EIGHTH SEMESTER

Course No.	Title of Course	Credit Hours
HND	Internship/Project	6(0-6) MC
HND	Nutrition Policies and Programs	3(3-0) MC
HND	Food Service Management	3(3-0) MC
		12 (6-6)
Elective Courses (2 courses equal to 5 credit hours)		
Elective	Food Toxins & Allergens	3(3-0) EC
Elective	Nutritional Deficiency Disorders	3(3-0) EC
Elective	Food Supplements	2(2-0) EC
Elective	Metabolism of Nutrients	2(2-0) EC
Elective	Nutrition Epidemiology	2(2-0) EC
		5(5-0)/5(4-1)

HND INTERNSHIP/PROJECT 6 (0-6)

Elective NUTRITION POLICIES AND PROGRAMS 3(3-0)

Learning Outcomes:

- To familiarize with global and local nutrition policies and programs in the domain of public health nutrition
- To prevent and control specific micronutrient deficiencies through diet based approaches among the vulnerable
- To promote appropriate diets and healthy lifestyles and access, analyze and monitor nutrition situations

Theory:

History and importance of nutrition intervention planning; World declaration on nutrition; Nutrition development partners; Policy guidelines; Community nutrition programs: national and international, supplementary feeding programs; Food fortification, supplementation and diet diversification; School feeding programs: interventions and impacts; Improving household food security; Protecting consumers through improved food quality and safety; Preventing and managing infectious diseases; Promoting breast feeding; Caring for socio-economically deprived and vulnerable; Preventing and controlling specific micronutrient deficiencies; Promoting appropriate diets and healthy lifestyle; Improving health care; Five years plan for Pakistan (Nutrition); Nutrition intervention: counselling for change; SUN movement; One health concept; National nutrition programs: food & nutrition program, Tawana Pakistan, school health program; Developing effective food and *nutrition policies* and programs.

Suggested Readings:

1. Edelstein, S. 2011. Nutrition in Public Health: A Handbook for Developing Programs and Services, 3rd ed. Jones & Bartlett Learning, Sudbury, M.A, USA.

2. IFPRI. 2016. Taking Actions: Progress and Challenges in Implementing Nutrition Policies and Programs. International Food Policy Research Institute, Washington, DC, USA.
3. Nnakwe, N.E. 2009. Community Nutrition: Planning Health Promotion and Disease Prevention. Jones and Bartlett Learning International, London, UK.
4. Semba, R.D. and M.W. Bloem. 2008. Nutrition and Health in Developing Countries, 2nd ed. Humana Press, New York, USA.
5. Spark, A. 2007. Nutrition in Public Health: Principles, Policies and Practice. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.

HND FOOD SERVICE MANAGEMENT 3 (3-0)

Learning Outcomes:

- To describe the key milestones of food service industry
- To relate the current trends in food service operations and evolution through the business life cycle
- To explain the art underlying menu development and method for recipe standardization
- To understand the planning considerations vital for creating a successful food service operation

Theory:

Food service management: introduction; position, manage and leverage a successful food service operation; The compilation of management practices: tools and techniques, essential approaches. Food service industry: history, segmentation and managerial implication, menu planning and development, recipe standardization, costing and analysis, food supply chain management, distribution channels, supplier selection, purchasing, equipment selection, forecasting, storage management, product inventory management, human resource management, customer services, marketing. Food safety: GMP, HACCP.

Suggested Readings :

1. Barron, C.W., T. Power and D.R. Reynolds. 2012. Introduction to Management in the Hospitality Industry, 10th ed. John Wiley Sons Inc., Hoboken, New Jersey, USA.
2. Reynolds, D.R. 2014. Foodservice Management Fundamentals. John Wiley Sons Inc., Hoboken, New Jersey, USA.
3. Reynolds, D.R. and K.W. McClusky. 2014. Study Guide to Accompany Foodservice Management Fundamentals. John Wiley Sons Inc., Hoboken, New Jersey, USA.

