

## **Education for SDGs specific courses on sustainability**

University of Poonch Rawalakot offers the following **full degree programs supporting sustainable development education**:

1. Bachelor of Education (2.5 and 1.5 years) program (SDG-4)
2. M.Sc.(Hons.) and PhD. in. Horticulture (SDG-2)
3. M. Sc. Program in Food Science and Technology (SDG-2)
4. M.Sc. Power and Energy System Engineering (SDG-7 and SDG-9)

### **M. Sc. Program in Horticulture (SDG-2):**

The subject Horticulture deals with the production, improvement and utilization of fruits, vegetables and ornamental plants. The objectives of Horticulture departments are:

1. Enhance Food Security: Implement practices and research initiatives in horticulture that increase agricultural productivity and ensure a stable and sufficient food supply, particularly in regions facing food insecurity.
2. Promote Sustainable Agriculture: Integrate and promote sustainable horticultural practices that prioritize environmental conservation, minimize resource use, and contribute to the long-term resilience of agricultural ecosystems.
3. Improve Nutritional Diversity: Develop and disseminate knowledge on the cultivation of diverse horticultural crops to enhance dietary diversity and address malnutrition, contributing to improved health and well-being.
4. Support Smallholder Farmers: Implement programs to empower smallholder farmers involved in horticulture, providing them with the necessary knowledge, resources, and market access to improve their livelihoods and contribute to local and global food security.

### **M. Sc. Program in Food Science and Technology (SDG-2):**

These Programs are designed to impart fundamental and advanced technical training for preparing highly skilled workforce for industries such as meat, poultry, and fish processing, dairy and milk processing, beverages, fruit and vegetable processing, fat and oil processing and sugar technology. The aim and objectives of the program are:

1. To introduce novel, nutritious, economical and value-added food products for the local consumption and export.
2. To produce qualified and highly skilled food technologists for food industries, government, teaching and research organizations.

3. To establish links between teaching/research institutions, government, commercial organizations and consumers.
4. To produce qualified and highly skilled food technologist for food industries, government, teaching and research organizations.
5. To establish links between teaching/research institutions, government, commercial organizations and consumers.

Link:

<https://upr.edu.pk/downloads/prospectus-2022-23>

## Department of Horticulture

### Scheme of Studies for M.Sc. (Hons.)/PhD

Course No.	Course title	Credit Hrs.
HORT-701	Advanced Fruit Science	3(2-1)
HORT-702	Advanced Vegetable Science	3(2-1)
HORT-703	Fruit Breeding	3(2-1)
HORT-704	Vegetable Breeding	3(2-1)
HORT-705	Horticultural Seed Science and Technology	3(2-1)
HORT-706	Rootstocks for Horticultural Crops	3(2-1)
HORT-707	Mineral Nutrition of Horticultural Crops	3(2-1)
HORT-708	Physiology of Horticultural Crops	3(2-1)
HORT-709	Plant Growth Regulators	3(2-1)
HORT-710	Post-Harvest Physiology	3(2-1)
HORT-711	Landscape Designs	3(2-1)
HORT-712	Turf grass Management	3(2-1)
HORT-713	Environmental Horticulture	3(2-1)
HORT-714	Plant Tissue Culture	3(1-2)
HORT-715	Biotechnology of Horticultural Crops	3(2-1)
HORT-716	Prospective Horticultural Crops	3(2-1)
HORT-717	Special Problem	1(1-0)
HORT-718	Seminar (I & II)	1(1-0)
HORT-719	Research and Thesis (M.Sc. (Hons.))	10(0-10)
HORT-720	Research and Thesis (Ph.D.)	20(0-20)
HORT-721	Introduction to Entrepreneurship	3(3-0)

**SCHEME OF STUDIES**  
for  
**M.Sc. (Hons.) Human Nutrition and Dietetics**



**Human Nutrition and Dietetics**  
**Faculty of Agriculture, University of Poonch, Rawalakot, Azad**  
**Kashmir Pakistan**

UNIVERSITY OF POONCH, RAWALAKOT, AZAD JAMMU AND KASHMIR  
(Department of Human Nutrition and Dietetics)

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DEPARTMENT OF HUMAN NUTRITION AND DIETETICS  
FACULTY OF AGRICULTURE, UNIVERSITY OF POONCH,  
RAWALAKOT,

AZAD KASHMIR

SCHEME OF STUDIES FOR M.Sc. (Hons.) /PhD HUMAN NUTRITION &  
DIETETICS DEGREE PROGRAM

<b>Course No.</b>	<b>Title of the course</b>	<b>Credit Hours</b>	<b>Major</b>
HND-701	Maternal and Child Nutrition	3(3-0)	Major
HND-702*	Nutrigenomics and Proteomics	3(2-1)	Major
HND-703	Clinical Nutrition and Dietetics	3(1 -2)	Major
HND-704	Complementary Nutrition for Health Promotion	3(2-1)	Major
HND-705	Physiology of Digestion and Metabolism	3(2-1)	Major
HND-706	Molecular Physiology and Immunology of Nutrition	3(2-1)	Major
HND-707	Recent Advances in Nutrition and Dietetics	3(3-0)	Major
HND-708**	Food and Nutritional Security: Policy to Practice	3(3-0)	Major
HND-709	Sports and Exercise Nutrition	3(2-1)	Major
HND-710	Applied Dietetics	3(2-1)	Major
HND-711	Social and Behavioral Aspects of Public Health	3(3-0)	Major
HND-712	Pediatric and Geriatric Nutrition	3(3-0)	Major
HND-713	Professional Dietetics Practices	3(3-0)	Major
HND-714	Public Health Nutrition	3(2-1)	Major
HND-715	Nutritional Epidemiology & Research Methods	3(2-1)	Major

HND-716	International Nutrition	3(3-0)	Major
HND-717	Public Health Microbiolog	3(2-1)	Major
HND-718	Nutrition Program Management	3(3-0)	Major
HND-719	Special Problem	1(1-0)	Major
HND-720	Seminar	1(1-0)	Major

