

# Subject: Nutrition and Dietetics

## Part A: Human Physiology, Nutritional Biochemistry and Dietetics

### Objectives:

This course will enable the learners to:

1. Understand all aspects of nutrition including nutritional science and therapeutic nutrients
2. Determine nutritional status and various disease conditions related to diet
3. Apply Nutrition Care process in treating the patients
4. Understand counselling techniques to conduct dietary counselling for patients

### Contents:

- Nutritional deficiency Disorders such as, PEM, anemia, Disorders due to the deficiency of Iodine, Vitamins and their precursors, trace elements (Zn, Se, Fe, Cu etc.) and their dietary management
- Principle of diet therapy and factors in planning therapeutic diets
- Dietary management of different diseases: cardiovascular disease, diabetes mellitus, infections and fever, hepatobiliary and pancreatic disorders, kidney disease, cancer, HIV AIDS, Gastrointestinal diseases etc.
- Routine hospital diets (modification in consistency and texture, clear liquid, full fluid diet, modification of diet in nutrients)
- Special feeding methods (intravenous feeding, tube feeding etc.)
- Geriatric nutrition and diet for elderly people
- Nutrition for Athletes
- Pre and post-operative diets
- Food allergy
- Anti-nutritional factors in food
- Malnutrition and psychosocial development
- Balanced diet and dietary standards
- Development and Management of Food Composition Data
- Development of nutrient enriched food & diet
- Menu planning and serving of food
- Nutrition for infants, preschoolers and children
- Diet for hospitalized patient
- Medical food preparation

## Part B: Human Nutrition

### Objectives:

The course will enable the learners to:

1. Get an insight into the role of nutrition in growth and development.
2. Understand the importance of nutrition in maintaining optimum body composition.
3. Understand the need for special nutritional considerations in altered climatic conditions.
4. To update on the recent advance in Human Nutrition.

### Contents:

- **Introduction: Nutrition, Nutritive value of food, Principle of DRI, RDI, RDA, FBDG**
  - Body composition
  - Carbohydrates in diet and body
  - Lipids in diet and body
  - Protein and amino acid in diet and body
  - Protein quality and evaluation
  - Water soluble vitamins
  - Fat soluble vitamins
  - Energy balance and energy metabolism
  - Macro minerals
  - Trace minerals
  - Normal development effects on nutritional requirements
  - Nutrition in pregnancy, lactation, growing years, adult years and elderly
  - Food requirements through the life cycle
- **Nutritional status of Nepalese people and their assessment**
  - Anthropometric, clinical and biochemical
  - Nutrient assessment, use of nutrient analysis program; computer application in nutrition, use of NUTRO Program, nutrition counselling
  - Eating disorders
  - Nutrition and fitness
  - Oriental concept (satwic, Tamasic, Rajasic etc.) foods

## Part C: Food Science, Safety and Toxicology

### Objectives:

This course will enable the learners to:

1. Understand the composition of food products
2. Design the process of production of nutritious food products
3. Define toxicity
4. Discuss different types of toxic factors found in food and food additives, influence of toxicity to human health, regulatory limits of toxin and so on.
5. Know the concept of food security, food safety and Quality and emerging issues on food adulteration and food safety.

### Contents:

- **Introduction:** Definition and scope of food science and, it's inter relationship with food chemistry, food microbiology and food processing, historical development of food presentation, an overview of modern techniques of food preservation and processing
- **Carbohydrates:** Introduction, classification, effect of cooking (gelatinization and retro gradation), uses of carbohydrates in food preparations
- **Fats and Oils:** Introduction, classification, refining, hydrogenation and winterization, autoxidation (factors and prevention measures), flavor reversion, physical properties of fats and oils, effect of heating on fats and oils with respect to smoke point, commercial uses
- **Proteins:** Basic structure and properties , type of proteins based on their origin (plant/animal), effect of heat on proteins (denaturation, coagulation), functional properties of proteins (gelation, emulsification, foamability, viscosity), commercial uses of proteins in different food preparations (like egg gels, gelatin gels, cakes, confectionary items, custard , soups, curries etc.)
- **Food processing:** Definition, objectives, Post harvest operations, Principles of food preservation, types of treatment, effect of factors like heat, acid alkali on food constituents
- **Quality evaluation of food:** Introduction, QC & QA, Quality attributes, Principles of QC, Measurements of QA, and Objectives of sensory evaluation, Sensory assessment techniques, method & requirements.
- **Food Adulteration:** Introduction, Food adulterants and their tastings methods, Current market practices
- **Food additives:** Introduction, types and functions of emulsifiers, preservative, colorants, non-nutritive sweeteners, antioxidants etc.
- **Flavor:** Definition, food flavors (tea, coffee, wine, meat, fish spices etc.), Flavor Enhancers
- **Browning in food:** Introduction, Types & Role in food preparation, Prevention of undesirable browning

