UNIVERSITY OF HEALTH SCIENCES LAHORE

UHS

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UNDERGRADUATE PROGRAMS

ALLIED HEALTH SCIENCES CURRICULA 2024

DEPARTMENT OF MEDICAL EDUCATION

University of Health Sciences, Lahore

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UHS/DME-25/960

Date: 11-03-2025

Pro Vice Chancellor
University of Health Sciences
Lahore.

Subject: Submission of semester-based curricula of Undergraduate Allied Health Sciences Degree Problem

The curricula of following Allied Health Sciences undergraduate programs have been developed by the subject advisory committee (SAC). The curriculum is prepared and reviewed by the experts of Subject advisory committee and is ready for uploading on official website.

Convener SAC	Degree Program	Signature
Brig (R) Tariq Mirza Mahmud	BS Medical Imaging Technology	
Prof. Dr. Asim Mumtaz	BS Medical Laboratory Technology	
Prof. Dr. Muhammad Moeen	BS Optometry & Orthoptics	
Prof. Dr. Nabila Talat	BS Operational Theater Technology	
Prof. Dr. Shazia Maqbool	BS Speech and Language Pathology	
Prof. Dr. Syed Asadullah Arslan	Doctor of Physical Therapy	
Prof. Dr. Saira Khalid	BS Dental Technology	
Dr. Shazia Zahra	BS Nutrition	

Dr. Saba Khaliq
Director, Institute of Allied Health Science
University of Health Sciences, Lahore

Prof. Dr. Sumera Ehsan
Head Department of Medical Education
University of Health Sciences, Lahore

SUBJECT ADVISORY COMMITTEE

1. Dr. Shazia Zahra (Convener)
Assistant Professor
Director Nutritionist
FMH College of Medicine & Dentistry, Lahore

2. Prof. Rizwana Muzaffar
Principal, Institute of Allied Health Sciences
Rashid Latif Medical & Dental College, Lahore

3. Prof. Dr. Sanaullah Iqbal
Chairman, Department of Food Science & Human Nutrition
University of Veterinary and Animal Sciences, Lahore

4. Ms. Wardah Nisar
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5. Dr. Muneeb Gilani
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6. Ms. Rimsha Fatima
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7. Mr. Asad Abbas
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Multan Medical & Dental College, Multan

8. Dr. Naveed Ahmad
Assistant Professor, Multan College of Food & Nutrition
Multan Medical & Dental College, Multan

9. Ms. Aqsa Ali
Assistant Professor, Allied Health Sciences
Akhtar Saeed Medical & Dental College, Lahore

SCHEME OF STUDIES

Semester	Course Code	Course Title	Theory	Practical	Credit Hours
1st Semester	GEFE	Functional English	03	00	03
	GEQR	Quantitative Reasoning-I	03	00	03
	GENS	Natural Sciences	02	01	03
	GEAH	Arts and Humanities	02	00	02
	GEICP	Ideology and Constitution of Pakistan	02	00	02
	IDC	Basic Biochemistry	03	00	03
	PERL-I	PERL-I	01	00	01
Total Credit Hours					**17**
2nd Semester	GEEW	Expository Writing	03	00	03
	GEQR	Quantitative Reasoning-II	03	00	03
	GESS	Social Sciences	02	00	02
	GEIE	Islamic Studies/Ethics	02	00	02
	IDC	Basic Anatomy	03	00	03
	IDC	Basic Physiology	03	00	03
	PERL-II	PERL-II	01	00	01
Total Credit Hours					**17**
3rd Semester	GEE	Entrepreneurship	02	00	02
	GECCM	Citizenship Education and Community Engagement	02	00	02
	GEICT	Applications of Information and Communication Technologies (ICT)	02	01	03
	IDC	General Pathology	03	00	03
	MFHN	Fundamentals of Human Nutrition	03	00	03
	MFST	Introduction to Food Science and Technology	02	01	03
	MMA	Macronutrients in Human Nutrition	03	00	03
	EPC-1	English Proficiency-1	02	00	02
	PERL-III	PERL-III	01	00	01
Total Credit Hours					**22**
	MFM	Food Microbiology	02	01	03

4th Semester	MMI	Micronutrients in Human Nutrition	03	00	03
	MPNA	Principles of Nutritional Assessment	02	01	03
	MNL	Nutrition through Lifecycle	03	00	03
	MFSM	Fundamentals of Food Service Management	02	01	03
	PS	Pakistan Studies	02	00	02
	EPC-2	English Proficiency-2	02	00	02
	PERL-IV	PERL-IV	01	00	01
Total Credit Hours					**20**
5th Semester	MFFN	Functional Foods & Nutraceutical	02	01	03
	MCN-I	Clinical Nutrition-I	02	01	03
	MHD	Hospital Dietetics	02	01	03
	MNI	Nutritional Immunology	03	00	03
	MNT-I	Medical Nutrition Therapy-I	02	01	03
	MDNI	Drug Nutrient Interaction	03	00	03
	EPC-3	English Proficiency-3	02	00	02
	PERL-V	PERL-V	01	00	01
Total Credit Hours					**21**
6th Semester	EL-1	Elective 1	03	00	03
	MCN-II	Clinical Nutrition – II	02	01	03
	MRMN	Research Methodology in Nutrition	02	01	03
	EL-2	Elective 2	03	00	03
	MNT-II	Medical Nutrition Therapy- II	02	01	03
	MCASN	Clinical Aspects of Sports Nutrition	03	00	03
	EPC-4	English Proficiency-4	02	00	02
	PERL-VI	PERL-VI	01	00	01
Total Credit Hours					**21**
	MFLR	Food laws & Regulations	03	00	03
	MNPCC	Nutritional Practices in Critical Care	02	01	03
	MBNP	Basics of Nutrigenomics and Proteomics	02	01	03

7th Semester	MRAND	Recent Advances in Nutrition & dietetics	02	01	03
	MNCS	Nutritional Counselling Skills	02	01	03
	INT	Internship/Field Experience	03	00	03
	EPC-5	English Proficiency-5	02	00	02
	PERL-VII	PERL-VII	01	00	01
Total Credit Hours					**21**
8th Semester	MPHN	Public Health Nutrition	03	00	03
	MBND	Biotechnology in Nutrition and Dietetics	02	01	03
	MNP	Nutrition and Psychology	03	00	03
	MFTA	Food Toxicology and Additives	02	01	03
	EPC-6	English Proficiency-6	02	00	02
	PERL-VIII	PERL-VIII	01	00	01
	CAP	Cap-stone Project	03		03
Total Credit Hours					**18**

5th Semester

FUNCTIONAL FOODS AND NUTRACEUTICALS

Credits Hours: 3 (2-1)

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Define and classify functional foods and nutraceuticals.
2. Discuss bioactive components and their health benefits.
3. Analyze regulatory and labeling aspects of nutraceuticals.
4. Evaluate clinical evidence supporting functional food claims.
5. Formulate functional food products targeting specific health issues.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Functional Foods and Nutraceuticals • Definitions and concepts of functional foods and nutraceuticals • Historical background and global trends • Classification of functional foods and nutraceuticals • Comparison with pharmaceutical drugs and dietary supplements	6
Unit II: Health Benefits and Mechanisms of Action • Concept of food as medicine • Mechanisms of action: antioxidant, anti-inflammatory, lipid-lowering, immunomodulatory and other effects • Introduction to nutrigenomics and nutrigenetics	8
Unit III: Functional Foods in Disease Prevention • Role of functional foods in cardiovascular diseases, diabetes, obesity and cancer prevention • Functional foods for gut health, bone health, cognitive function and immune enhancement • Scientific evidence and clinical trial data supporting health claims	10
Unit IV: Bioactive Components in Functional Foods • Dietary fiber, prebiotics and probiotics • Phytochemicals: flavonoids, polyphenols, carotenoids and glucosinolates • Omega-3 fatty acids, plant sterols, bioactive peptides and functional proteins	10

Unit V: Development and Formulation of Nutraceuticals • Selection of functional ingredients • Formulation techniques and delivery systems (capsules, bars, beverages and other formats) • Stability, bioavailability and shelf-life considerations	8
Unit VI: Nutraceuticals in Practice • Herbal nutraceuticals, traditional remedies and modern applications • Use of nutraceuticals in chronic disease management • Drug–nutrient interactions and safety concerns	8
Unit VII: Food Regulations and Safety Aspects • Regulatory frameworks: FDA (USA), EFSA (European Union), FSSAI (India) and DRAP (Pakistan) • Labeling requirements, health claims and marketing regulations • Quality assurance and safety assessment of nutraceutical products	6
Unit VIII: Research and Innovations in Functional Foods • Advances in food biotechnology • Emerging trends: personalized nutrition and microbiome-targeted products • Current research gaps and opportunities for product development	4
Total	**60**