<b>Course Title</b>	<b>MATERNAL AND CHILD NUTRITION</b>
<b>Course Code</b>	<b>HND-701</b>
<b>Credit hrs.</b>	<b>3(3-0)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the importance of nutrition in first 1000 days with special reference to brain development, learning, lifelong health and quality life</li> <li>2. Understand the short- and long-term consequences of poor prenatal and postnatal nutrition on the growth and development of offspring</li> <li>3. Relate the impact of nutritional discrepancies on maternal and child health</li> <li>4. Discuss the globally practiced nutrition sensitive and specific evidence-based interventions for the improved health of neonates, children, adolescents and adults</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Nutrition in first 1000 days; Intervening in the preconception period to impact pregnancy outcomes; Maternal physiology and nutrition during reproduction; Physiological and nutritional aspects of placenta; Lifestyle and maternal health interactions between mother and fetus; Fetal growth: Nutritional regulation, endocrine interactions, influence on brain development and behaviour, fetal malnutrition and long-term outcomes, interventional strategies, micronutrient supplementation, intrauterine growth, low birthweight; Preterm and small-for- gestational age infants; Iron-deficiency anemia, pica, gluten, lactose intolerance, gestational diabetes, obesity and metabolic dysfunction; Breastfeeding; Infant formulas and weaning/complementary foods; Stillbirths: Rates, risk factors, economic and psychosocial consequences; Maternal and child nutrition: Levels and trends, undernutrition and overweight, evidence-based interventions, programs and policies for reducing malnutrition; WHO implementation plan on maternal, infant and young child nutrition.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Bhatia, J., Z.A. Bhutta and S.C. Kalhan. 2013. Maternal and Child Nutrition: The First 1,000 Days. Karger Medical and Scientific Publishers, Basel, Switzerland.</li> <li>2. Moran, V.H., P. Christian, S.P. Officer, G. Development, M. Gates and R. Pérez escamilla. 2021. Maternal and Child Nutrtrion. John Willay and Sons, MA, USA.</li> <li>3. More, J. 2021. Infant, Child and Adolescent Nutrition: A Practical Handbook. 2<sup>nd</sup> Ed. CRC Press, Taylor and Francis Group, Boca Raton, FL, USA.</li> </ol>

	<p>4. Redman, L.M. 2019. Nutrition During Pregnancy and Lactation: Implications for Maternal and Infant Health. Multidisciplinary Publishing Institute, Basel, Switzerland.</p> <p>5. UNICEF/WHO/World Bank. 2021. Levels and Trends in Child Malnutrition: UNICEF/WHO/World Bank Group Joint Child Malnutrition Estimates, Key findings of the 2020 edition. United Nations Children's Fund, World Health Organization, The World Bank. UNICEF, New York, WHO, Geneva, The World Bank, Washington DC, USA.</p>
<b>Course Title</b>	<b>NUTRIGENOMICS AND PROTEOMICS</b>
<b>Course Code</b>	<b>HND-702</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Provide the understanding about nutritional omics at molecular level</li> <li>2. Understand the various genes and pathways of different diseases</li> <li>3. Extract and quantify the RNA from various samples</li> <li>4. Learn the procedures of gel electrophoresis, spectroscopy and qRT-PCR</li> </ol>
<b>Contents</b>	<p><b>Theory</b>  Omics approaches: Nutrigenomics, nutrigenetics, genomics, transcriptomics, proteomics and metabolomics; Omics for the development of novel phytomedicines, functional and nutraceutical foods; Nutrigenomics: Concepts, tools and expectation; Opportunities and challenges in the nutrigenetics/nutrigenomics and health; Improving the nutritional value of cereal grains using genomic approach; Genomics applied to nutrients; Recent advances in nutraceutical, functional foods and nutrigenomics; Molecular basis of bioactive food components and human health; Molecular mechanisms of genetic variation linked to diet; Micronutrients and genomic stability and function; Contemporary dietary patterns; Proteomics: Need, scope, challenges and applications in nutrition research; Genomics, proteomics and health; Treatment of genetic disorders; Gene expression, profiling and genomic approaches to address various health issues; Disease related pathways and genes, food groups and nutrigenomics.</p> <p><b>Practical</b>  Primer designing; Nutrigenomics tools; Identification and quantification of DNA from blood; Extraction and quantification of RNA; Gene expression and qRT-PCR; Gel based proteomics; Protein extraction and quantification; One /Two- dimensional electrophoresis, Metabolomics; Analysis of urine metabolites by spectroscopy; Protein microarray.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Bagchi, D., F.C. Lau and M. Bagchi. 2010. Genomics, Proteomics and Metabolomics in Nutraceuticals and Functional Foods. Blackwell-Wiley, John Wiley and Sons Ltd, Chichester, UK.</li> <li>2. Caterina, R.D., J.A. Martinez and M. Kohlmeier. 2020. Principles of Nutrigenetics and Nutrigenomics; Fundamentals of Individualized Nutrition. Elsevier, London, UK.</li> <li>3. Korf, B.R. and M.B. Irons. 2013. Human Genetics and Genomics, 4<sup>th</sup> Ed. BlackwellWiley, John Wiley and Sons Ltd, Chichester, UK.</li> </ol>

	<p>4. Kussmann, M. and P.J. Stover. 2017. Nutrigenomics and Proteomics in Health and Disease Towards a Systems- level Understanding of Gene–diet Interactions. 2<sup>nd</sup> Ed. John Wiley and Sons Ltd, Chichester, UK.</p> <p>5. Pathak, Y.V. and A.M. Ardekani. 2018. Nutrigenomics and Nutraceuticals Clinical Relevance and Disease Prevention. Taylor and Francis Group, London, UK.</p>
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<b>Course Title</b>	<b>CLINICAL NUTRITION AND DIETETICS</b>
<b>Course Code</b>	<b>HND-703</b>
<b>Credit hrs.</b>	<b>3(1-2)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Describe the types of different diets and their role in clinical setting</li> <li>2. Know the role of nutrition for optimal health throughout the lifecycle</li> <li>3. Apply clinical nutrition to cure acute and chronic health disorders</li> <li>4. Practice research methods in clinical nutrition and dietetics</li> </ol>
<b>Contents</b>	<p><b>Theory</b>  Normal nutrition and modified diets: Estimated energy requirement (EER), dietary reference intakes (DRIs), regular diet, mechanical soft (dental soft) diet, pureed diet; Nutritional management of fluid intake and hydration; Vegetarian diets; Kosher guidelines; Transitional diets; Modification of carbohydrates, proteins, fats, fiber, minerals, vitamins and pediatric diets; Ketogenic diets; Nutrition care and assessment; Drug-nutrient interactions and prescription of herbal products; Food hypersensitivity: Food allergy and intolerance; Changing behavior and dietary counseling; Diets through the lifecycle: Preconception, pregnancy, infants, children, adolescents and elderly people; Clinical nutrition in health and diseases: Cardiovascular diseases, stroke, diabetes, obesity, irritable bowel disease, colorectal cancer, gastrointestinal diseases, pancreatic disease, thermal injury, liver disease, respiratory diseases, neurological conditions, epilepsy, palliative care, renal disease; HIV infection and severe malnutrition; Prescription of nutritional products; Nutrition support in critically ill patients; Enteral and parenteral nutrition: Introduction, calculations and complications;. Nutraceuticals; Alternative medicines; Dietary supplements; Personalized nutrition and medicines.</p> <p><b>Practical</b>  Energy and nutrient requirements through the lifecycle; Assessment of nutritional status in clinical practice; Nutrient and caloric requirements of amputees, burns and adjusted body weight (ABW) calculations; Case studies and recommendations of therapeutic diets for patients with infection and other health disorders; Enteral formulas and enteral nutrition in medical care; Administration of tube feeding; Parenteral solutions; Meal planning: Nutrients required for all age groups in health and diseases; Administering diet in clinical setup and at home; Visit of nutrition clinics; Practicing nutrition: Mock clinic.</p>