- **High pressure processing:** Introduction, principles of high pressure processing, use of high pressure to improve food safety and stability, effect of high pressure on food quality, microbial aspects of high pressure processing.
- **Pulsed electric fields processing:** Introduction, mechanism of action, PEF treatment system, Pulsed electric field processing of liquid foods and beverages.
- **Irradiation of foods:** Introduction, fundamentals of food irradiation, wholesomeness of Irradiated foods, biological effects of irradiation
- **Microwave heating:** Introduction, dielectric properties of foods, heat transfer and mass transfer in microwave processing, microwave processing of foods.
- **Minimal processing of vegetables, fruits and juices:** Introduction, factors and processing operations that affect the quality of minimally fresh processed plant foods, microbial and sensory quality of minimally fresh processed fruits and vegetables
- **Food Fortification:** Introduction, objectives, strategy, technology, ideal vehicle, nutrients & premix ideal fortificants, examples of fortified food in market, laws related to fortification
- **Food Safety and Toxicology:** Concept of food security, food safety and Quality and emerging issues on food adulteration and food safety; Preventive tools of food safety, quality management and quality assurance systems and brief introduction of HACCP/GHP etc.; Introduction of laws related to food safety in Nepal, food laws, regulations and food standard formulation and development at national and international level; National and international food safety system and related organizations, WTO and its provision of sanitary and phytosanitary measures (SPS), Codex, Infosan etc.; Roles of Government, producers, traders, consumers and their organizations for food quality management and food safety. General introduction and history of food toxicology and natural toxins in food from plant and animal sources; Anti nutritional factors found in different food & their effects on human health & nutrition; Basic concept of nutrigenomics & toxicogenomics, functional genomics & safe diets. Concept of receptors mediated gene-expression, modulation in food toxicology; Food contaminants: Toxicology of metal such as Lead, mercury, cadmium, Arsenic, copper, selenium etc. Toxic residue of environmental pollutants etc.; Food additives & their toxic effects such as preservative, texture enhancers, stabilizers, sweeteners, coloring agents, ripening agents, etc.; Regulatory limits of toxin & contaminants, status of Food Standard of Nepal in relation to limits of toxin & contaminants; Food allergy and Food sensitivity due to food toxins and contaminants, emerging issues of functional and GMO foods in relation to toxicological aspects; Concept of risk analysis and toxicological risk assessment of food; Concept of xenobiotic compounds, biotransformation & kinetics, influence of nutrition, age, gender & biotransformation; Persistent organic pollutants (POPs) in human food chain; Toxicity from drinking water, Vitamins and micronutrients; Pesticides, growth hormones, veterinary drugs and other agrochemicals and their residue in food chain and toxic effect to human health.

## Part D: Food and Medical Microbiology

### Objectives:

This course will enable the learners to:

1. Understand food and water borne diseases, microbial risk assessment and their control.
2. Understand the emerging issues of food and microbiology and give orientation, knowledge and skills on food and medical microbiology.

### Contents:

- **Introduction:** General history of food and medical microbiology; General introduction of modern food and medical microbiology
- **Food and water borne diseases:** Bacterial: Cholera, Shigellosis, Typhoid fever; Viral: Rota Viral Diarrhoea and Polio; Protozoan: Amoebiasis, Giardiasis; Signs and symptoms of different types of food poisoning, methods of preventing food poisoning
- **Microbial genetics:** Bacterial DNA structure, replication and expression; Genetic recombination in bacteria; Gene cloning
- **Control of microorganisms by physical and chemical agents**
- **Sampling food products for microbiological food safety (pathogens), microbiological quality and sampling plan**
- **Microbial ecology, human intestinal microflora, probiotics, prebiotics, and symbiosis**
- **Molds:** Fungi of medical importance, fungi important in food; Contamination, spoilage and control of food
- **Antibiotics:** Modes of action of antibiotics; resistance to antibiotics; clinical use of Antibiotics; Introduction to antiviral drugs.
- **Immunology:** Introduction of antigen and immunoglobulin; Antigen-antibody reactions: Introduction, significance and types; precipitation, agglutinations, complement fixation reactions, labeled assays (ELISA, IFA, RIA)
- **Some techniques:** PCR, Western blotting Gel electrophoresis; Plate counts methods; MPN method, Membrane filter, MBRT and Resazurin tests
- **Culture media:** Introduction, types and uses
- **Isolation of Pure Culture and Enumeration:** Spread plate, Streak Plate and Pour plate methods
- **Staining Techniques:** Introduction, Principle of staining; Types of staining: Simple Staining, Negative Staining, Gram Staining, AFB Staining
- **Microbial Risk Assessment:** Introduction risk assessment procedures; Quantitative microbial risk assessment (Q-MRA)
- **Quality control of foods using microbiological criteria:** Control at source; Codes of good manufacturing practices (GMP), Hazard analysis and Critical control point (HACCP), ISO 9000 series, ISO 22000.

