: Therapeutic Nutrition; P: Practical *(To be taken from other Discipline)*	4	3-0-1	15	60	75
					Semester-VI Total	20				375
					YEAR-3	40				750
			Eligible to be awarded Bachelor of Science in Botany *on Exit*			126	Marks (Year: I+II+III)			2325

MJ = Major, MI = Minor Course, DSE = Discipline Specific Elective Course, CA= Continuous Assessment, ESE= End Semester Examination, T = Theory, P= Practical, L-T-P = Lecture-Tutorial-Practical

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SEMESTER-V

MAJOR (MJ)

Major 08: Fundamentals of Diet Therapy
Credit: 4
Full Marks: 75

Learning outcomes:

At the end of the course the student will be able to:

1. Understand the various therapeutic diets and role in prevention of diseases.
2. Know about dietary management for texture & consistency Based Diets
3. Learn about Core Components of the Therapeutic Food Plan
4. Knowledge regarding Personalised Nutrition.

MJ-8T: Fundamentals of Diet Therapy (Theory) **Credits 03**

Course Content:

1. Basic concepts of Diet Therapy

- Historical outline of Diet Therapy-Monastic & The Medieval Diet.
- Definition and objectives of therapeutic nutrition.
- Principles of therapeutic diet.
- Principles of modifying diets based on energy, macronutrients, texture, flavour, genetic predispositions, metabolic profile, gut microbiota, medical history & comorbidities, lifestyle factors (activity level, stress, sleep, etc.).

2.Texture & Consistency Based Diets

- Clear liquid diet for digestive rest—broths, gelatin, clear juice.
- Full liquid diet- smooth purees, milk, yogurt.
- Soft/blenderized diet: for chewing/swallowing challenges—foods pureed, cooked soft with mild seasoning.
- Bland diet: avoids spicy, caffeine, alcohol; mild, soothing for the GI tract.

3.Feeding Methods & Care Planning

- Enteral nutrition: tube feeding types, indications, complications.
- Parenteral nutrition: PPN vs. TPN, monitoring.
- Pre and post-operative diets.
- Diet for specific situation- acid ash diet, alkaline ash diet, ornish diet, DASH diet.

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4.Core Components of the Therapeutic Food Plan

- Macronutrients balanced carbohydrates, healthy fats, lean proteins quinoa, olive oil, lentils, fatty fish.
- Micronutrients address deficiencies based on individual needs Spinach (folate), dairy (calcium), seeds (magnesium).
- Anti-inflammatory foods reduce oxidative stress & chronic inflammation turmeric, ginger, berries.
- Gut-health support restore microbiome balance yogurt, kefir, fermented foods, prebiotic fibers.
- Hydration support detox and cellular function herbal teas, infused water, coconut water

MJ-8P: Fundamentals of Diet Therapy (Practical) Credits 01

1. Planning and preparation of clear fluid diets.
2. Planning and preparation of full fluid diets.
3. Planning and preparation of soft diets.
4. Planning and preparation of therapeutic diets specially emphasis on gut health support with intervention of anti-inflammatory nutrition.

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Major 09: Clinical Diet Therapy-1
Credit: 4
Full Marks: 75

Learning outcomes:

At the end of the course the student will be able to:

1. 1.To know regarding dietary management of diabetic patient.
2. To learn regarding dietary management of heart disease patient.
3. To educate regarding dietary management of kidney disease patient.

MJ-9T: Clinical Diet therapy-1 (Theory) **Credits 03**

Course Content:

1. **Diabetes Mellitus**:

- Types with specific causes, symptoms, diagnosis, Management of diabetes by insulin therapy, oral hypoglycemic agents (OHA).
- Glucose monitoring at home.
- Dietary care and nutritional therapy, meal plan for a diabetic patient.
- Alternatives therapeutic management to combat hyperglycemia.

2. **Cardiovascular diseases**:

- Etiology and risk factors of various types of heart diseases.
- Hypertension-dietary management.
- Dietary management against progression of atherosclerosis.

3. **Hyerlipidemias:**

- Primary and secondary hyperlipidemia-causes, risk factors and linked with heart diseases and dietary management.
- National Cholesterol Education Programme (NCEP) guidelines.

4. **Renal Diseases**:

- Causes and dietary management of acute renal disease.
- Causes and dietary management of chronic renal disease.
- Uremia-cause, risk factors and dietary management.
- Causes and dietary management of nephrolithiasis.