<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Gandy, W., J.A. Madden and M. Holdsworth. 2020. Oxford Handbook of Nutrition and Dietetics. 3<sup>rd</sup> Ed. Oxford University Press, Oxford, UK.</li> <li>2. Hickson, M. and S. Smith. 2017. Advanced Nutrition and Dietetics in Nutrition Support. 1<sup>st</sup> Ed. John Wiley and Sons Inc., NJ, USA.</li> <li>3. Konek, S.H. and P.J. Becker. 2019. Samour and King's Pediatric Nutrition in Clinical Care. 5<sup>th</sup> Ed. Jones and Bartlett Learning, Burlington, MA, USA.</li> <li>4. Nelms, M. and K.P. Sucher. 2019. Nutrition Therapy and Pathophysiology. 4<sup>th</sup> Ed. Cengage Learning, Boston, MA, USA.</li> <li>5. Rolfes, S.R., K. Pinna and E. Whitney. 2017. Understanding Normal and Clinical Nutrition. 11<sup>th</sup> Ed. Cengage Learning, Boston, USA.</li> </ol>
<b>Course Title</b>	<b>COMPLEMENTARY NUTRITION FOR HEALTH PROMOTION</b>
<b>Course Code</b>	<b>HND-704</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Learn about the role of healthy diet in disease prevention</li> <li>2. Describe the relationship of therapeutic and complementary nutrition during the lifecycle</li> <li>3. Interpret and apply nutrition concepts to evaluate and improve the nutritional health of individuals</li> <li>4. Integrate knowledge and skills in nutrition and/or dietetics fields</li> </ol>
<b>Contents</b>	<p><b>Theory</b>  An overview of nutrition; Planning a healthy diet; Fundamentals of integrative nutrition; Phytochemical and disease prevention; Popular diets; Integrating therapeutic and complementary nutrition; Life cycle nutrition: Pregnancy, infancy, childhood, adolescence, adulthood and the later years; Women's health and weight management: Overweight, obesity and underweight; Men's health: Skeletal system and joint health, respiratory health, skin health; Healthy eating habits for infants, toddlers and young children; Best practices for dietary guidelines: Mediterranean, American, Asian, DASH diet; Complementary feeding for special children; Use of supplements in digestive and metabolic problems; Nutrient requirements.</p> <p><b>Practical</b>  Dietary reference values and food-based dietary guidelines: WHO RNI, US DRIs, European RDAs/EURRECA, Pakistan-specific guidelines; Adaptation of normal diet for changing needs; Preparation of Mediterranean and DASH diets in Pakistani context.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Marie, K.F.R. 2020. Human Nutrition. University of Hawaii, Manoa, Hawaii.</li> <li>2. Nelms, M., K.P. Sucher and K. Lacey. 2015. Nutrition Therapy and Pathophysiology. 3<sup>rd</sup> Ed. Cengage Learning, Boston, USA.</li> <li>3. Nweze, N. 2018. Community Nutrition: Planning Health Promotion and Disease Prevention. 3<sup>rd</sup> Ed. Jones and Bartlett Learning Navigate, Lincoln, UK.</li> <li>4. Roth, R. 2011. Nutrition and Diet Therapy. 10<sup>th</sup> Ed. Cengage Learning, Delmar, USA.</li> <li>5. Whitney, E and S.R. Rolfes. 2021. Understanding Nutrition. 16<sup>th</sup> Ed. Cengage Learning, Boston, USA.</li> </ol>

<b>Course Title</b>	<b>PHYSIOLOGY OF DIGESTION AND METABOLISM</b>
<b>Course Code</b>	<b>HND-705</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Learn in depth knowledge about cellular mechanism of food digestion</li> <li>2. Identify the role of different hormones and enzymes during the process of digestion</li> <li>3. Understand the involvement of gut associated organs and their secretions during the process of digestion and metabolism</li> <li>4. Describe the importance of different secretions involved in the regulation of metabolism and activation of metabolic pathways</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Regulation of gastrointestinal motility; Mastication and deglutition of food; Salivary glands; Secretion and functions of saliva; Digestion of food in stomach: Gastric motility, control of gastric emptying, gastric glands, secretion of gastric juice, mechanism of acid production, pepsin and its function, intrinsic factors, regulation of gastric secretions; Intestinal glands and their secretions: Regulation and composition of intestinal juice; Chylomicron and coagulation of milk; Enteric nervous system; Gastrin; Cholecystokinin secretion; Motilin; Gastrointestinal barriers; Villi crypts and the life cycle of small intestine enterocytes; Over view of transport across the intestinal epithelium; Mechanism of absorption in small intestine; Absorption of amino acids and peptides; Absorption and transport of lipids in blood; Absorption of monosaccharides and transport across intestinal epithelium; Pancreas: Exocrine secretions, insulin synthesis, secretion and physiologic effects, insulin and nutrient metabolism, syndrome and other pancreatic hormones, control of pancreatic exocrine secretions, insulin deficiency and excess diseases; Liver: Bile secretion, role of bile acids in fat digestion and absorption, metabolic functions of bile, role of bile acid in cholesterol homeostasis, physiology of hepatovascular system; Physiology of vomiting; Large intestine: Absorption, secretions, formation of faeces, large intestine motility.</p> <p><b>Practical</b></p> <p>Collection and analysis of saliva and pancreatic juice of different animals; Pavlov's pouch; Thyriverella fistula in dogs; Fistulation and canulation of rumen in</p>