## Part E: Essentials of Public Health Nutrition

### Objectives:

At the end of this nutrition course, the learners will be able to:

1. Explain the concept and importance of nutrition in public health
2. Identify critical food and nutrition-related factors that affect health
3. Demonstrate and analyze the linkages between food and nutrition, and public health
4. Examine breast feeding situation and dietary requirement of all stages of life in Nepal and compare with other countries and relate to indicators and variables in Nepal
5. Use to interpret the WHO growth chart for classifying the nutritional status of the population under study
6. Relate the role of nutrition in causation of various communicable and non-communicable diseases
7. Describe public health nutrition cycle for assessment, design, implement and evaluate programs which can improve the nutritional status of the population at national and international level
8. Plan and implement dietetics for various diseases and conditions during conflicts, disaster and emergencies

### Contents

#### Unit 1: Body composition, Growth and Development of human body in different life stages

- a. Chemical composition of the human body
- b. Methods to accurately measure body composition, the principles of the various body composition methods such as DEXA, BOD POD etc, the 4C model of body composition
- c. Physical changes of the body- lifecycle approach (Pre-birth to elderly)
- d. Cognitive growth and development and role of nutrition

#### Unit 2: Introduction to Public health nutrition

- a. Concept of public health nutrition
- b. The public health nutrition cycle – Triple A model

- c. Roles and responsibilities of public health nutritionists
- d. Government's and other sector's role in public health nutrition
- e. Nutrition training in public health

### Unit 3: Dietary requirement and life course perspective

- a. Evaluate importance of nutrition on growth and development of the foetus, infant, child and adolescent,
- b. Evaluate importance of nutrition during of pregnancy and lactation and outcome
- c. Examine nutritional issues and problem of targeted groups (childhood, adolescent, reproductive age, menopausal and senior-elderly citizens)
- d. Nutritional need of special group of the population childhood, adolescent, reproductive age, menopausal and senior-elderly citizens)

### Unit 4: Infant and young child feeding and growth monitoring

- a. Introduction, importance and proper method of feeding
- b. Growth monitoring and interpretation of measurement
- c. Benefits of growth monitoring
- d. Current trend in breastfeeding practices in rural and urban communities
- e. Trends in Nutritional Status of Children under Five Years
- f. Infant and young child feeding practices
- g. Importance of micronutrients and macronutrients among under five children

### Unit 5: Nutrition and diseases

- a. Nutrition and infections (and infestations)
- b. Nutritional changes/consequences that result from the common infections and infestations (malaria, diarrheal diseases, TB, HIV/AIDS and intestinal parasites etc.)
- c. Non-communicable diseases and their relation to nutrition (Diabetes, Cancer, Hypertension and other chronic diseases etc)
- d. Concept of fetal origin of adult diseases
- e. Examine overweight, obesity and its relation to diseases and conditions
- f. Identify risk group and design prevention program

## Part F: Applied food nutrition

### Objectives:

At the end of this nutrition course, the learners will be able to:

1. Describe functions of food groups, development and health
2. Describe basic local good groups nutrition and healthy foods
3. Understand the interaction between nutrients and infections
4. Learn the importance of hygiene and sanitation
5. Aware of eating habits, cultural and social influences in the society

### Contents:

- Interpretation of the scientific facts tell us about nutrition and health.
- Understand why we eat what we eat.
- Explanation of the nutrition National as well as Global (WHO) standards and guidelines.
- Processes of digestion, absorption, and transport.
- Major nutrients, vitamins, and minerals and their roles in the body.
- Physiology, and health concerns of pregnant and lactating women, infant, children, adolescents, adults and older adults
- Macro and micro nutrients and their specific functions in the metabolic process, interacting cellular physiology, biochemistry and nutrition
- Current hot topic in nutrition, integrated with discussion, debate, and presentation
- Concepts of energy balance and weight control.
- Relationship between physical fitness, health, and nutrition.
- Relationship between diet and health.
- Nutritional consideration for sports/exercising person as compared to normal active person
- Importance of micronutrients for Exercise
- Importance of Fluid balance in different types of sports and exercise and use of sports drink.
- Methods of evaluation of own diet.
- Impact of culture on health and food choices
- Entrepreneurship in the field of nutrition and dietetics