Course Contents (Practical)

Practical Topics	**OSPE**
Practical I: Identification and Classification of Functional Foods and Nutraceuticals • Identification of commonly available functional foods and nutraceutical products• Classification based on source, bioactive ingredients, and intended health benefits• Recognition of major bioactive compounds (probiotics, prebiotics, phytochemicals, omega-3 fatty acids, plant sterols, dietary fiber, etc.)	1
Practical II: Evaluation of Labels, Health Claims and Product Information • Review of commercial nutraceutical and functional food labels• Interpretation of ingredient lists, nutrition facts, dosage recommendations, and safety warnings• Assessment of health claims according to national and international regulatory guidelines	1

Practical III: Functional Food Product Development and Case-Based Application • Selection of functional ingredients for specific health conditions (e.g., diabetes, cardiovascular disease, obesity, gut health)• Development of a prototype functional food concept or formulation	1
Total	**3**

Recommended Books

1. Shi, J., Ho, C.T. and Shahidi, F. (2005). *Asian Functional Foods*. Marcel Dekker/CRC Press, New York, USA.
2. Shi, J., Mazza, G. and Le Maguer, M. (2002). *Functional Foods: Biochemical and Processing Aspects* (Vol. 2). CRC Press, Taylor & Francis Group, Boca Raton, Florida, USA.
3. Wildman, R.E.C. (2006). *Handbook of Nutraceuticals and Functional Foods* (2nd Edition). CRC Press, Taylor & Francis Group, Boca Raton, Florida, USA.
4. Food and Agriculture Organization (FAO). (2007). *Report on Functional Foods*. Food and Agriculture Organization of the United Nations, Rome, Italy.

CLINICAL NUTRITION – I

Credits: 3 (2-1)

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the etiology and pathophysiology of nutrition-related diseases and disorders.
2. Identify the signs, symptoms, and nutritional implications of nutrient deficiency and disease conditions.
3. Assess the role of nutrients and dietary interventions in the prevention and management of clinical disorders.
4. Apply principles of nutritional assessment and nutrition care in various disease conditions.
5. Develop evidence-based dietary recommendations for patients across different stages of the life cycle.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Clinical Nutrition • Definition, scope and significance of clinical nutrition • Role of nutritionists and dietitians in healthcare settings • Overview of nutritional assessment techniques • Introduction to nutrition care process and medical nutrition therapy	10
Unit II: Etiology and Pathophysiology of Malnutrition • Definition and classification of malnutrition • Causes and risk factors leading to malnutrition • Impact of acute and chronic diseases on nutritional status • Inflammatory processes and their role in malnutrition	12
Unit III: Nutritional Management of Chronic Diseases • Cardiovascular diseases: dietary strategies for prevention and management • Diabetes mellitus: carbohydrate management and nutritional interventions • Renal diseases: nutritional assessment and dietary management of kidney disorders	16
Unit IV: Gastrointestinal Disorders and Nutrition • Inflammatory bowel diseases: nutritional implications and dietary management • Malabsorption syndromes: nutritional challenges and interventions • Liver diseases: nutritional support and dietary considerations	11
Unit V: Clinical Nutrition Across the Lifespan • Pediatric clinical nutrition: nutritional requirements, malnutrition and feeding problems • Geriatric clinical nutrition: age-related nutritional challenges and interventions • Nutrition support considerations in vulnerable populations	11
Total	60

Course Contents (Practical)

Practical Topics	No. of OSPEs
Practical I: Nutritional Assessment and Laboratory Interpretation • Anthropometric, biochemical, clinical and dietary assessment methods• Interpretation of laboratory investigations relevant to nutritional assessment• Identification and assessment of malnutrition	1
Practical II: Clinical Case Management of Disease Conditions • Nutritional assessment and diet planning for cardiovascular diseases, diabetes mellitus and renal diseases• Development of nutrition care plans and dietary recommendations based on case scenarios	1
Practical III: Gastrointestinal, Pediatric and Geriatric Nutrition	1

• Nutritional management of gastrointestinal disorders and liver diseases• Pediatric and geriatric nutrition case studies• Nutrition counseling and diet planning during ward rotations and clinical practice	
Total	**3**

Suggested Instructional / Reading Materials

1. Mahan, L.K. and Raymond, J.L. *Krause's Food & the Nutrition Care Process*, 14th Edition. Elsevier.
2. Sardesai, V.M. *Introduction to Clinical Nutrition*, CRC Press.
3. Nelms, M., Sucher, K., Lacey, K. and Roth, S. *Nutrition Therapy and Pathophysiology*.
4. Escott-Stump, S. *Nutrition and Diagnosis-Related Care*.
5. Academy of Nutrition and Dietetics. Evidence-Based Nutrition Practice Guidelines.

HOSPITAL DIETETICS

Credits: 3 (2-1)

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Perform nutritional assessment and interpret dietary requirements of hospitalized patients.
2. Develop meal plans and therapeutic diets according to disease-specific nutritional needs.
3. Apply principles of enteral and parenteral nutrition in clinical settings.
4. Modify diets and prepare specialized dietary regimens according to medical conditions and patient requirements.
5. Design hospital menus and therapeutic dietary trays in accordance with established dietary guidelines and protocols.

Course Contents (Theory)

Topics	**MCQs**
Unit I: Nutritional Assessment and Dietary Planning in Hospital Settings • Techniques for assessing nutritional status in hospitalized patients • Interpretation of laboratory results and diagnostic tests • National and international dietary guidelines and recommendations • Customizing diets based on nutritional guidelines and patient requirements	24

Unit II: Tailored Meal Plans for Health Conditions • Therapeutic diets in hospitals: concepts and applications • Principles of therapeutic nutrition • Meal planning for cardiovascular diseases• Meal planning for diabetes mellitus • Meal planning for renal diseases • Meal planning for gastrointestinal disorders • Nutritional management of malnutrition • Pediatric and geriatric nutrition: special considerations and nutritional requirements across life stages	20
Unit III: Specialized Diets and Nutrition Support Protocols • Enteral and parenteral nutrition: principles and indications • Implementation and monitoring of nutrition support therapies • Protocols for specialized diets • Gluten-free diets • Low-residue diets • Low-sodium diets • Modified texture diets and dysphagia management	16
Total	60

Course Contents (Practical)

Practical Topics	**No. of OSPEs**
Practical I: Hospital Menu Planning and Diet Modification • Menu development for hospital food services for general patients• Modification of diets according to disease conditions and nutritional requirements• Development of post-operative dietary trays	1
Practical II: Therapeutic Diet Planning and Tray Preparation • Development of therapeutic dietary trays for cardiovascular diseases, diabetes mellitus, renal diseases and gastrointestinal disorders• Calculation of nutrient requirements and meal planning for hospitalized patients	1
Practical III: Enteral Nutrition and Specialized Feeding Protocols • Formulation of nutritionally adequate enteral feeds for inpatient services• Selection and preparation of specialized diets according to clinical protocols• Evaluation of nutritional adequacy and patient suitability	1
Total	**3**

Suggested Instructional / Reading Materials

1. Webster-Gandy, J., Madden, A., & Holdsworth, M. *Oxford Handbook of Nutrition and Dietetics*. Oxford University Press.
2. Pender, F. *Clinical Cases in Dietetics*.
3. Puckett, R.P. *Food Service Manual for Health Care Institutions*.
4. Mahan, L.K., Raymond, J.L. *Krause's Food & the Nutrition Care Process*. Elsevier.
5. Payne-Palacio, J., & Theis, M. *Foodservice Management: Principles and Practices*.