	buffalo calves, collection and study of ruminal fluid and recording of motility of gastrointestinal tract.
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Ganong, W.F. 2019. Review of Medical Physiology. 26<sup>th</sup> Ed. Mcgraw Hill Professional Publishing, NY, USA.</li> <li>2. Guyton, A.C and J.E. Hall. 2021. Textbook of Medical Physiology. 14<sup>th</sup> nd Ed. W.B. Saunders Company, PA, USA.</li> <li>3. Kim, E.B. 2014. Gastrointestinal Physiology. 2<sup>nd</sup> Ed. McGraw-Hill Education, NY, USA.</li> <li>4. Leonard, J. 2018. Gastrointestinal Physiology. 9<sup>th</sup> Ed. Elsevier, Amsterdam, Netherlands.</li> </ol>
<b>Course Title</b>	<b>MOLECULAR PHYSIOLOGY AND IMMUNOLOGY OF NUTRITION</b>
<b>Course Code</b>	<b>HND-706</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Focus on the nutrition related biochemical, cellular and immunological pathways</li> <li>2. Learn the impact of dietary modulation on gut epithelium and microbiome</li> <li>3. Understand the diet associated underlying metabolic pathways</li> <li>4. Describe diet and pathogen associated immunological pathways</li> </ol>
<b>Contents</b>	<p><b>Theory</b>  Anatomy and histology of gut; Molecular mechanism of mucous production: Cellular proliferation, activation and movement; Intestinal motility: Local and systemic control; Nerve innervation: Intrinsic factors, epithelium as barrier, epithelium breach, aquaporin (AQP) as therapeutic target for exocrine disorders, oxidative stress of epithelium and aging; Microbial population: Antioxidants, mechanism of dysbiosis, role of microbiome in immunity; Nutritional immune- genetics: Synthesis of immunologically active substances, intracellular killing of pathogens, epithelial immune response - innate and adaptive, role of M cell in gut immunity, role of microbiome in immunity, modulation and regulation of immune process.</p> <p><b>Practical</b>  Intestinal epithelial cell isolation and identification; Isolation of DNA from saliva; Microbiome isolation and identification; Immune cell identification; Immune titer in gut premises.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Abbas, A., A. Lichtman, S. Pillai. 2018. Cellular and Molecular Immunology. 9<sup>th</sup> Ed. Elsevier, North York, Canada.</li> <li>2. Barrett, K.E., S.M. Barman, H.L. Brooks and J.X.J. Yuan. 2019. Ganong's Review of Medical Physiology. 26<sup>th</sup> Ed. McGraw-Hill Education, NY, USA</li> <li>3. Clarke. M. and J. Frampton. 2020. Stem Cells: Biology and Application. 1<sup>st</sup> Ed. CRC Press, Taylor and Francis Group, Boca Raton, FL, USA.</li> <li>4. Guyton, A.C. and J.E. Hall. 2021. Textbook of Medical Physiology. 14<sup>th</sup> Ed. W.B. Saunders Company Philadelphia, PA, USA.</li> <li>5. Karp, G., J. Iwasa and W. Marshall. 2016. Karp's Cell and Molecular Biology: Concepts and Experiments. 8<sup>th</sup> Ed. John Wiley and Sons Press,</li> </ol>

	NY, USA.
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<b>Course Title</b>	<b>RECENT ADVANCES IN NUTRITION AND DIETETICS</b>
<b>Course Code</b>	<b>HND-707</b>
<b>Credit hrs.</b>	<b>3(3-0)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply in depth knowledge about recent developments in research settings</li> <li>2. Recognize global trends in the domain of nutrition and dietetics</li> <li>3. Explain composition of body at atomic, molecular and tissue level as well as body composition techniques</li> <li>4. Interpret anthropometric measures of nutritional status and tools available for anthropometric assessment</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Critical appraisal of research article; Dietary reference value, (DRVs); Report of DRVs on macro and micronutrients; Dietary recommendations and food labelling; Body composition; Technology driven dietary assessment; Retrospective and prospective tool for assessment of dietary intake; Polyphenols, flavonoids and their biological effects; Carbohydrate metabolism in relation to diseases: Diabetes, obesity and CVDs; Obesity prevention and weight loss interventions; Obesity paradox in cancer; Waist circumference, sagittal abdominal diameter and their relationship with cardio-metabolic risk factors; Nutritional modulation of maternal intestinal microbiota and its impact on fetus development; Manipulation of the intestinal microbiome in new-born infants; Gestational diabetes and its management; Situation analysis of maternal and child health via national nutrition survey; Evidence-based practice guidelines for the nutritional management of patients receiving chemotherapy; Cutting-edge advances and reviews in human nutrition and dietetics across the lifespan.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Gandy, W., J.A. Madden and M. Holdsworth. 2020. Oxford Handbook of Nutrition and Dietetics. 3<sup>rd</sup> Ed. Oxford University Press, Oxford, UK.</li> <li>2. Munoz, N. and M. Bernstein. 2019. Nutrition Assessment Clinical and Research Applications. 1<sup>st</sup> Ed. Jones and Bartlett Learning, Burlington, MA, USA.</li> </ol>