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MJ9P: Clinical Diet therapy-1 (Practical) **Credits 01**

1. Planning and preparation of diets for diabetes mellitus.
2. Planning and preparation of diet for atherosclerosis.
3. Planning and preparation of diets for hypertension.
4. Planning and preparation of diets for nephritis and nephrotic syndrome.
5. Planning and preparation of diets for Chronic Kidney disease.

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Major 10: Food Microbiology
Credit: 4
Full Marks: 75

Learning outcomes:

At the end of the course the student will be able to:

1. 1.To know regarding bacteria, virus, protozoa, fungi etc.
2. To learn regarding bacterial growth and nutritional requirement.
3. To educate regarding fermented products and probiotics.

MJ-10T: Food Microbiology **Credits 03**

Course contents:

1.Basics of Microbiology:

- General characteristics of bacteria, fungi, virus, protozoa and algae.
- Bacterial structure- Cell walls of Gram positive and Gram negative, Bacteria capsule, Bacterial spore.
- Basic concept of viroids and prions.

2. Nutrition and culture of Bacteria:

- Bacterial growth-Extrinsic and intrinsic factors affecting growth.
- Bacterial growth curve.
- Types of starters culture.

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.
- Alcoholic beverages and traditional foods.

4. Food borne diseases

- Bacterial agents (e.g., Salmonella enterica, Clostridium perfringens, Escherichia coli O157, Listeria monocytogenes).
- Viral agents (e.g., Norovirus, Hepatitis A virus).
- Parasites (e.g., Giardia lamblia, Taenia solium)
- Toxin-mediated illnesses: food intoxication (e.g., Clostridium botulinum toxin, mycotoxins)

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MJ10P: Food Microbiology (Practical) **Credits 01**

1. Study of equipments in a food microbiology lab.
2. General procedures for aseptic work.
3. Staining of bacteria (gram staining).
4. Preparation of nutrient broth and media with agar.
5. Bacteriological examination of water, milk, dried fish and fish meal and canned foods.
6. Common preparation of starter culture for fermented food preparation.

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MAJOR ELECTIVE (DSE)

Major Elective – 01: Nutrition and Immunity
Credit: 4
Full Marks: 75

Learning Outcome:

At the end of the course the student will be able to:

1. 1.To know the basics of immune system.
2. To learn how amino acid, fatty acid and carbohydrates control immune function.
3. To educate regarding probiotics and immune health.

Major (Elect.) MJE -1T: Nutrition and Immunity **Credits 03**

Course contents:

1. Overview of Immune System:

- Types of immunity-innate immunity, acquired immunity, active and passive immunity.
- Basic outline of antigen-antibody interaction.
- Basic idea about immuno-competent cells- Neutrophil, B-lymphocytes, T-lymphocytes (helper, cytotoxic and suppressor), monocytes and macrophages.
- Types and functions of immunoglobulins.
- Properties of immunogen, antigens and haptens. Human leukocyte antigens.

2. Macronutrients and immune functions:

- Role of various amino acids (glutamine, arginine etc) on immune functions.
- Role of glutathione on immune function.
- Polyunsaturated fatty acids - anti and pro inflammatory effects.
- Dietary fibres modulate the immune system.

3. Vitamins and minerals and immune functions:

- Effect of vitamin D, A and C on immune cell activation.
- Role of vitamin B1, B2, B3 and B12 on anti and pro inflammatory responses.

4. Immunomodulator properties of functional foods:

- Probiotics and Gut–Immune Axis Modulation.

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- Role of Polyphenols and Flavonoids on immune health.
- Food-Derived Bioactive Peptides and Immunity.

Major (Elect.) MJE -1P: Nutrition and Immunity (**Practical**) **Credits 01**

1. Test for agglutination reaction.
2. Single Radial Immunodiffusion (SRID) test
3. Poster presentation on immunonutrition.
4. Preparation of immuno-nutrient rich functional foods.

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MINOR (MI)

Minor-5: Nutrition in Special Physiological Phases
Credit: 4
Full Marks: 75

Learning outcomes-

After completion of the course the students will be able to:

1. To know regarding nutritional requirements and dietary management during pregnancy.
2. To know about the physiology of lactation, nutritional requirements and dietary management during lactation.
3. To learn about nutritional requirement of toddlers / preschool / school going children / adolescent / adults.

MI – 5T: Nutrition in Special Physiological Phases **Credits 04**

Course Contents-

1. Nutrition during Pregnancy:

- Importance of adequate weight gain during pregnancy, antenatal care and its schedule.
- Dietary management for a pregnant mother.
- Importance of iron, folic acid and calcium during pregnancy.
- Common problems of pregnancy and their managements- morning sickness, anaemia, constipation, pregnancy induced hypertension, gestational diabetes.