NUTRITIONAL IMMUNOLOGY

Credits: 3 (3-0)

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the structure and function of the human immune system and its relationship with nutrition.
2. Describe the role of macro- and micronutrients, phytonutrients, and probiotics in immune regulation.
3. Analyze the influence of nutrition on immune responses, inflammation, autoimmunity, and infectious diseases.
4. Evaluate nutritional strategies and interventions for enhancing immune function and managing immune-related disorders.
5. Apply principles of nutritional immunology across different life stages and clinical conditions.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Nutritional Immunology • Overview, scope and significance of nutritional immunology • Historical development and evolution of the field • Ethical and regulatory considerations in nutritional immunology • Fundamental principles and concepts of immunology • Definition of nutritional immunology and role of dietary components in immune function	8

Unit II: Structure and Function of the Immune System • Anatomy and physiology of the immune system • Innate and adaptive immune systems: characteristics and functions • Immune responses to pathogens, antigens and foreign invaders • Major immune cells, tissues and organs involved in host defense	9
Unit III: Nutrients and Immune Function • Impact of macronutrients (carbohydrates, proteins and fats) on immune responses • Role of vitamins and minerals in immune regulation • Effects of phytonutrients, antioxidants and probiotics on immune health • Nutrient deficiencies and immune dysfunction	21
Unit IV: Immune System Regulation and Nutritional Immunomodulation • Immune responses in the context of dietary factors • Nutrition and immune tolerance • Inflammation and immune-related diseases • Nutritional interventions to enhance immune function • Functional foods, nutraceuticals and dietary supplements in immunomodulation • Dietary strategies for managing immune-related conditions	22
Unit V: Nutritional Immunology Across the Lifespan • Nutritional immunology in infants, children and adolescents • Immune function in adulthood and ageing • Immune support during pregnancy and lactation • Age-related changes in immunity and nutritional requirements	11
Unit VI: Nutrition, Infectious Diseases and Immune Disorders • Influence of nutrition on susceptibility to infections • Nutritional management of infectious diseases • Impact of undernutrition on immune response and infection risk • Nutrition in chronic inflammatory diseases • Nutritional interventions for autoimmune disorders, allergies and food intolerances	10
Unit VII: Gut-Immune Axis and Nutritional Support for Immune-Related Disorders • Gut microbiota and immune function • Role of the microbiome in health and disease • Nutritional approaches to promote gut and immune health • Cancer and nutrition: role of diet in prevention and management • Nutritional support for HIV/AIDS and immunodeficiency disorders	9
Total	90

Suggested Instructional / Reading Materials

1. 1. Nutrition and Immunology- principles and practice by M. Eric Gershwin, MD; J. Bruce German, PhD; Carl L. Keen, PhD

MEDICAL NUTRITION THERAPY – I

Credits: 3 (2-1)

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the pathophysiological changes affecting nutritional status in gastrointestinal, cardiovascular, endocrine, renal, and other disease conditions.
2. Apply the principles of Medical Nutrition Therapy (MNT) in the prevention and management of common clinical disorders.
3. Develop evidence-based nutrition care plans and therapeutic diets for patients with acute and chronic diseases.
4. Assess nutritional requirements and formulate appropriate dietary interventions for diverse patient populations.
5. Demonstrate competence in nutrition assessment, meal planning, and patient counseling through clinical case management.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Medical Nutrition Therapy • Overview, scope and objectives of Medical Nutrition Therapy (MNT) • Historical development and evolution of MNT • Role of MNT in healthcare and disease management • Ethical and legal considerations in nutrition therapy	5
Unit II: Dietary Reference Intakes and Therapeutic Diet Planning • Introduction to Dietary Reference Intakes (DRIs) • Determination of nutrient requirements for various patient populations • Principles and guidelines for planning therapeutic diets	6
Unit III: Medical Nutrition Therapy for Gastrointestinal Disorders • Nutrition management of gastroesophageal reflux disease (GERD) • Celiac disease and gluten-free dietary management • Inflammatory bowel diseases and nutritional interventions • Dietary management of gastrointestinal symptoms • Enteral and parenteral nutrition support	16
Unit IV: Diabetes and Endocrine Disorders	5

• Nutritional management of diabetes mellitus • Carbohydrate counting and insulin therapy • Dietary strategies for prevention of diabetes complications • Nutrition considerations in endocrine disorders	
Unit V: Cardiovascular Disease and Hypertension • MNT for cardiovascular diseases, hyperlipidemia and hypertension • Dietary strategies for lowering blood cholesterol and blood pressure • Therapeutic dietary approaches including the DASH diet	6
Unit VI: Nutritional Support for Kidney Disease • Medical nutrition therapy for chronic kidney disease (CKD) • Protein, sodium, potassium and phosphorus management • Nutrition care during dialysis and renal transplantation	7
Unit VII: Malnutrition and Wasting Disorders • Assessment and management of malnutrition in clinical settings • Nutritional support for patients with cancer, HIV/AIDS and other wasting conditions • Strategies to optimize energy and protein intake	8
Unit VIII: Food Allergies, Intolerances and Eating Disorders • MNT for food allergies and intolerances including lactose intolerance and gluten intolerance • Food allergen management and label interpretation • MNT for anorexia nervosa, bulimia nervosa and binge eating disorder • Weight management strategies and bariatric surgery considerations	7
Total	60

Course Contents (Practical)

Practical Topics	No. of OSPEs
Practical I: Gastrointestinal and Food Allergy Case Management • Ward-based case studies and nutritional assessment• Meal planning for upper and lower gastrointestinal disorders• Dietary management of food allergies and intolerances• Development of nutrition care plans for GI conditions	1
Practical II: Cardiometabolic and Renal Nutrition Therapy Meal planning for cardiovascular diseases and hypertension• Nutritional management of diabetes and endocrine disorders• Diet planning for chronic kidney disease and dialysis patients• Clinical case discussions and dietary modifications	1
Practical III: Weight Management and Specialized Clinical Conditions	1

• Nutrition management of obesity and weight-related disorders• Dietary interventions for eating disorders• Nutritional support for malnutrition and wasting conditions	
Total	**3**

Suggested Instructional / Reading Materials

1. Mahan, L.K., Raymond, J.L. *Krause's Food & the Nutrition Care Process*. Latest Edition. Elsevier.
2. Nelms, M., Sucher, K., Lacey, K., & Roth, S. *Nutrition Therapy and Pathophysiology*.

DRUG–NUTRIENT INTERACTION

Credits: 3 (3-0)

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the significance of drug–nutrient interactions and their impact on clinical outcomes and therapeutic effectiveness.
2. Differentiate between various types of drug–nutrient interactions and their mechanisms.
3. Analyze pharmacokinetic and pharmacodynamic processes involved in drug–nutrient interactions.
4. Identify patient-, drug-, and nutrition-related factors that influence drug–nutrient interactions.
5. Develop evidence-based strategies for the prevention, assessment, and management of drug–nutrient interactions in clinical practice.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Drug–Nutrient Interactions • Definition, scope and significance of drug-nutrient interactions • Historical development and evolution of the field • Impact of drug–nutrient interactions on clinical outcomes and therapeutic effectiveness • Role of healthcare professionals in preventing and managing interactions	9

Unit II: Types of Drug–Nutrient Interactions • Pharmacokinetic interactions: absorption, distribution, metabolism and excretion • Pharmacodynamic interactions and their effects on drug action • Combined pharmacokinetic and pharmacodynamic interactions • Classification and examples of common drug–nutrient interactions	13
Unit III: Mechanisms of Drug–Nutrient Interactions • Nutrient competition and absorption interference • Alterations in nutrient metabolism and utilization • Effects on nutrient excretion, storage and bioavailability • Drug-induced nutrient deficiencies and toxicities	17
Unit IV: Factors Influencing Drug–Nutrient Interactions • Patient-related factors: age, sex, genetics and physiological status • Drug-related factors: dosage, formulation and route of administration • Nutrition-related factors: dietary intake, nutritional status and supplement use • Disease conditions affecting drug–nutrient interactions	18
Unit V: Assessment and Management of Drug–Nutrient Interactions • Clinical assessment and monitoring of potential interactions • Identification of high-risk patients and medications • Strategies to minimize adverse effects and therapeutic failure • Dietary modifications and supplementation recommendations for patients on medication therapy	14
Unit VI: Clinical Applications and Case Studies • Analysis of real-life case studies involving drug–nutrient interactions • Development of nutrition intervention and management plans • Drug–nutrient interactions in special populations and chronic diseases • Ethical and professional considerations in clinical practice	19
Total	90

Suggested Instructional / Reading Materials

1. Handbook of Drug-Nutrient Interactions by Joseph I. Boullata and Vincent T. Armenti

6th Semester

ELECTIVE I: COMMUNITY PEDIATRICS

Credits: 3 (3-0) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the unique healthcare needs and challenges of pediatric populations within community settings.
2. Apply preventive healthcare measures, early intervention strategies, and health promotion approaches for children and adolescents.
3. Assess growth, nutritional status, and health indicators of infants and children using community-based approaches.
4. Evaluate the role of immunization, breastfeeding, nutrition programs, and disease prevention strategies in improving child health outcomes.
5. Demonstrate effective communication, teamwork, and community engagement skills to promote child health and reduce health disparities.