	<p>3. New, L. S.A., T.R. Hill, A.M. Gallagher and H.H. Vorster. 2019. Introduction to Human Nutrition. 3<sup>rd</sup> Ed. John Wiley &amp; Sons, NJ, USA.</p> <p>4. Waddon, T.A. and G.A. Bray. 2018. Handbook of Obesity Treatments. The Guilford Press, NY, USA.</p> <p>5. Whitney, E. and S.R. Rolfes. 2018. Understanding Nutrition. 3<sup>rd</sup> Ed. Cengage Learning, MA, USA.</p>
<b>Course Title</b>	<b>FOOD AND NUTRITIONAL SECURITY: POLICY TO PRACTICE</b>
<b>Course Code</b>	<b>HND-708</b>
<b>Credit hrs.</b>	<b>3(3-0)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Learn the policy process and existing policy set up with their implementation status</li> <li>2. Know about the perspectives of food and nutrition related policies</li> <li>3. Define policy interventions along with formulation of the policy documents</li> <li>4. Communicate future global trends for sustainable food and nutrition security</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>The concepts of malnutrition, hunger and vulnerability in relation to poverty; Measuring food security; The concept of livelihood framework and its components; Assessment of livelihoods in different food security contexts; Interpretation of livelihood indicators; Assessment of information systems related to food security analysis, baseline and action oriented assessment, institutional contexts; Reporting food security situation; Food assistance programs: Targeting vs. blanket approaches, monitoring and assessment of targeting process; Establishment of a food and nutritional security policy framework; Institutional framework for food and nutritional security policies, formulation, implementation, monitoring and evaluation; Food and nutritional security policy frame work in developing countries with special focus on Pakistan – case studies.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Bashir, M.K. 2016. Food Security Policies in Pakistan. In Reference Module in Food Sciences,. Elsevier, Amsterdam, Netherlands.</li> <li>2. Pollard, C.M. and S. Booth. 2019. Addressing Food and Nutrition Security in Developed Counties. Multidisciplinary Digital Publishing Institute, Basel, Switzerland.</li> <li>3. Refiei, M. 2014. Food Security Measurement Guide: A Study on Assessing the Internal Validity. Lambert Academic Publishing, Saarbrücken, Germany.</li> <li>4. Swinnen, J. and J. McCermott. 2020. COVID- 19 and Global Food Security. International Food Policy Research Institute. Washington DC, USA.</li> <li>5. Yadav, S.S., J.R. Robert, L.H. Jerry, W.E. Andreas and H. Danny. 2019. Food Security and Climate Change. 1stEd. Wiley-Blackwell, NJ, USA.</li> </ol>

<b>Course Title</b>	<b>SPORTS AND EXERCISE NUTRITION</b>
<b>Course Code</b>	<b>HND-709</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the concepts of physiology and biochemistry involved in exercise and training</li> <li>2. Know the various factors which influence the fitness level, health and immune system of the athletes</li> <li>3. Learn about nutritional requirements for different types of athletes with different food choices</li> <li>4. Formulate the diet plan to meet the energy requirement, regulate body metabolism and provide the nutrients to maintain and repair the muscle tissue</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Exercise: Physiology and biochemistry, energy and protein balance, body composition and health; Athlete's diet; Fluid and electrolyte balance; Dehydration and fatigue; Exercise and immune function; Supplements and ergogenic aids for sports performance; Nutritional implications and strategies for exercise and training; Nutrition for power and sprint training; Nutrition for disabled athletes; Population groups: Children, female athletes, ethnic groups, vegetarian/vegan athletes; Injured athlete: Surgery and rehabilitation; Exercise benefits and environmental stress.</p> <p><b>Practical</b></p> <p>Body composition assessments; Pre-test screening by conducting basic screening procedures; Flexibility testing; Blood pressure measurements; Resting metabolic rate determinations; Submaximal exercise testing; Aerobic power field assessments; Maximal oxygen consumption measurements; Walk assessment; Musculoskeletal fitness measurements; Anaerobic fitness measurements; Pulmonary function testing; Visit of various health and fitness centers.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Belski, R., A. Forsyth and E. Mantziouris. 2021. Nutrition for Sport, Exercise and Performance: A Practical Guide for Students, Sports Enthusiasts and Professionals. Taylor and Francis Group, Oxfordshire, UK.</li> <li>2. Haff, G.G. and C. Dumke. 2021. Laboratory Manual for Exercise Physiology. Human Kinetics, Champaign, IL, USA.</li> </ol>

	<p>3. Kenney, W. L., J. H. Wilmore and D. L. Costill. 2019. Physiology of Sport and Exercise. Human Kinetic.7<sup>th</sup> Ed. Champaign, IL, USA.</p> <p>4. Lee, J. 2018. The Essential Guide to Sports Nutrition and Bodybuilding. 1<sup>st</sup> Ed. Lean Gains, Walsall, UK.</p> <p>5. McArdle, W.D., F.I. Katch and V.L. Katch. 2019. Sports and Exercise Nutrition. Wolters Kluwer, Alphen aan den Rijn, Netherlands.</p>
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<b>Course Title</b>	<b>APPLIED DIETETICS</b>
<b>Course Code</b>	<b>HND-710</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Study how to apply biological, biochemical and physiological scientific principles to nutrition practice</li> <li>2. Interpret and apply nutrition concepts to evaluate and improve the nutritional health of communities and individuals with medical conditions</li> <li>3. Identify and apply food principles to food and nutrition systems</li> <li>4. Design diets for patients in hospital setup according to their nutritional needs and health conditions</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Applied dietetics: Scope, profession; Pakistani diets and food composition database; Dietician: Classification, responsibility; Dietary counselling; Menu planning: Importance, principles, factors affecting and steps involved; Balanced diet and nutrition: Ways to attain balanced diet; Relationship of nutrients to growth process; Applied dietetics for different age groups;</p> <p>Nutrition and aging: Complication and strategies; Microorganisms and their application in foods; Types of therapeutic diets and modification of normal diets during illness: Diets for patients in hospital setup; Role of dietician in managing diet or menu plan; Food chemistry and diseases; Role of supplements in health and diseases; Diet therapy.</p> <p><b>Practical</b></p> <p>Preparation and evaluation of different therapeutic diets as prescribed by medical nutrition therapy; Use of nutrition databases and softwares; Sensory evaluation and consumer acceptability; Nutritional labelling of different food products; Visit to the hospitals; Diet charts for healthy and diseased persons; Effects of processing on nutrients: Case studies related diet plan or development of therapeutic diets, healthy diet promotion by lecture or attractive material; Marketing material for health promotion.</p>
<b>Suggested Readings</b>	<p>1. Coveney, J. and S. Booth. 2019. Critical Dietetics and Critical Nutrition Studies. Springer International Publishing, Cham, Switzerland.</p>