Elective FOOD TOXINS & ALLERGENS 3 (3-0)

Learning Outcomes:

- To acquire an in-depth understanding of toxicology related to food and health

- To understand various types of toxins from plant, animal and plant origins as well induced by extraneous chemicals
- To familiarize with food allergens, their health implications and management

Theory:

Toxicology: introduction, dose-response, absorption, translocation, storage, excretion; Natural toxins of plant origin: goitrogens, cyanogenic glycosides, favism, lathyrogens, lecitins (hemagglutinins), mutagens in natural plant, caffeine, flavonoids and some others; Natural toxins of animal origin: animal liver, marine animals; Toxicity by extraneous chemicals: agricultural chemicals, food processing, packaging, additives, adulterants; Toxicity from water; Microbial toxins: mycotoxins – molds, mushrooms; Bacterial food intoxication; Bacterial food infection; Food allergies: introduction, incidence of food allergy, food allergens of protein families, animal origin and plant origin; Adverse allergic reaction, diagnosis, prevention, legislation and labelling, allergen management, food intolerances, emergency treatment of food-induced allergic reactions.

Suggested Readings:

1. Awan, J.A. and F.M. Anjum. 2010. Food Toxicology. Unitech Communications, Faisalabad, Pakistan.
2. Coutts, J and R. Fielder. 2009. Management of Food Allergens. John Wiley & Sons Ltd., Chichester, West Sussex, UK.
3. Jedrychowski, L. and H.J. Wichers. 2009. Chemical and Biological Properties of Food Allergens. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.
4. Metcalfe, D., H.A. Sampson, R.A. Simon and G. Lack. 2014. Food Allergy: Adverse Reaction to Foods and Food Additives, 5th ed. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK.
5. Shibamoto, T and L. Bjeldanes. 2009. Introduction to Food Toxicology, 2nd .ed. Academic Press, London.

Elective **NUTRITIONAL DEFICIENCY DISORDERS** **3 (3-0)**

Learning Outcomes:

- To analyze existing global scenario of protein energy malnutrition and hidden hunger
- To understand the causes & consequences of common micronutrient deficiencies and the scale of the problem
- To discuss food based approached for the management of nutritional deficiency disorders

Theory:

Introduction and general concepts; Protein-energy malnutrition and hidden hunger: types, causative factors, clinical symptoms, management; Vitamin related deficiency disorders: Nyctolopia (night blindness), xerophthalmia and kerotomalacia; Rickets, osteomalacia, osteoporosis; Scurvy; Beriberi; Pallegra, Biotin Deficiency; Ariboflavinosis; Vitamin K deficiency; Hypocobalaminemia;

Paraesthesia; Minerals related deficiency disorders: nutritional anemia; goiter; zinc, potassium and magnesium deficiency disorders.

Suggested Readings:

1. Boyle, M.A. 2016. Personal Nutrition. Wadsworth Cengage Learning, Belmont, CA, USA.
2. Gropper, S.S., and J.L. Smith. 2013. Advanced Nutrition and Human Metabolism. 6th ed. Cengage Learning, Belmont, CA, USA.
3. Rolfes, S.R., K. Pinna and E. Whitney. 2015. Understanding Normal and Clinical Nutrition, 10th ed. Thomson and Wadsworth Publishers, USA.
4. WHO. 2004. Vitamin and Mineral Requirements in Human Nutrition. World Health Organization, Geneva, Switzerland.

Elective **FOOD SUPPLEMENTS** **2 (2-0)**

Learning Outcomes:

- To identify the current trends in the use of dietary supplement and analysis of their global market
- To demonstrate the impact of dietary supplements on health and disease prevention
- To discuss safety issues and global legislations on food supplements

Theory:

An overview of dietary supplements and their market; Forms of food supplements; Vitamins and mineral supplements; Essential fatty acids; Enzymes as supplements; Natural products and extracts; Probiotics and prebiotics in Health; Fish oil supplements; Non-essential nutrients as dietary supplements; Caffeine in food and dietary supplements; Medicinal plants as food supplements; Codex Alimentarius standards for food supplements; Safety of vitamins and minerals added to foods; Implications of mega doses; Global legislation on food supplements; DRAP Alternative Medicines and Health Products Enlistment Rules 2014.

Suggested Readings:

1. Caballero, B. 2009. Guide to Nutritional Supplements. Elsevier Ltd., Oxford, UK.
2. Ottaway, P.B. 2008. Food Fortification and Supplementation: Technological, Safety and Regulatory Aspects. Woodhead Publishing Limited, Cambridge, England.
3. Pray, L., A.L. Yaktine and D. Pankevich. 2014. Caffeine in Food and Dietary Supplements. The National Academes Press, Washington, DC, USA.
4. Ransley, J.K., J.K. Donnelly and N.W. Read. 2001. Food and Nutritional Supplements: Their Role in Health and Disease. Springer-Verlag Berlin Heidelberg, Germany.
5. Webb, G.P. 2011. Dietary Supplements and Functional Foods, 2nd ed. Blackwell Publishing Ltd., Oxford, UK.