Course Contents (Theory)

Topics	MCQs
Unit I: Neonatal and Infant Health Care • Essential newborn care and neonatal health services • Common neonatal health problems and community-based management • Early childhood development and survival strategies	10
Unit II: Growth Monitoring and Nutritional Assessment • Principles and importance of growth monitoring • Growth charts and interpretation of growth indicators • Assessment of nutritional status in infants and children • Early identification of growth faltering and malnutrition	15
Unit III: Promotion of Breastfeeding and Infant Feeding Practices • Benefits of breastfeeding for mother and child • Exclusive breastfeeding and complementary feeding recommendations • Community-based breastfeeding promotion and support initiatives	13
Unit IV: Prevention and Management of Childhood Illnesses • Oral rehydration therapy and management of childhood diarrhea • Integrated approaches to prevention and control of common childhood illnesses • Community education for disease prevention and health promotion	10
Unit V: Immunization and Preventive Child Health Services • Principles and importance of immunization• National immunization schedules and vaccination programs • Vaccine-preventable diseases and community outreach strategies	11

Unit VI: Community Nutrition and Nutritional Surveillance • Community feeding programs and child nutrition interventions • Nutritional surveillance systems and monitoring of child health indicators • Prevention and management of childhood malnutrition at community level	16
Unit VII: School Health and Regular Health Check-ups • Importance of routine health examinations and screening programs • School health services and adolescent health promotion • Community-based approaches to child health and development • Addressing health disparities through community engagement and multidisciplinary collaboration	15
Total	90

Suggested Instructional / Reading Materials

1. *Maternal and Child Health*. Management Sciences for Health (MSH).
2. *Child Health*. Available through ECOG e-book resources.
3. *Child Growth Standards and the Identification of Severe Acute Malnutrition in Infants and Children*. World Health Organization (WHO).
4. *A Joint Statement by the World Health Organization and the United Nations Children's Fund (UNICEF)* on Child Health and Nutrition.
5. Park, K. *Park's Textbook of Preventive and Social Medicine*. Latest Edition.
6. World Health Organization (WHO). *Integrated Management of Childhood Illness (IMCI) Guidelines*.
7. United Nations Children's Fund (UNICEF). *Programming Guide for Early Childhood Development and Child Nutrition*.

CLINICAL NUTRITION II

Credits: 3 (2-1) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the etiology and pathophysiology of nutrition-related complications associated with cancer, critical illness, neurological, endocrine, and mental health disorders.
2. Assess nutritional status and calculate macro- and micronutrient requirements for patients with complex clinical conditions.
3. Develop evidence-based nutrition care plans and therapeutic dietary interventions for specialized disease conditions.

4. Apply principles of enteral and parenteral nutrition support in clinical practice.
5. Evaluate the role of nutrition in improving clinical outcomes, quality of life, and recovery in patients with chronic and critical illnesses.

Course Contents (Theory)

Topics	MCQs
Unit I: Oncology Nutrition • Etiology and pathophysiology of cancer-related malnutrition • Cancer cachexia and metabolic alterations • Nutritional assessment and support during cancer treatment • Dietary considerations for cancer survivors and long-term care	11
Unit II: Critical Care Nutrition • Etiology and pathophysiology of malnutrition in critically ill patients • Metabolic response to trauma, sepsis, burns, and critical illness • Enteral and parenteral nutrition in critical care settings • Nutritional rehabilitation and support following critical illness	11
Unit III: Neurological Disorders and Nutrition • Etiology and pathophysiology of malnutrition in neurological disorders • Nutritional management of neurodegenerative diseases (Alzheimer's disease, Parkinson's disease, etc.) • Nutritional considerations in stroke and traumatic brain injury • Dysphagia and modified texture diets	13
Unit IV: Endocrine Disorders and Nutrition • Etiology and pathophysiology of malnutrition in endocrine disorders • Nutritional management of thyroid disorders and hormonal imbalances • Dietary considerations for metabolic syndrome • Nutrition and endocrine regulation of metabolism	14
Unit V: Eating Disorders and Mental Health Nutrition • Etiology and pathophysiology of eating disorders • Nutritional interventions for anorexia nervosa, bulimia nervosa and binge eating disorder • Relationship between nutrition and mental health • Nutritional support in depression, anxiety and other mental health conditions	11
Total	60

Course Contents (Practical)

Practical Topics	No. of OSPEs
Oncology and Critical Care Nutrition • Nutritional assessment and case management of oncology patients• Calculation of energy, protein and fluid requirements during cancer	1

treatment• Enteral and parenteral nutrition planning for critically ill patients• Development of nutrition care plans for intensive care settings	
Neurological and Endocrine Disorders • Nutritional assessment and dietary planning for neurological disorders• Modified texture diets and dysphagia management• Meal planning for thyroid disorders, hormonal imbalances and metabolic syndrome• Clinical case discussions and nutrition interventions	1
Eating Disorders and Mental Health Nutrition • Nutritional assessment and counseling for eating disorders• Development of nutrition care plans for mental health conditions• Ward rotations, case presentations and patient counseling for specialized clinical conditions	1
Total	**3**

Suggested Instructional / Reading Materials

1. Mahan, L.K., Raymond, J.L. *Krause's Food & the Nutrition Care Process*. Latest Edition. Elsevier.
2. Nelms, M., Sucher, K., Lacey, K., & Roth, S. *Nutrition Therapy and Pathophysiology*.
3. Mueller, C.M. *The ASPEN Adult Nutrition Support Core Curriculum*.
4. Escott-Stump, S. *Nutrition and Diagnosis-Related Care*.
5. Academy of Nutrition and Dietetics. *Evidence-Based Nutrition Practice Guidelines*.
6. Marian, M., & Allen, K. *Clinical Nutrition for Oncology Patients*.

RESEARCH METHODOLOGY IN NUTRITION

Credits: 3 (2-1) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain fundamental concepts, principles, and methodologies used in scientific research.
2. Identify research problems and formulate relevant research questions and objectives in nutrition and health sciences.
3. Design appropriate research studies and develop scientifically sound research proposals.

4. Apply data collection, management, and basic statistical analysis techniques to research data.
5. Critically evaluate scientific literature and communicate research findings through scientific writing and presentations.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Research Methodology • Meaning, scope and importance of research • Types of research: basic, applied, qualitative and quantitative research • Scientific method and research process • Ethical principles and research integrity	11
Unit II: Identification of Research Problems and Literature Review • Selection of research topics in nutrition and health sciences • Identification and formulation of research problems • Development of research questions, aims and objectives • Literature search techniques and critical review of scientific literature	10
Unit III: Research Design and Proposal Development • Components of a research proposal • Study designs: observational and experimental studies • Sampling techniques and sample size considerations • Variables, hypotheses and conceptual frameworks • Project planning and organization of research activities	10
Unit IV: Data Collection and Research Implementation • Methods of data collection and measurement tools • Questionnaire development and validation • Data quality assurance and management • Conducting research in a systematic and methodological manner • Case studies and practical examples from nutrition research	9
Unit V: Biostatistics and Data Analysis • Introduction to biostatistics and statistical concepts • Descriptive and inferential statistics • Data coding, entry and cleaning • Statistical analysis techniques used in nutrition and health research • Interpretation and presentation of results	11
Unit VI: Scientific Writing and Research Communication • Writing research proposals and review papers • Structure of scientific reports and research articles • Referencing and citation styles • Presentation and dissemination of research findings • Plagiarism, publication ethics and responsible conduct of research	10
Total	60

Course Contents (Practical)

Practical Topics	No. of OSPEs
Literature Review and Research Problem Identification • Searching scientific databases and literature sources• Critical appraisal of published research articles• Formulation of research questions and objectives	1
Research Proposal Development • Preparation of research proposals including methodology, sampling, and data collection tools• Development of conceptual frameworks and study plans	1
Data Management and Scientific Writing • Data entry and basic statistical analysis using software• Interpretation of results and preparation of tables and figures• Writing review papers and research reports	1
Total	**3**

Suggested Instructional / Reading Materials

1. Chaudhry, M. Shahzad, Mahmood, S. Yasir, & Tahir, Sajjad Ahmed. *Research Methodology*.

ELECTIVE II: REPRODUCTIVE HEALTH

Credits: 3 (3-0) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the concepts of reproductive health and the reproductive life cycle from adolescence to adulthood.
2. Describe the anatomical, physiological, hormonal, and nutritional aspects of male and female reproductive health.
3. Analyze the determinants of reproductive health and the role of nutrition in promoting reproductive well-being.
4. Evaluate nutritional interventions for reproductive health disorders, pregnancy, lactation, infertility, and sexually transmitted infections.