2. Nutrition during Lactation:

- Nutritional requirements during lactation.
- Dietary management, food supplements during lactation.
- Increase the production of breast milk-various factors.
- Care and preparation of nipples during breast feeding.

3. Nutrition during infancy to adult:

- Breast feeding - colostrums, its composition and importance in feeding. Initiation of breast feeding and duration of breast-feeding, advantages of exclusive breast-feeding, nutritional and other advantages of breast-feeding.
- Introduction of complementary foods, initiation of management of weaning.
- Nutrition requirement of toddlers / preschool / school going children / adolescent / adults.

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MI-5P: Nutrition in different phases of Human life Cycle (Practical) **Credits 01**

1. Planning and preparation of balanced diet for a pregnant woman
2. Planning and preparation of balanced diet for a lactating women
3. Planning and preparation of balanced diet for a pre-school child
4. Planning and preparation of balanced diet for school going child.
5. Planning and preparation of balanced diet for adolescents

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SEMESTER-VI

MAJOR (MJ)

Major 11: Food Preservation and Processing
Credit: 4
Full Marks: 75

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability to

1. **Identify** the primary biological, chemical, and physical causes of food spoilage.
2. **Explain** the metabolic pathways and mechanisms used by spoilage microorganisms.
3. **Describe** the characteristic signs and spoilage patterns in various food commodities.
4. **Analyze** intrinsic and extrinsic factors that influence the rate and type of food spoilage.
5. **Differentiate** between food spoilage and foodborne illness.
6. **Apply** the principles of food preservation to prevent or delay spoilage in different food systems.
7. **Interpret** laboratory data to diagnose the cause of spoilage in a food sample.

MJ-11T: Food Preservation and Processing (Theory) **Credits 03**

Course Contents:

1. Food processing and Methods of 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).
- Effect of various methods of cooking on foods, nutrient losses in cooking.
- Significance, principles of different methods of food processing: thermal processing-Cooking (moist heat, dry heat, combination method of cooking), blanching, pasteurization, sterilization, canning. Principles of microwave cooking and solar cooking.

2. Food preservation

- General principles of food preservation.
  Application of heat (pasteurization, sterilization).Application of cold (refrigeration, freezing).Water activity control (drying, adding solutes).Chemical preservatives (organic acids, nitrites, sulfites). Non-thermal technologies (HPP, Pulsed Electric Fields, Irradiation).Hurdle Technology.
- Food additives-various types and their effects on health.

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- **Food adjuncts and preserved products-**Spices (Chilies, Turmeric, Garlic and Ginger), use and nutritional aspect. Jams, Jellies, Pickles, Syrup, Squashes–uses and nutritional aspects.

3. Food Spoilage:

- **Microbial Spoilage - Bacteria-**General characteristics of spoilage bacteria.Gram-negative spoilage bacteria (*Pseudomonas*, *Acinetobacter*, *Shewanella*).Gram-positive spoilage bacteria (*Lactic Acid Bacteria*, *Bacillus*, *Clostridium*).
- **Microbial Spoilage - Yeasts and Molds-**Characteristics and growth requirements of spoilage yeasts and molds. Mycotoxin production and its significance (*Aspergillus*, *Penicillium*, *Fusarium*).
- **Chemical and Biochemical Spoilage-**Enzyme activity (lipases, proteases, pectinases).Lipid oxidation (rancidity).Non-enzymatic browning (Maillard reaction).Light-induced spoilage.
- Contamination of microorganisms in the spoilage of different kinds of foods, such as cereal and cereal products (Mold growth, mycotoxins, and staling of bread). Spoilage in modified atmosphere packaging (MAP).

4. Food safety and Food laws

- Concept of food safety, basic concept of HACCP, Safe food handling practices and storing food safely.
- Prevention of Food Adulteration (PFA) Act.
- FSS Act, Role of FSSAI on food safety**.**

MJ-11P: Food Preservation and Processing (Practical) Credits 01

i. **Spoilage Identification Lab-Observation and documentation of** spoiled food samples (moldy bread, slimy meat, sour milk, etc.).
ii. Preparation and preservation of jam, jelly, pickles, syrups etc (home made techniques), and Sensory evaluation by hedonic scale of these products.
iii. A Report to be submitted on a training programme (Food safety and food standard) from authorized trainers.