## Part G: Advanced Nutritional Assessment

### Objectives:

This course will enable the learners to:

1. Define and use ABCD methods to measure Nutritional Assessment
2. Describe anthropometric measurements used for community level screening of malnutrition
3. Identify anthropometric indicators of the nutritional status for children, adults, and pregnant women
4. Identify children and adults with malnutrition by comparing their measurements to standard cut-off values
5. Assess micronutrient deficiencies using clinical sign and symptoms

### Contents:

- Introduction: concept of nutritional assessment, importance, applications
- Anthropometric Measurements:
  - ABCD methods to measure Nutritional Assessment: 1. Anthropometry, 2. Biochemical/ biophysical methods, 3. Clinical methods, 4. Dietary method
  - Anthropometric measurements used to assess growth: Measurement unit and Procedure: Length/height, Weight, Head circumference, Body Fat
  - Converting measurements to indices: Weight for age (underweight), Height for age (stunting), Weight for height (Wasting), BMI, MUAC, Waist circumference, Hip circumference, Waist /Hip ratio
- **Biochemical: blood, urine and stool: Clinical Assessment:** General Clinical examination: hair, angles of the mouth, gums, nails, skin, eyes, tongue, muscles, bones, and thyroid; **Dietary Assessment:** Dietary history, 24-hour recall, Food frequency questionnaire, Food Diary, Observed food consumption; **Tools to measure:** Physical activity assessment, Food security assessment, Food diversity assessment, Emergency food and nutrition assessment

## Part H: Research Methods

### 1. Objectives

At the end of the course, the learners will be able to:

- a. Explain the concepts, process and steps involved in conducting health research
- b. Select suitable approaches to quantitative and qualitative data analysis
- c. Design quantitative and qualitative research
- d. Apply mixed methods in different research activities
- e. Demonstrate a critical understanding of various research methods.
- f. Reflect critically on evidence-based practice in public health issues
- g. Demonstrate knowledge and understanding of the assumptions of the research approaches that are commonly used in public health and other relevant areas.
- h. Demonstrate skills in processing, interpretation and use of data
- i. Develop a research proposal on a selected health problem

### 2. Course contents

Unit 1: Theoretical orientation on research methodology 20hrs

- a. Research paradigm and knowledge generation
- b. Research problems
- c. Research objectives
- d. Research framework
- e. Research design
- f. Rationale of research
- g. Literature review
- h. Ethics and research

Unit 2: Process of research 10 hrs

- a. Identifying research problems
- b. Setting research objectives
- c. Deciding research design
- d. Literature search and review
- e. Data collection – Techniques, tools and process
- f. Data analysis – management and analysis process
- g. Validity and reliability

Unit 3: Qualitative research Method 15hrs

- a. Qualitative research designs
- b. Selection of participants

- c. Instruments of qualitative study
- d. Qualitative data collection methods
- e. Qualitative data analysis
- f. Trustworthiness of Qualitative data

Unit 4: Mixed method in health research 5hrs

- a. Introduction to Mixed Methods (MM) study
- b. Theory of mixed methods
- c. Variations on the MM Designs
- d. Characteristics of MM Studies

Unit 5: Development of research proposal 10hrs

- a. Proposal of a research project - concept of proposal, components of a research proposal, research development process, obtaining ethical approval.

Unit 6: Writing Research Report

- a. Concept of research report
- b. Components of research report
- c. Organizing results
- d. Discussions of the results
- e. Limitations of research
- f. Conclusion and recommendation

Unit 7: Research report dissemination

- a. Oral presentation
- b. Poster presentation
- c. Publication

## Part I: Pedagogical methods

### 1. Objectives

At the end of the course, the learners will be able to:

1. Discuss the objectives and philosophies of pedagogy
2. Explain the required qualities for teaching in higher education
3. Discuss various pedagogical approaches used in education
4. Describe the relationship between curriculum and pedagogy
5. Describe the methods of student evaluation and assessment

### 2. Contents

- a. Objectives and philosophies of pedagogy
- b. Required qualities for teaching in higher education: individual, social and occupational/professional
- c. Pedagogical approaches (teaching methods and media) in education
- d. Curriculum and Pedagogy
- e. Balanced model of curriculum
- f. Methods of student evaluation and assessment: formative, summative and diagnostic