5. Apply evidence-based strategies for promoting reproductive health, gender equity, and reproductive rights in community and clinical settings.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Reproductive Health and Life Cycle Approach • Concepts, scope and importance of reproductive health • Reproductive life cycle approach • International Conference on Population and Development (ICPD) • Determinants of reproductive health and reproductive health indicators	10
Unit II: Anatomy, Physiology and Nutrition in Reproductive Health • Anatomy and physiology of the male and female reproductive systems • Menstrual cycle and hormonal regulation • Puberty and reproductive maturation • Role of nutrition in supporting reproductive function and hormonal balance	17
Unit III: Maternal Health and Infant Nutrition • Safe motherhood and antenatal care • Maternal nutrition before, during and after pregnancy • Breastfeeding and lactation physiology • Infant feeding recommendations and maternal nutritional support	23
Unit IV: Family Planning, Reproductive Rights and Gender • Reproductive behavior and fertility awareness • Contraceptive methods and family planning • Sexual and reproductive health rights • Gender, power dynamics and reproductive health • Prevention and management of sexually transmitted infections (STIs)	20
Unit V: Nutrition in Reproductive Health Disorders • Nutrition-related causes and management of infertility • Nutritional support during fertility treatment • Nutritional interventions for polycystic ovary syndrome (PCOS) and endometriosis • Dietary management of male reproductive disorders and infertility • Lifestyle and nutritional strategies for optimizing reproductive health	20
Total	90

Suggested Instructional / Reading Materials

1. Melville, C. *Sexual and Reproductive Health at a Glance*. John Wiley & Sons.
2. Van Look, P.F.A. *Sexual and Reproductive Health: A Public Health Perspective*. Academic Press (Elsevier).
3. Kulczycki, A. *Critical Issues in Reproductive Health*. Springer.

4. Anderson, B. *Reproductive Health: Women's and Men's Shared Responsibilities*. Jones & Bartlett Learning.
5. Kotch, J.B. *Maternal and Child Health: Problems, Programs, and Policy*. Jones & Bartlett Learning.
6. World Health Organization. *Sexual and Reproductive Health Guidelines*.
7. Academy of Nutrition and Dietetics. *Nutrition Care Manual: Women's Health and Reproductive Nutrition*

MEDICAL NUTRITION THERAPY – II

Credits: 3 (2-1) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the etiology, pathophysiology, and nutritional implications of complex clinical disorders requiring specialized nutrition therapy.
2. Apply the Nutrition Care Process (NCP) to assess, diagnose, intervene, and monitor patients with acute and chronic diseases.
3. Develop evidence-based medical nutrition therapy plans for nutritionally vulnerable individuals across different clinical settings.
4. Integrate social, cultural, economic, and environmental factors into individualized nutrition care planning.
5. Demonstrate clinical reasoning in selecting appropriate therapeutic diets and nutrition support strategies for specialized disease conditions.

Course Contents (Theory)

Topics	MCQs
Unit I: Medical Nutrition Therapy for Oncology and Palliative Care • Pathophysiology of cancer-related malnutrition and cachexia • Nutritional assessment and management during cancer treatment • Nutrition support in palliative and end-of-life care • Improving quality of life through nutrition interventions	6
Unit II: Geriatric Nutrition and Long-Term Care • Nutrition assessment in older adults • Medical nutrition therapy for age-related disorders and frailty	4

• Nutrition management in long-term care facilities and nursing homes • Sarcopenia, malnutrition, and healthy ageing	
Unit III: Neurological and Neuromuscular Disorders • Medical nutrition therapy for Alzheimer's disease, Parkinson's disease, multiple sclerosis, and stroke • Nutritional support for neuromuscular disorders • Feeding difficulties, dysphagia, and oral nutrition support	8
Unit IV: Gastrointestinal Surgery and Transplant Nutrition • Nutrition assessment before and after gastrointestinal surgery • Enteral and parenteral nutrition in surgical patients • Liver and pancreas transplantation nutrition • Post-transplant dietary management and complications	8
Unit V: Pediatric Medical Nutrition Therapy • Nutrition assessment and intervention in pediatric patients • Medical nutrition therapy for failure to thrive, pediatric diabetes, obesity, and gastrointestinal disorders • Pediatric enteral and parenteral nutrition support	9
Unit VI: Immune-Related Conditions and Rare Metabolic Disorders • Medical nutrition therapy for HIV/AIDS, rheumatoid arthritis, and autoimmune diseases • Nutrition support in immunosuppressed patients • Inborn errors of metabolism and rare genetic disorders• Specialized therapeutic diets and medical foods	13
Unit VII: Bone and Hepatobiliary Disorders • Nutrition for osteoporosis, osteopenia, and metabolic bone diseases • Nutritional management of secondary bone disorders • Medical nutrition therapy in hepatobiliary diseases including fatty liver disease, hepatitis, cirrhosis, and biliary disorders • Role of macro- and micronutrients in liver health	12
Total	60

Course Contents (Practical)

Practical Topics	No. of OSPEs
Oncology, Hepatobiliary and Critical Care Nutrition • Nutritional assessment of oncology patients• Meal planning for hepatobiliary disorders• Nutrition support during metabolic stress and critical illness• Development of individualized nutrition care plans	1
Neurological, Bone and Immune-Related Disorders • Nutritional assessment and dietary management of neurological disorders• Meal planning for rheumatoid arthritis and autoimmune disorders• Nutritional interventions for osteoporosis and bone health• Clinical case discussions and patient counseling	1
Pediatric, Surgical and Specialized Clinical Nutrition • Nutrition care for pediatric patients and post-surgical cases• Nutritional support in transplant patients	1
Total	**3**

Suggested Instructional / Reading Materials

1. Mahan, L.K., & Raymond, J.L. *Krause's Food & the Nutrition Care Process*. 14th Edition or Latest Edition. Elsevier.
2. Nelms, M., Sucher, K., Lacey, K., & Roth, S. *Nutrition Therapy and Pathophysiology*.

CLINICAL ASPECTS OF SPORTS NUTRITION

Credits: 3 (3-0) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the role of macro- and micronutrients in energy production and athletic performance.
2. Assess the nutritional requirements of athletes participating in different sports and physical activities.
3. Develop evidence-based dietary plans to optimize athletic performance, recovery, and overall health.
4. Evaluate the use of dietary supplements and ergogenic aids in sports nutrition.
5. Apply nutrition strategies for weight management, hydration, injury recovery, and special athlete populations.

Course Contents (Theory)

Topics	MCQs
Unit I: Basic Nutrition Concepts for Athletes • Macronutrients and micronutrients in athletic performance • Energy metabolism and nutrient requirements • Hydration and electrolyte balance for athletes	9
Unit II: Nutritional Assessment in Sports Nutrition • Assessment methods for athletes, including dietary, anthropometric, and biochemical assessment • Interpreting athlete-specific assessment data	10
Unit III: Dietary Planning for Athletes • Energy and macronutrient requirements for various sports and activities • Meal planning and timing for training, competition, and recovery • Special dietary considerations for endurance, strength, and team sports	10
Unit IV: Dietary Supplements and Ergogenic Aids • Common dietary supplements and their efficacy in sports • Risks and benefits of supplement use for athletes • Identifying potential supplement-related issues in athletes	9
Unit V: Special Populations in Sports Nutrition • Nutritional needs of young athletes, older athletes, and female athletes • Athletes with dietary restrictions and food allergies • Nutrition for athletes with specific health conditions (e.g., diabetes, eating disorders)	9
Unit VI: Weight Management in Sports Nutrition • Weight loss, weight gain, and body composition for athletes • Strategies for making weight classes safely • Nutrition for athletes with disordered eating and overtraining issues	11
Unit VII: Hydration and Heat-Related Issues • Hydration strategies and fluid balance in athletes • Preventing and managing heat-related illnesses • Electrolyte imbalances and their impact on performance	10

Unit VIII: Nutrition and Injury Recovery • Nutrition strategies to support injury recovery and tissue healing • Nutritional interventions to reduce inflammation and muscle soreness • Rehabilitation nutrition plans for athletes	9
Unit IX: Sports Nutrition for Endurance Athletes • Nutritional strategies for marathon runners, triathletes, and cyclists • Carbohydrate loading and glycogen replenishment • Recovery nutrition for endurance events	9
Unit X: Sports Nutrition for Strength and Power Athletes • Protein requirements and muscle protein synthesis for strength athletes • Supplements for muscle gain and recovery • Strategies for athletes involved in power sports	4
Total	90

Suggested Instructional / Reading Materials

1. Burke, L. *Clinical Sports Nutrition Illustrated*.
2. Clark, N. *Nancy Clark's Sports Nutrition Guidebook* (5th Edition or Latest Edition).