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Major 12: Nutrition, Education and Communication
Credit: 4
Full Marks: 75

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability

1. Explain theories and models of education and behavior change relevant to nutrition.
2. Assess the educational needs of specific populations (e.g., by age, culture, socio-economic status).
3. Design nutrition education interventions (goals, objectives, content, and materials) tailored to different audiences.
4. Use a variety of communication tools and media (print, digital, interpersonal, mass media) to convey nutrition messages effectively.
5. Critically evaluate existing nutrition education/communication campaigns/programs for strengths, weaknesses, and ethical issues.
6. Apply evaluation methods to measure outcomes of nutrition education programs (knowledge, attitudes, behaviors).
7. Incorporate cultural sensitivity, literacy, and ethics in nutrition communication.

MJ-12T: Nutrition Education and CommunicationCredits 03

1. Foundations of Nutrition Education & Communication

- Definitions, importance and objectives of nutrition education and communication.
- Audiences (individual, group, community, population).
- Cultural, socio-economic, and demographic influences on nutrition behaviours.
- Barriers to effective nutrition education / miscommunication / misinformation.

2. Methods and Tools for Nutrition Education & Communication

- Interpersonal communication / counseling skills.
- IEC tools: pamphlets, posters, flipcharts.
- Mass media.
- Digital/social media: websites, apps, blogs, social platforms.
- Visual communication: infographics, video, photography.
- Nonverbal communication, storytelling, narrative approaches

3. Planning, Implementation & Evaluation of Programs

- Program design and content development.
- Resource mobilization and stakeholder engagement.

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- Pilot testing materials.
- Implementation strategies in different settings (school, community, clinical, workplace)

5. Theoretical Frameworks &Behavior Change Models

- Behavior change theories (e.g. Health Belief Model, Theory of Planned Behavior, Social Cognitive Theory, Transtheoretical Model).
- Social learning and social cognitive theory.
- Fogg Behavior Model.
- Motivation, ability and triggers for behaviour.
- Nutrition education for elderly, pregnant women, lactating mother, children and adolescent.

MJ-12P: Nutrition Education and Communication (Practical) Credits 01

1. Submission of Review report on existing national / international nutrition education campaign(s). (5 marks)
2. Investigation and submission of report with proper documentation (GPS image) of 5 days visit to a nutrition education campaign (needs assessment to evaluation plan). (15 marks)

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Major 13: Clinical Diet Therapy-2
Credit: 4
Full Marks: 75

COURSE LEARNING OUTCOMES:

This course provides a comprehensive overview of the

1. Pathophysiology and dietary management forvarious gastrointestinal disorder.
2. Pathophysiology and dietary management for liver, biliary system, and pancreas.
3. Pathophysiology and dietary management for**Anorectal Diseases.**

MJ-13T: Clinical Diet Therapy Part-2 Credits 03

Course contents:

1. Upper-digestive tract diseases:

- Causes, nutritional care and dietary management for Gastroesophageal Reflux Disease (GERD).
- Causes, nutritional care and dietary management for Peptic Ulcer Disease (Gastric and Duodenal Ulcers).
- Causes, nutritional care and dietary management for Functional Dyspepsia

2. Small Intestinal Diseases:

- Causes, nutritional care and dietary management for Celiac Disease.
- Causes, nutritional care and dietary management for Lactose Intolerance.
- Causes, nutritional care and dietary management for Small Intestinal Bacterial Overgrowth (SIBO) and Irritable Bowel Syndrome (IBS)
- Causes, nutritional care and dietary management for Inflammatory Bowel Disease (IBD).

3. Large Intestinal and Anorectal Diseases:

- Causes, nutritional care and dietary management for Diverticular Disease, Constipation.
- Causes, nutritional care and dietary management for Diarrhea (Weaning diarrhea, post antibiotic diarrhea, osmotic and secretory diarrhea).
- Causes, nutritional care and dietary management for Hemorrhoids (Internal and External).

4. Liver, Billiary and Pancreatic diseases

- Types of jaundice and hepatitis: A brief overview
- Causes, nutritional care and dietary management for viral hepatitis.
- Causes, nutritional care and dietary management for Alcoholic Liver Disease and liver Cirrhosis.

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- Causes, nutritional care and dietary management for Cholelithiasis (Gallstones), Cholecystitis (Acute and Chronic).
- Causes, nutritional care and dietary management for Acute Pancreatitis, Chronic Pancreatitis.