	<p>2. Gandy, J. 2019. Manual of Dietetic Practice. 6<sup>th</sup> Ed. John Wiley and Sons, NJ, USA.</p> <p>3. Huq, A.K.O. 2012. Human Nutrition &amp; Applied Dietetics. Masuda Islam Publishers, Dhaka, Bangladesh.</p> <p>4. Mahan, L.K., J.L. Raymond and S. Escott Stump. 2013. Krause's Food &amp; the Nutrition Care Process. 13<sup>th</sup> Ed. Elsevier, Amsterdam, Netherlands.</p> <p>5. Nelson, M. 2020. Statistics in Nutrition and Dietetics. John Wiley and Sons, London, UK.</p>
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<b>Course Title</b>	<b>SOCIAL AND BEHAVIORAL ASPECTS OF PUBLIC HEALTH</b>
<b>Course Code</b>	<b>HND-711</b>
<b>Credit hrs.</b>	<b>3(3-0)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Learn about the importance of improving public health</li> <li>2. Know about sociology of food choices</li> <li>3. Improve their knowledge about different social problems of the society which deteriorate public health of nation</li> <li>4. Equipped with integrated community actions for better public health through different public and private stakeholders</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Public health: Historical perspectives, determinants, ethical considerations, role of social sciences; Overview of health education and connections between behavior and health; Principles of health behavior: The ecological model, health belief model, trans theoretical model (stages of change), precaution adoption process model; Insights from behavioral economics; Behavior change theories; Environmental and occupational health; Health systems organization: Community organization for health promotion and education, community-based participatory action research; Evaluation of health promotion and education programs; Program planning in health care services; Biostatistics and/or epidemiology; Chronic disease prevention and control; Cross-cultural health promotion; Economics and health; Socio-cultural factors and their impact on health; Health impact due to rapid economic change; Role of civil society in health care; Social policy and public health; National and global disease control programs; Stakeholders in public health including NGO's and social support networks; Sexuality and public health; Social marketing in public health; Planning and evaluating public health programs; Social epidemiology and the social environment; Health disparities; Diversity and cultural competence; Social determinants: Socioeconomic influences on health (health care access) race /ethnicity and gender; Equity in health care; Local social issues affecting public health; Case studies.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Birkhead, G.S. 2020. Essentials of Public Health, 4<sup>th</sup> Ed. Jones and Bartlett Learning, MA, USA.</li> <li>2. Crosby, R.A. and L.F. Salazar. 2021. Essentials of Public Health Research Methods. 1<sup>st</sup> Ed. Jones and Bartlett, MA, USA.</li> </ol>

	<p>3. FAO. 2015. Nutrition and Social Protection. Food and Agriculture Organization of the United Nations, Geneva, Switzerland.</p> <p>4. Schneider, M.J. 2021. Introduction to Public Health. 6<sup>th</sup> Ed. Jones and Bartlett Learning, MA, USA.</p> <p>5. The World Bank. 2013. Improving Nutrition through Multi-sectoral Approaches. Washington DC, USA.</p>
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<b>Course Title</b>	<b>PEDIATRIC AND GERIATRIC NUTRITION</b>
<b>Course Code</b>	<b>HND-712</b>
<b>Credit hrs.</b>	<b>3(3-0)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Familiarize with the applications of nutrition during fetal growth, early and post-natal life</li> <li>2. Demonstrate steps involved in the infant growth assessment</li> <li>3. Explain feeding guidelines for infants, children, and adolescents</li> <li>4. Understand theories of aging and impact of different nutritional interventions</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Infant nutrition: Growth, nutritional requirements, dietary reference intakes; Development and chemical composition of body; Infant growth assessment; Infant feeding: Breastfeeding, formula and complementary feeding; Nutritional needs of pre-term infant; Nutrition of low-birth weight; Feeding guidelines for children and adolescents; The aging society and nutrition epidemiology; Molecular theories of aging and nutritional interventions; Geriatric nutrition: Nutritional assessment, nutrition concerns, health disorders, prevention of age-related disorders, nutrients interaction; Nutrition management in nursing homes and assisted living environment; Drug-nutrient interactions during old age; Multicultural and ethical issues; Practical approaches to management.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. American Academy of Pediatrics. 2018. Pediatric Clinical Practice Guidelines and Policies. 18<sup>th</sup> Ed. American Academy of Pediatrics, Illinois, USA.</li> <li>2. Chernoff, R. 2014. Geriatric Nutrition: The Health Professional's Handbook. Jones and Bartlett Learning, Burlington, MA, USA.</li> <li>3. Kleinman, R.E. and F.R. Greer. 2020. Pediatric Nutrition. 8<sup>th</sup> Ed. American Academy of Pediatrics, Washington DC, USA.</li> <li>4. Morley, J.E. and D.R. Thomas. 2007. Geriatric Nutrition. CRC Press, Taylor and Francis Group, Boca Raton, FL, USA.</li> <li>5. Watson, R.R. 2019. Handbook of Nutrition in the Aged. CRC Press, Taylor and Francis Group, Boca Raton, FL, USA.</li> </ol>

<b>Course Title</b>	<b>PROFESSIONAL DIETETICS PRACTICES</b>
<b>Course Code</b>	<b>HND-713</b>
<b>Credit hrs.</b>	<b>3(3-0)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Know about the profession of dietetics to ensure good dietetics practices</li> <li>2. Apply counselling skills for cognitive and behavior change for better health</li> <li>3. Summarize future challenges of dietetic professionals</li> <li>4. Analyze tricks and strategies applicable during professional career</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Dietetics education and training from students to professionals; Future perspectives; Professional ethics and good dietetics practices; Standards of practice and professional performance for registered dietitians; Joining together: Team approach; Evidence based practice; Use of reflection in advancing practice; Educational preparations in dietetics; Credentialing of dietetic practitioners; Management in food and nutrition systems; Challenges for dietetic professionals in comparison with other health professionals; Communication and interviewing; Principles and theories of learning; Motivating clients and employees; Group facilitation and dynamics; Implementing and evaluating learning; Motivational counselling for behaviour change; Nutrition and behaviour modifications; Advanced practice approaches; Influencing patients practice and environment; Application of the advanced practice model in dietetics; Professional practice standards requirements; Distance education in dietetics; Dietary reference values and food based dietary guidelines; Specific areas of dietetic practice; Pediatric clinical dietetics and childhood nutrition; Palliative and hospice care; Maternal clinical dietetics and nutrition; Public health nutrition; Sports nutrition; Food services: Food service in hospitals, institutions and prisons; Armed forces nutrition.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Canter, D.D and R. DeYoung-Daniels. 2021. The Profession of Dietetics. 7<sup>th</sup> Ed. Jones and Bartlett Publishers LLC, Sudbury, MA, USA.</li> <li>2. Gandy, J. 2019. Manual of dietetic practice. 6<sup>th</sup> Ed. Wiley-Blackwell, Chichester, West Sussex, UK.</li> <li>3. Payne, A and H.M. Barker. 2010. Advancing Dietetics and Clinical Nutrition.</li> </ol>