7th Semester

FOOD LAWS & REGULATIONS

Credits: 3 (3-0) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the food laws, regulations, and standards governing food safety and quality in Pakistan.
2. Describe the roles and responsibilities of food safety authorities, public analysts, and regulatory agencies.
3. Interpret legal requirements related to food additives, packaging, labeling, and food quality standards.
4. Evaluate the implementation and enforcement of food laws for consumer protection and public health.
5. Promote awareness of food safety regulations and consumer rights through effective communication and advocacy.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Food Laws and Regulatory Framework • Overview of food laws and regulations in Pakistan • National and international food regulatory systems • Consumer protection and food safety legislation	14
Unit II: Food Additives and Standards • Classification of food additives • Permissible food additives and maximum allowable limits • National and international food standards	24
Unit III: Food Packaging and Labeling Regulations • Food packaging materials and regulatory requirements • Labeling requirements for packaged foods • Nutrition labeling, health claims, and consumer information	20
Unit IV: Food Safety Enforcement and Regulatory Authorities • Duties and responsibilities of public analysts • Roles and powers of food safety officers and drug inspectors • Food law enforcement agencies in Pakistan and their regulatory functions	22
Unit V: Consumer Awareness and Public Health Communication • Role of electronic and print media in food safety awareness • Consumer rights and empowerment • Public awareness campaigns and risk communication in food safety	10
Total	90

Suggested Instructional / Reading Materials

1. Government of Pakistan (GOP). *The Punjab Consumer Protection Act, 2005*. Government of the Punjab, Lahore, Pakistan.
2. Government of Pakistan (GOP). *Punjab Pure Food Rules, 2011*. Health Department, Government of the Punjab, Lahore, Pakistan.
3. Government of Pakistan (GOP). *Drug Regulatory Authority of Pakistan (DRAP) Act, 2012*. Government of Pakistan, Islamabad.
4. Government of Pakistan (GOP). *Pakistan Halal Authority Act, 2015*. Ministry of Science and Technology, Government of Pakistan, Islamabad.
5. *Pakistan Standards and Quality Control Authority (PSQCA) Food Standards*. Latest Edition.
6. *Codex Alimentarius Commission*. General Principles of Food Hygiene and Food Standards.
7. *Food Safety and Standards: A Practical Guide for Food Businesses*. Latest Edition.

NUTRITIONAL PRACTICES IN CRITICAL CARE

Credits: 3 (2-1) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Perform nutritional assessment of critically ill patients using appropriate assessment methods.
2. Apply medical nutrition therapy, including enteral and parenteral nutrition, in critically ill patients.
3. Provide nutritional counseling and participate in multidisciplinary nutrition care in critical care settings.
4. Monitor nutritional status and evaluate the effectiveness of nutrition interventions in critically ill patients.
5. Recognize ethical, pharmacological, and cultural considerations related to nutritional care in critical care settings.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Nutrition in Critical Care • Overview of the course, objectives, and the importance of nutrition in critical care.	4

• Ethical considerations and cultural influences in nutritional care for critically ill patients.	
Unit II: Critical Care Environment and Multidisciplinary Team • Introduction to critical care units and healthcare professionals. • Interactions and collaboration within a multidisciplinary team. • The role of nutritionists and dietitians in critical care.	7
Unit III: Physiology of Critical Illness • The impact of critical illness on metabolism and nutrient utilization. • Changes in energy expenditure and protein catabolism. • Stress response and the immune system.	5
Unit IV: Nutritional Assessment in Critical Care • Methods of nutritional assessment in critically ill patients. • Interpreting nutritional assessment data. • Incorporating nutritional assessment into patient care plans.	8
Unit V: Nutritional Support in Critical Care • Enteral and parenteral nutrition in critical care. • Indications for artificial nutrition support. • Managing complications of feeding tubes and access.	9
Unit VI: Fluid and Electrolyte Management • Fluid balance in critical care settings. • Electrolyte disturbances and their management. • Intravenous (IV) fluid selection and administration.	5
Unit VII: Pharmacological and Enteral Nutrition Interactions • Drug–nutrient interactions in critical care.• Drug administration via enteral feeding tubes.• Adjusting nutrition plans based on medication use.	7
Unit VIII: Complications and Special Considerations • Addressing gastrointestinal complications in critical care.• Nutritional care in cases of sepsis, acute respiratory distress syndrome (ARDS), and organ failure.• Surgical and post-operative nutrition support.	8
Unit IX: Monitoring and Assessing Nutritional Status in Critical Care • Continuous monitoring and assessment of nutritional status.• Use of biochemical markers in critically ill patients.• Interpreting laboratory values.	4

Unit X: Ethical and Cultural Aspects of Nutritional Care • Ethical dilemmas in nutritional care for critically ill patients.• Cultural considerations and end-of-life nutritional support.• Palliative nutrition care in critical care settings.	3
Total	60

Course Contents (Practical)

Practical Topics	No. of OSPEs
Practical I: Nutritional Assessment in Critical Care Nutritional assessment of critically ill patients using clinical, anthropometric, biochemical, and dietary methods• Interpretation of nutrition screening and assessment tools	1
Practical 2: Enteral and Parenteral Nutrition Support • Calculation of energy, protein, and fluid requirements• Development of enteral and parenteral nutrition plans• Selection of feeding routes and monitoring of nutrition support	1
Practical 3: Critical Care Case Management • Case-based nutrition care planning for critically ill patients• Monitoring nutrition interventions, patient counseling, and multidisciplinary case discussions	1
Total	**3**

Suggested Instructional / Reading Materials

1. Kane, K., & Prelack, K. *Medical Nutrition Therapy*. Latest Edition.
2. Rajendram, R., Preedy, V.R., & Patel, V.B. (Eds.). *Diet and Nutrition in Critical Care*. Springer.
3. Raymond, J.L., & Morrow, K. *Krause and Mahan's Food & the Nutrition Care Process*. Elsevier.

BASICS OF NUTRIGENOMICS AND PROTEOMICS

Credits: 3 (2-1) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the molecular and genetic foundations underlying nutrigenomics and proteomics.

2. Describe gene–diet interactions and their influence on health, disease, and nutrient metabolism.
3. Apply basic proteomic and nutrigenomic techniques used in nutrition research.
4. Explain the principles of personalized nutrition based on genetic and proteomic information.
5. Analyze and interpret nutrigenomic and proteomic data for disease prevention, management, and research applications.
6. Evaluate emerging technologies and future trends in nutrigenomics, proteomics, and personalized nutrition.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Molecular Biology and Genetics • Overview of molecular biology, genetics, and their relevance to nutrition. • Understanding cellular structures, DNA, RNA, and gene expression.	5
Unit II: Basics of Proteomics • Introduction to proteomics, its goals, and applications in nutrition research • Techniques for protein extraction, quantification, and analysis.	6
Unit III: Protein Structure and Function • Understanding the structure, folding, and functions of proteins. • Relationship between protein structure and nutritional bioactivity.	5
Unit IV: Proteomic Techniques in Nutrition • Hands-on training in mass spectrometry, gel electrophoresis, and chromatography. • Protein identification, quantification, and characterization using proteomic tools.	6
Unit V: Basics of Nutrigenomics • Introduction to nutrigenomics, its principles, and applications in personalized nutrition. • Exploring gene–diet interactions and their implications for health.	8
Unit VI: Nutrigenomic Techniques and Tools • Introduction to genomics tools and bioinformatics for nutrigenomic analysis.	5

• Data interpretation and visualization in nutrigenomics.	
Unit VII: Gene–Nutrient Interactions • Understanding how nutrients influence gene expression and function. • Epigenetic modifications and their role in nutrigenomic responses.	7
Unit VIII: Nutrigenomics in Disease Prevention and Management • Applying nutrigenomics to assess disease risk and design nutrition-based interventions. • Case studies on nutrigenomics-guided approaches for specific health conditions.	10
Unit IX: Personalized Nutrition and Dietary Recommendations • Principles of personalized nutrition based on genetic profiling and nutrigenomic insights. • Ethical considerations and communication of nutrigenomic information.	4
Unit X: Integration of Proteomics and Nutrigenomics in Research • Combined approaches to study proteogenomics and integrate protein and gene expression data. • Research projects and applications in nutrition for enhancing food quality and health.	3
Unit XI: Future Trends and Emerging Technologies • Exploring emerging technologies in proteomics and nutrigenomics. • Implications for the future of personalized nutrition and healthcare.	1
Total	60

Course Contents (Practical)

Practical Topics	No. of OSPEs
DNA Extraction and Genotyping Extract DNA from biological samples (e.g., cheek swabs, blood).• Perform genotyping using PCR and analyze the results.	1
Protein Profiling and Analysis	1

Extract proteins from different food sources and analyze their concentration using the Bradford assay.• Perform gel electrophoresis to profile proteins and visualize them.	
Gene Expression Analysis Isolate RNA from cells or tissues.• Conduct real-time PCR to analyze gene expression patterns in response to specific dietary components.	1
Interpretation of Nutrigenomic Data Interpret sample nutrigenomic reports to identify genetic variations influencing nutrient metabolism.• Discuss nutrition implications based on genetic information and current scientific evidence.	-
Total	**3**

Suggested Instructional / Reading Materials

1. Mine, Y., Kazuo, M., & Shahidi, F. (2009). *Nutrigenomics and Proteomics in Health and Disease: Food Factors and Gene Interactions*. John Wiley & Sons, New Jersey, USA.
2. Brand-Foissac, R., & Grimaldi, J. H. (2006). *Nutritional Genomics: Impact on Health and Disease*. Wiley-VCH, Germany.
3. Campbell, N. A. (2010). *Introduction to Proteomics: Principles and Applications*. John Wiley & Sons, New Jersey, USA.
4. Rozen, R., & Kole, C. *Nutrigenomics: The Impact of Dietary Regulation of Gene Function on Human Disease*.