C13P: Clinical Diet therapy-2 (Practical) **Credits 01**

1. Planning and preparation of diets for GERD.
2. Planning and preparation of diet for peptic ulcer.
3. Planning the preparation of diets for IBS.
4. Planning the preparation of diets for Viral Hepatitis.
5. Planning the preparation of diets for Pancreatitis.
6. Planning the preparation of diets for Alcoholic Liver Disease.
7. Planning the preparation of diets for IBD.

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MAJOR ELECTIVE (DSE)

Major Elective – 02: Sports nutrition and adaptive nutrition
Credit: 4
Full Marks: 75

COURSE LEARNING OUTCOMES:

After the completion of the course, students will have ability

1. To enable students to understand key nutrition concepts through participatory and interactive learning approaches.
2. To develop skills in nutrition communication, digital tools, and behavioral engagement strategies.
3. To integrate technology, games, simulations, and case-based learning into nutrition education.
4. To enhance students' capacity for critical thinking, teamwork, and practical application of nutrition knowledge.

Major (Elect.) -2T Sports nutrition and adaptive nutrition Credits 03

Course contents:

1. Sports & Performance Nutrition

- Macronutrient requirements for athletes under different training and performance conditions.
- Macronutrient requirements for athletes under different training and performance conditions.
- Design dietary plans for pre-, during, and post-training / competition phases.
- Recovery & Repair: Post-exercise nutrition, muscle recovery, injury nutrition, inflammation, sleep & rest.

2. Space Nutrition

- Role of nutrition in maintaining astronaut health.
- Energy, Macronutrient (carbohydrates, proteins, fats), Micronutrients (vitamins and minerals) for astronaut.
- Fluid and electrolyte balance for astronaut.
- Antioxidants and immune support for astronaut

3. Occupational and extreme environmental condition related nutritional strategy

- Energy, Macronutrient and micronutrient requirements in heavy work.
- Nutrition in hot and cold climate.
- Nutrition at high altitude.
- Diet for soldiers, miners, construction workers, and athletes.

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Major (Elect.) -2P Sports nutrition and adaptive nutrition (Practical) Credits 01

1. Measurement of body composition using skin-folds for different sports person.
2. Conduct dietary assessment of a sportsperson and evaluate nutrient intake.
3. Preparation of a **model space diet or space food product** for astronauts.
4. Preparation of diet plans for workers in **hot climate, cold climate, and high-altitude conditions**.

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MINOR (MI)

Minor-6: Therapeutic Nutrition
Credit: 4
Full Marks: 75

COURSE LEARNING OUTCOMES:

Upon successful completion of this course, students will be able to:

1. Identify the key components, indications, and contraindications for major therapeutic diets.
2. Develop standardized meal plans and menus that adhere to specific therapeutic diet prescriptions.
3. Modify food textures and consistencies appropriately for patients with dysphagia and other chewing/swallowing impairments.
4. Perform nutrient analysis on therapeutic menus to ensure they meet prescribed guidelines.
5. Demonstrate practical food preparation and cooking techniques for various therapeutic diets in a kitchen lab.

MI– 6T: Therapeutic Nutrition **Credits 03 (45L)**

Course Contents

1. Basics of Therapeutic Nutrition

- Diet Progression (NPO, Clear Liquid, Full Liquid, Soft).
- Standard Hospital Diets.
- Menu Planning Fundamentals.

2. Cardiac and Lipid-Restricted Diets and **Diets for Diabetes and Weight Management**

- Sodium-Restricted (2g, 1g).
- Therapeutic Lifestyle Changes (TLC).
- DASH Diet.
- Carbohydrate Counting, Consistent Carbohydrate Menu.

3. Diets for Gastrointestinal Disorders Allergy and Elimination Diets

- Fiber-Modified (Low-Residue, High-Fiber).
- Low-FODMAP.
- Lactose-Restricted.
- Gluten-Free diet.
- "Top 8" Allergen-Free Elemental Diets.

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4. Renal Diets and Specialized Nutritional Support

- Sodium, Potassium, Phosphorus, and Fluid Control.
- Introduction to Enteral Formula Composition and Modular Components.
- Par-enteral nutritional support.

MI-06 P: Therapeutic Nutrition (Practical) **Credits 01 (30 hrs)**

1. Planning and preparation of clear fluid diets.
2. Planning and preparation of full fluid diets.
3. Planning the preparation of soft diets.
4. Planning the preparation of Therapeutic Lifestyle Changes (TLC).
5. Planning the preparation of DASH.

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