	Churchill Livingstone, Edinburg, UK.
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	<p>4. Raymond, J.L. and K. Morrow. 2020. Krause and Mahan's Food &amp; the Nutrition Care Process. 15<sup>th</sup> Ed. Elsevier, NY, USA.</p> <p>5. Winterfeldt, E.A., M.L. Bogle and L.L. Ebro. 2011. Dietetic Practice and Future Trends. 3<sup>rd</sup> Ed. Jones and Bartlett Publishers LLC, Sudbury, MA, USA.</p>
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<b>Course Title</b>	<b>PUBLIC HEALTH NUTRITION</b>
<b>Course Code</b>	<b>HND-714</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand major drivers of public health nutrition</li> <li>2. Plan and execute public health interventions</li> <li>3. Assess the nutritional status of the public and communities</li> <li>4. Monitor the major public health nuisance through appropriate surveillance</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Understanding public health: Dynamics, governmental responsibility, knowledge and skills of public health nutritionists; Public health nutrition: Concept and guiding principles, history, ethics, key problems, food and nutrition policy, identify key nutritional problem, over- and under nutrition; Applying nutrition to public health: Nutritional epidemiology; Accessing and intervening in the community's nutrition needs: Assessment of nutritional status in individuals and populations, targeting at risks, infant feeding, changing public eating behavior, food choices and dietary guidelines; Advocating and influencing health and nutrition policies; Providing nutrition care services in public health primary care; Protecting the public's nutritional health: Safeguarding the food supply, food security and adequate food access for the public, security of the food supply and bioterrorism preparedness; Staffing public health nutrition programs and services; Networking for nutrition; Global developments in the food system; Leadership development and program management.</p> <p><b>Practical</b></p> <p>Dietary guidelines; Food guidelines and dietary quality; Nutrition screening and monitoring tools; Dietary intake assessment methods for individuals and groups; Dietary and anthropometric assessment methods for children and adults: Stature, weight, BMI, body composition, frame size, circumference and skin fold measurements; Physiological assessment of children and adults; Energy assessment and physical activity; Environmental challenges and assessment.</p>
<b>Suggested Readings</b>	1. Birkhead G.S. 2020. Essentials of Public Health, 4 <sup>th</sup> Ed. Jones and Bartlett Learning, MA, USA.

	<p>2. Buttriss, J., J.M. Kearney, S. Lanham-New and A. Welch. 2018. Public Health Nutrition. John Wiley &amp; Sons, Hoboken, NJ, USA.</p> <p>3. Dinour, L. M., J. Obenchain and A. Spark. 2015. Nutrition in Public Health: Principles, Policies, and Practice. 2<sup>nd</sup> Ed. Taylor and Francis Group, Boca Raton, FL, USA.</p> <p>4. Edelstein, S. 2011. Nutrition in Public Health: A Handbook for Developing Programs and Services. Jones and Bartlett Learning International, London, UK.</p> <p>5. Schneider, M.J. 2021. Introduction to Public Health. 6<sup>th</sup> Ed. Jones and Bartlett Learning, MA, USA.</p>
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<b>Course Title</b>	<b>NUTRITIONAL EPIDEMIOLOGY AND RESEARCH METHODS</b>
<b>Course Code</b>	<b>HND-715</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Explain the basics of epidemiology along with deep insight of understanding of health, disease, and risk</li> <li>2. Develop basic framework for qualitative research design</li> <li>3. Write report and means for efficient dissemination of findings</li> <li>4. Nutrition interventions through efficient experimental plan</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Epidemiological study designs; Descriptive epidemiologic studies: Case report, case series report; Correlation study (ecological study); Cross sectional study (prevalence studies); Analytical epidemiological studies; Case control study; Cohort studies (prospective cohort, ecologic correlational); Retrospective cohort studies; Interventional (experimental), randomized controlled trials; Basic concepts in epidemiology; rates, risk, ratio and measures of food-borne disease association; epidemiological approaches for public health; Epi-curve analysis, statistical methods in epidemiology; Sampling and data presentation; Regression and meta-analysis in epidemiology.</p> <p><b>Practical</b></p> <p>Measuring health, disease, and risks; Calculation of odds ratio (OR) and relative risk (RR) for food borne diseases; Quantitative and qualitative approaches in epidemiology; Sampling and sample size determination; Data collection and presentation methods; Methods of data analysis; Steps for developing surveillance framework in NCDs; Case study of Typhoid Marry and John Snow’s work on cholera outbreak; Case-study for food borne illness; Report writing and dissemination of findings.</p>