RECENT ADVANCES IN NUTRITION & DIETETICS

Credits: 3 (2-1) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain recent advances in the physiological and metabolic roles of nutrients and their interactions in human nutrition.
2. Evaluate emerging scientific evidence related to the pharmacological actions and therapeutic applications of nutrients.
3. Critically appraise current research and controversies in nutrition and dietetics.
4. Discuss advances in nutritional science related to functional foods, gene regulation, and specialized nutrition.

5. Apply current evidence to contemporary nutrition and dietetic practice.

Course Contents (Theory)

Topics	MCQs
Unit I: Energy Metabolism and Energy Expenditure • Energy content and calorific value of foods and common misconceptions. • Physiological fuel values. • Measurement of energy expenditure in the body and recent research developments.	12
Unit II: Digestive Physiology and Nutrient Requirements • Recent advances in digestive absorption and malabsorption. • Essential nutrients, micronutrients, Recommended Dietary Allowances (RDAs), and recent evidence supporting dietary reference intakes.	20
Unit III: Advances in Carbohydrates and Dietary Management • Glycemic index of foods and common myths. • Nutritive and non-nutritive sweeteners and their safety assessment. • Recent issues in diet planning, meal planning, and nutrition management.	14
Unit IV: Advances in Proteins, Lipids, Vitamins and Bioactive Compounds • Therapeutic applications of specific amino acids. • Recent research in fatty acid synthesis, polyunsaturated fatty acids (PUFAs), and health claims. • Vitamins and minerals: emerging health claims. • Polyphenols, tannins, phytates, phytoestrogens, cyanogenic compounds, lectins, and saponins.	29
Unit V: Emerging Areas in Nutrition Science • Nutritional regulation of gene expression. • Nutrition management in special conditions: space travel, high altitudes, low temperatures, and submarines. • Recent developments in human nutrition and dietetics.	15
Total	90

Course Contents (Practical)

Practical Topics	No. of OSPEs
Critical Appraisal of Recent Nutrition Research • Review and presentation of recent research articles from peer-reviewed nutrition journals.• Interpretation of research findings and discussion of clinical relevance.	1
Dietary Assessment and Evidence-Based Meal Planning	1

• Evaluation of dietary recommendations using current evidence.• Case-based meal planning using updated nutrition guidelines.	
Journal Club and Emerging Nutrition Topics • Journal club presentations on recent advances in nutrition and dietetics.• Discussion of emerging trends and controversies in nutrition science.	1
Total	3

Suggested Instructional / Reading Materials

1. *Nutrition Reviews*. Wiley.
2. *The Journal of Nutrition*. American Society for Nutrition.
3. *The American Journal of Clinical Nutrition*. American Society for Nutrition.
4. *British Journal of Nutrition*. Cambridge University Press.
5. *European Journal of Clinical Nutrition*. Springer Nature.
6. *International Journal of Vitamin and Nutrition Research*. Hogrefe Publishing.
7. *International Journal of Food Science and Nutrition*. Taylor & Francis.
8. *Nutrition Research*. Elsevier.
9. *Annals of Nutrition & Metabolism*. Karger Publishers.
10. Bergheim, I. *Clinical Nutrition: Recent Advances and Remaining Challenges*.

NUTRITIONAL COUNSELLING SKILLS

Credits: 3 (2-1) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the Nutrition Care Process (NCP) and its application in different nutrition practice settings.
2. Demonstrate effective nutrition counseling and communication skills using a person-centered approach.
3. Apply behavior change theories and learning principles in nutrition education and counseling.
4. Develop nutrition care plans and provide culturally appropriate nutrition counseling across the lifespan.

5. Evaluate the effectiveness of nutrition counseling interventions through follow-up and documentation.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Nutrition Counseling and the Nutrition Care Process • Introduction to counseling skills and guides for Nutrition and Dietetics practice. • Overview of the Nutrition Care Process (NCP) and its application in different practice settings. • Professional writing and communication.	11
Unit II: Communication and Person-Centered Counseling • Interviewing and person-centered counseling. • Counseling through the lifespan: communication and cultural diversity. • Professional ethics and communication in nutrition counseling.	11
Unit III: Behavior Change and Nutrition Counseling • Stages and processes of health behavior change. • Counseling for behavior modification: cognitive change. • Motivational approaches to nutrition counseling.	14
Unit IV: Nutrition Education and Learning Strategies • Principles and theories of learning and planning learning. • Implementing and evaluating learning. • Development of nutrition education materials.	16
Unit V: Group Counseling and Presentation Skills • Group facilitation and group dynamics. • Effective oral presentations using instructional media. • Presentation of group lessons and evaluation of counseling sessions.	8
Total	60

Course Contents (Practical)

Practical Topics	No. of OSPEs
Nutrition Care Process Documentation • Preparation of Nutrition Care Process (NCP) documentation using the ADIME format.• Identification of nutrition problems and formulation of nutrition diagnoses (PES statements) from case scenarios.	1
Nutrition Counseling and Communication Skills • Conducting patient interviews and dietary history using person-centered counseling techniques.• Demonstration of communication skills,	1

motivational interviewing, goal setting, and behavior change counseling through role-play or simulated patient encounters.	
Patient Counseling and Follow-up • Selection of a patient for nutrition counseling.• Development of an individualized nutrition care plan, implementation of counseling, documentation of follow-up, and evaluation of outcomes.	**1**
Total	**3**

Suggested Instructional / Reading Materials

1. Holli, B. B., & Beto, J. A. (2014). *Nutrition Counseling and Education Skills for Dietetics Professionals* (6th ed.). Lippincott Williams & Wilkins.
2. Mahan, L. K., & Raymond, J. L. (2016). *Krause's Food & the Nutrition Care Process* (14th ed.). Elsevier.
3. Whitney, E. N., & Rolfes, S. R. (2016). *Understanding Nutrition* (14th ed.). Cengage Learning.

8th Semester

PUBLIC HEALTH NUTRITION

Credits: 3 (3-0) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Characterize populations at greatest risk of malnutrition and nutrition-related diseases, considering biological, cultural, socioeconomic, and environmental determinants.
2. Explain the principles and scope of public health nutrition in disease prevention and health promotion.
3. Apply epidemiological and nutrition assessment methods to identify nutrition-related public health problems.
4. Evaluate nutrition interventions and programs at individual, community, and policy levels.
5. Design evidence-based nutrition education and behavior change strategies for diverse populations.
6. Assess national and global public health nutrition programs and their impact on population health.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction and Principles of Public Health Nutrition • Define public health nutrition and importance of nutrition in public health. • Ethical considerations and cultural influences in public health nutrition. • Core principles of public health nutrition and their application. • Determinants of health and their relationship to nutrition. • Public health nutrition approaches to addressing diet-related health issues.	14
Unit II: Epidemiology and Nutrition Assessment • Basics of epidemiology and its role in nutrition research. • Designing and interpreting nutrition studies. • Analyzing and using nutrition data for public health decision-making. • Methods for assessing dietary intake and nutritional status in populations. • Community nutrition surveys and their role in public health planning. • Interpreting nutritional data for program development.	20
Unit III: Nutrition Education and Public Health Programs • Strategies for nutrition education in diverse populations. • Social and behavior change theories applied to nutrition promotion. • Designing effective nutrition education interventions. • Maternal and child nutrition programs in Pakistan. • Nutrition programs for schools and communities in Pakistan. • Evaluation of school- and community-based nutrition programs.	24

Unit IV: Global Nutrition and Public Health Campaigns • Nutrition-related global health issues (e.g., malnutrition, stunting, obesity). • International nutrition programs and initiatives. • Addressing nutrition disparities in a global context. • Designing public health nutrition campaigns. • Social marketing techniques for promoting healthy dietary behaviors. • Evaluating the effectiveness of public health campaigns.	18
Unit V: Program Evaluation and Outcome Assessment • Methods for evaluating the impact of public health nutrition programs. • Assessing the outcomes and effectiveness of interventions. • Using evaluation data for program improvement.	14
Total	**90**

Suggested Instructional / Reading Materials

1. Willett, W. *Nutritional Epidemiology* (2nd Edition). Oxford University Press.
2. Farmer, R., Miller, D., & Lawrenson, R. *Epidemiology and Public Health Medicine* (4th Edition). Blackwell Science.
3. Morrell, D. *Epidemiology in General Practice*. Oxford General Practice Series.