Elective **METABOLISM OF NUTRIENTS** **2 (2-0)**

Learning Outcomes:

- To understand the metabolic roles of carbohydrates, fats, proteins, vitamins and minerals
- To generalize the way in which nutrients are processed through major metabolic fates in order to perform various energetic and structural functions in the body
- To establish the role of enzymes and hormones in metabolism of nutrients

Theory:

Metabolic pathways: objectives, chemical reactions, enzymes, co-enzymes and prosthetic groups, metabolic pathways; Role of ATP in metabolism: objectives, functions, phosphorylation of ADP to ATP; Digestion and absorption: gastrointestinal tract, digestion and absorption of carbohydrates, fats and proteins; Absorption of vitamins and minerals; Metabolism of carbohydrates and fats; Protein nutrition and metabolism; Nitrogen balance and protein requirements; Protein synthesis and metabolism of amino acids; Integration and control of metabolism: pattern of metabolic regulation, intracellular regulation of enzyme activity, responses to fast acting hormone by covalent modification of enzyme proteins, slow acting hormones, changes in enzymes synthesis.

Suggested Readings:

1. Bender, D.A. 2014. Introduction to Nutrition and Metabolism, 5th ed. CRC Press, Taylor & Francis, Boca Raton, FL, USA.
2. Davidson, S., R. Passmore, R and M.A. Eastwood. 1986. Human Nutrition and Dietetics. Churchill Livingstone, New York, U.S.A.
3. Gropper, S.S. and J.L. Smith. 2013. Advanced Nutrition and Human Metabolism, 6th ed. Wadsworth Cengage Learning, Belmont, CA, USA.
4. Kohlmeier, M. 2015. Nutrient Metabolism: Structures, Functions, and Genes, 2nd Ed. Academic Press, San Diego, CA, USA.
5. Lanham-New, S.A., I.A. Macdonald and H.M. Roche. 2011. Nutrition and Metabolism, 2nd ed. Blackwell Publishing, Jones & Wiley Sons Ltd., Chester, West Sussex, UK.
6. Whitney, E.N. and S.R. Rolfes. 2016. Understanding Nutrition, 14th ed. Cengage Learning, Belmont, CA, USA.

Elective **NUTRITION EPIDEMIOLOGY** **2 (2-0)**

Learning Outcomes:

- To learn the methodology and applications of nutritional epidemiology
- To apply various epidemiological study designs for research in the domain
- To study collection and handling of data related to socio-demographic profile and dietary intake of the community

Theory:

Principles of nutritional epidemiology: objective of nutritional epidemiological research, interpretation, systematic reviews, role of meta-analysis; Nutritional

epidemiological studies: classification, uses in research, selection of right study; Socio-demographic and psycho-social variables; Sampling, study size and power of study: types of sampling, variability, sample size, power of studies; Food consumption, nutrient intake and the use of food composition tables: food consumption tables and nutrient databases, calculation on nutrient intake from data on food intake and composition of foods, food groups and food scores; Household surveys: characteristics of household data, techniques, uses and limitations, using household surveys in epidemiological studies; Individual surveys: methods for assessment of present or recent data, measurement error in dietary assessment, energy adjustment, effects of measurement error on validity, adjustment of intake in the distant past, problems of retrospective assessment in population sub-groups; Validation of dietary assessment: the context of validation, validation techniques, factors affecting the design of validation studies, statistical techniques and interpretation.

Suggested Readings:

1. Frank, G.C. 2008. Community Nutrition: Applying Epidemiology to Contemporary Practice, 2nd ed. Jones and Bartlett Publishers Inc., Sudbury, MA, USA.
2. Margetts, B.M. and M. Nelson. Design Concepts in Nutritional Epidemiology, 2nd Ed. Oxford University Press, New York, USA.
3. Rothman, K.J., S. Greenland and T.L. Lash. 2008. Modern Epidemiology, 3rd ed. Lippincott & Wilkins, Philadelphia, PA, USA.
4. Spark, A. 2007. Nutrition in Public Health: Principles, Policies and Practice. CRC Press, Taylor & Francis, Boca Raton, FL, USA.
5. Walter, W. 2013.Nutritional Epidemiology, 3rd ed. Oxford University Press, New York, USA.