<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. David, D.C. and M. Szklo. 2019. <i>Global Epidemiology</i>. 6<sup>th</sup> Ed. Elsevier, Amsterdam, Netherlands.</li> <li>2. Fletcher, G.S. 2020. <i>Clinical Epidemiology: The Essentials</i>, 6<sup>th</sup> Ed. Wolters Kluwer, Philadelphia, USA.</li> <li>3. Joann, G., E. Elmore, D. Wild, M. Heidi, D. Nelson and L.K. David. 2020. <i>Jekel's Epidemiology, Biostatistics, Preventive Medicine, and Public Health</i>. Elsevier eBook on VitalSource, 5<sup>th</sup> Ed. Elsevier, Amsterdam, Netherlands.</li> <li>4. Lovegrove, J.A., L. Hodson, S. Sharma and S.A. Lanham. 2014. <i>Nutrition Research Methodologies</i>. Wiley- Blackwell, Chichester, West Sussex, UK.</li> <li>5. Willett, W. 2012. <i>Nutritional Epidemiology</i>. 3<sup>rd</sup> Ed. Oxford University Press, Oxford, UK.</li> </ol>
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<b>Course Title</b>	<b>INTERNATIONAL NUTRITION</b>
<b>Course Code</b>	<b>HND-716</b>
<b>Credit hrs.</b>	<b>3(3-0)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Learn about current global nutritional status, existing or emerging issues in international nutrition</li> <li>2. Influence the health and survival of people living in developing world</li> <li>3. Analyse the policies/interventions for achieving the global nutrition targets</li> <li>4. Deliver an overview to the students about global perspective of current nutritional situation</li> </ol>
<b>Contents</b>	<p><b>Theory</b></p> <p>Public health nutrition problems and solutions for low- and middle- income countries; Nutrition and Development: Agriculture and food production; Food prices fluctuation and its impact; Water sanitation and disaster nutrition; Global nutritional deficiencies; Fully functioning and equitable health systems: A prerequisite for reaching the health MDGs; Maternal mortality in developing countries; Infant mortality; Addressing the changing health challenges of the developing world; Challenges in tracking progress and measuring achievements; Approaches implemented at the household, community, national and international levels to improve nutritional status; Major existing or emerging issues in international nutrition that influence the health, survival and development capacity of people living in developing societies; Analysis of the policy environment for achieving the global nutrition targets; Various direct and indirect approaches to improve nutritional well-being of populations; One health programs.</p>
<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Black, R. E., A. Singhal and R. Uauy. 2014. <i>International Nutrition: Achieving Millennium Goals and Beyond</i>. S. Karger AG, Basel, Switzerland.</li> <li>2. DeMarco, R. and J.H. Walsh. 2019. <i>Community &amp; Public Health Nursing: Evidence for Practice</i>. 3<sup>rd</sup> Ed. Lippincott, Philadelphia, USA.</li> <li>3. International Food Policy Research Institute. 2016. <i>Global Nutrition Report 2016: From Promise to Impact: Ending Malnutrition by 2030</i>. Washington DC, USA.</li> </ol>

	<p>4. Medeiros, D.M. and R.E.C. Wildman. 2019. Advanced Human Nutrition. 4<sup>th</sup> Ed. Jones and Bartlett Learning, MA, USA.</p> <p>5. Sareen, S., Gropper, J.L. Smith and T.P. Carr. 2021. Advanced Nutrition and Human Metabolism. 8<sup>th</sup> Ed. Cengage Learning, NY, USA.</p>
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<b>Course Title</b>	<b>PUBLIC HEALTH MICROBIOLOGY</b>
<b>Course Code</b>	<b>HND-717</b>
<b>Credit hrs.</b>	<b>3(2-1)</b>
<b>Objectives</b>	<p>By the end of this course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Give knowledge of the basic principles of bacteriology, virology and mycology</li> <li>2. Describe immunology and parasitology including the nature of pathogenic microorganisms</li> <li>3. Interpret pathogenesis, laboratory diagnosis, transmission, prevention and control of diseases common in the country</li> <li>4. Manage and control infectious diseases through disinfection and sterilization techniques</li> </ol>
<b>Contents</b>	<p><b>Theory</b>  Scope of public health microbiology; Water-borne microbial diseases and their control; Use of microbes in waste water treatment; Role and significance of antimicrobials; Food-borne microbial diseases and their control; Bacterial, viral and fungal diseases transmitted through dairy products, meat, eggs, vegetables, fruits and their control; Role of vaccines in public health; Sexually transmitted microbial diseases and their control; Host response in HIV Infection Vector borne microbial disease; Bacterial, viral and fungal diseases of zoonotic importance; Nosocomial infections; Improved diagnostics in microbiology: Developing a business case for hospital administration; Bio-warfare; Infection control: Surveillance, monitoring and communication of infection; Nature of risk and its assessment, management of risk of disease transmission from and to the patient, patient isolation; Hazard groups; Disinfection and sterilization; Infectious waste management; Infection control in community.</p> <p><b>Practical</b>  Identification of microorganisms and/or their metabolites in food: Dairy products, meat, eggs, vegetables, fruits and air; Detection of antibiotic residues in foods; Demonstration of food and water sanitation.</p>



<b>Suggested Readings</b>	<ol style="list-style-type: none"> <li>1. Cangliang, Shen, Yifan Zhang. 2017. Food microbiology laboratory for the food science student: a practical approach.1<sup>st</sup> Ed. Springer International Publishing, Cham, Switzerland.</li> <li>2. David H. Persing and Fred C. Tenover and Randall T. Hayden &amp; Greet leven and Melissa B. Miller and Frederick S. Nolte. 2016. Molecular Microbiology: Diagnostic Principles and Practice. 3<sup>rd</sup> Ed. ASM Press, Washington DC, USA.</li> <li>3. Donelli G. 2021. Advances in Microbiology, Infectious Diseases and Public Health. Vol. 15. Springer, Cham, Switzerland.</li> <li>4. Lusk, J., M.K. Cowan, H. Smith. 2019. Microbiology Fundamentals: A Clinical Approach. 3<sup>rd</sup> Ed. McGraw- Hill Education,</li> <li>5. Török, E., Moran, E., and Cooke, F. 2016. Oxford Handbook of Infectious Diseases and Microbiology. 2<sup>nd</sup> Ed. Oxford University Press, Oxford, UK.</li> </ol>
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<b>Course Title</b>	<b>Nutrition Program Management</b>
<b>Course Code</b>	<b>HND-718</b>
<b>Credit hrs.</b>	<b>3(3-0)</b>
<b>Objectives</b>	
<b>Contents</b>	<p>Nutrition program planning, understanding nutrition interventions, Nutrition programs for developing countries, Management strategies for nutrition programs. Assessment of nutrition program, Nutrition programs for specific age groups, for controlling micronutrient deficiencies, Nutrition program for combating protein energy malnutrition, National nutrition program strategies for different countries, National nutrition program strategies for Pakistan, National nutrition program strategies for South east Asia.</p>
<b>Suggested Readings</b>	

<b>Course Title</b>	<b>Special Problem</b>
<b>Course Code</b>	<b>HND-719</b>
<b>Credit hrs.</b>	<b>1(1-0)</b>
<b>Objectives</b>	
<b>Course Title</b>	<b>Seminar</b>
<b>Course Code</b>	<b>HND-720</b>
<b>Credit hrs.</b>	<b>1(1-0)</b>
<b>Objectives</b>	