BIOTECHNOLOGY IN NUTRITION AND DIETETICS

Credits: 3 (2-1) Credit Hours
Course Learning Outcomes
By the end of this course, the student will be able to:

1. Explain the principles and applications of biotechnology in food, nutrition, and dietetics.
2. Describe the role of microorganisms in the production of functional foods, food ingredients, and nutraceuticals.
3. Discuss the principles of food fermentation, starter cultures, and biopreservation in improving food quality and safety.
4. Evaluate the production and nutritional applications of microbial products, including probiotics, prebiotics, single-cell proteins, microbial polysaccharides, and bioactive compounds.
5. Explain the concepts, applications, and safety aspects of genetically modified foods and metabolic engineering in nutrition.
6. Perform basic laboratory techniques related to food biotechnology and interpret their applications in nutrition and dietetics.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Food Biotechnology • Food biotechnology: definition, history, scope, and global economic importance. • Future potential of biotechnology in food and nutrition. • Microorganisms used in food and nutrition biotechnology. • Introduction to fermented foods and their diversity. • Fermented foods of the subcontinent and nutritional significance.	18
Unit II: Fermentation, Starter Cultures and Food Biopreservation • Food fermentation and its benefits in food processing and nutrition. • Starter cultures, selection criteria, and important starter cultures for food fermentations. • Food biopreservation. • Bacteriocins as food preservatives and their mode of action.	19
Unit III: Microbial Products and Functional Food Ingredients • Production of major nutrients using biotechnological approaches. • Food additives, colours, and flavours produced through biotechnology. • Single-cell oils (SCO): production, oleaginous microorganisms, safety, and applications. • Microbial exopolysaccharides (EPS) and their importance. • Single-cell proteins (SCP): production and applications. • Food applications of algae and edible fungi (including Spirulina). • Nutritive and non-nutritive sweeteners and their production.	22
Unit IV: Metabolic Engineering and Functional Foods • Introduction to metabolic engineering. • Aims and steps of metabolic engineering. • Metabolic engineering of lactic acid bacteria (LAB) and dairy applications. • Functional foods and biotechnology.	16
Unit V: Genetically Modified Foods and Biotechnology in Nutrition • Genetically modified microbes and foods. • Consumer awareness regarding genetically modified (GM) foods. • Biotechnology and food-related disorders.	15
Total	**90**

Course Contents (Practical)

Practical Topics	No. of OSPEs
Culture Media Preparation and Probiotic Microorganisms • Introduction to probiotics and prebiotics, their criteria, and applications.	1

• Preparation of selective media for the growth of *Lactobacillus* species and identification of culture characteristics.	
Enzymatic Production of Prebiotics • Introduction to β-galactosidase and transgalactosylation. • Enzymatic conversion of lactose into galacto oligosaccharides (GOS). • Factors affecting GOS production.	0.5
Analysis of Prebiotic Products • Quantification of galacto-oligosaccharides (GOS) using thin-layer chromatography (TLC). • Interpretation of chromatographic results and efficacy evaluation of prebiotics.	1
Development of Functional Dairy Products • Concept of lactose intolerance and lactose-free dairy products. • Production of reduced-lactose milk and yogurt enriched with galacto-oligosaccharides (GOS).	0.5
Total	3

Suggested Instructional / Reading Materials

1. Shetty K., Paliyath G., Pommeto, Levin, R. E. 2006. Food Biotechnology. 2nd edition. Taylor and Francis Group, LLC.
2. Stahl U., Donalies U. E. B., and Nevoigt E. 2008. Food Biotechnology. Advances in Biochemical Engineering /Biotechnology. Springer-Verlag Berlin Heiderberg.

NUTRITION AND PSYCHOLOGY

Credits: 3 (3-0) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the relationship between nutrition, psychology, and overall health and well-being.
2. Describe the psychological, social, and cultural factors influencing eating behaviors and dietary choices.
3. Discuss the role of nutrition in mental health and the principles of nutritional psychiatry.
4. Apply psychological theories and behavior change models in nutrition education and dietary counseling.
5. Analyze case scenarios involving nutrition-related psychological issues and recommend appropriate nutrition education and counseling strategies.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Nutrition and Psychology • Definition and scope of nutrition and psychology. • Understanding the mind-body connection in nutrition.	8
Unit II: Psychological Factors Influencing Eating Behavior • Emotional eating and stress-related eating. • Eating disorders: anorexia nervosa, bulimia nervosa, and binge eating disorder. • Body image, self-esteem, and their impact on food choices.	16
Unit III: Nutritional Psychiatry and Dietary Counseling Diet and mental health associations. • Nutritional interventions for mental health conditions including depression, anxiety, and ADHD. • Assessment tools: food diaries, questionnaires, and psychological assessments. • Understanding client behavior and motivation for dietary changes.	22
Unit IV: Behavior Change and Sociocultural Influences • Transtheoretical Model (Stages of Change). • Motivational interviewing and goal setting. • Cognitive-behavioral strategies for dietary change. • Cultural food practices and traditions. • Socioeconomic factors and access to nutritious food. • Media influence on dietary preferences.	24
Unit V: Mindful Eating, Nutrition Education and Practical Applications • Mindful eating principles and practices. • Mindful meal planning and mindful eating for weight management. • Educational strategies and materials for nutrition programs. • Incorporating behavior change techniques in nutrition education. • Case studies involving nutrition and psychological factors. • Dietary planning with psychological considerations.	20
Total	90

Suggested Instructional / Reading Materials

1. Logue, A. W. *The Psychology of Eating and Drinking*.
2. Straub, R. O. *Health Psychology: A Biopsychosocial Approach*.
3. Wansink, B. *Mindless Eating: Why We Eat More Than We Think*.
4. Snyder, C. R., Hoyle, R. H., & Girard, J. *Foundations of Health Psychology*.
5. Lakshmi, P. S. *Textbook of Human Nutrition*.

FOOD TOXICOLOGY AND ADDITIVES

Credits: 3 (2-1) Credit Hours

Course Learning Outcomes

By the end of this course, the student will be able to:

1. Explain the basic principles of food toxicology and their application to food safety.
2. Identify and classify major food toxicants, contaminants, and food additives.
3. Evaluate the safety, functions, and regulatory aspects of food additives.
4. Describe toxicological testing methods and principles of food safety risk assessment.
5. Discuss national and international regulatory frameworks governing food safety and additives.
6. Perform basic laboratory techniques related to food toxicology and food safety analysis.

Course Contents (Theory)

Topics	MCQs
Unit I: Introduction to Food Toxicology • Overview of toxicology principles and their application to food safety. • Historical perspective and major events in food safety.	7
Unit II: Food Toxicants and Contaminants • Identification and classification of toxicants in food. • Common food contaminants and their sources. • Health effects of foodborne toxins and contaminants. • Case studies of foodborne illness outbreaks.	20
Unit III: Food Additives and Safety Evaluation • Types of food additives and their functions. • Safety evaluation of food additives. • Toxicological testing methods. • Principles of risk assessment for food safety.	20
Unit IV: Food Safety Regulations and Emerging Issues • International and national regulations related to food safety and additives. • Compliance with regulatory standards. • Current and emerging issues in food toxicology. • Future trends and research directions.	13
Total	**60**

Course Contents (Practical)

Practical Topics	No. of OSPEs
Identification of Food Additives Identification and classification of common food additives from packaged food labels (preservatives, colours, sweeteners, antioxidants, emulsifiers) and interpretation of permitted uses.	1
Food Label Evaluation and Regulatory Compliance Evaluation of food labels for ingredient declaration, additive information, allergen labeling, and compliance with food labeling regulations.	-
Detection of Common Food Adulterants Qualitative laboratory tests for common food adulterants in milk, spices, edible oils, and other food products.	1
Food Safety Risk Assessment Interpretation of case studies involving food contamination, foodborne toxins, and food poisoning outbreaks; identification of hazards and preventive measures.	1
Total	**3**

Suggested Instructional / Reading Materials

1. Food Biotechnology" by S.C. Mandal and M. Brahmachari

2. Biotechnology in Functional Foods and Nutraceuticals" by Debasis Bagchi, Anand Swaroop, and Manashi Bagchi

3. Food Biotechnology" by Kalidas Shetty, Gopinadhan Paliyath, Anthony Pometto, and Robert E. Levin