(OBE)

SCHEME OF STUDIES

FOR

B.Sc. (Hons.) Human Nutrition & Dietetics

(4 years degree program)

National Institute of Food Science and Technology

Faculty of Food, Nutrition & Home Sciences

University of Agriculture

Faisalabad.

B.SC. (HONS.) HUMAN NUTRITION & DIETETICS

Vision

The vision of the National Institute of Food Science & Technology is to be recognized as an excellent institution playing a key role in the transformation of food and nutrition disciplines to be competitive nationally and internationally.

Mission

The aim of the National Institute of Food Science & Technology is to make nation prosperous, and food secure with better health. This will be achieved with the following mission:

- Gain scientific and technical knowledge to solve the problems in the food industries regarding the processing of different food products
- Create and develop new food products, and therapeutic recipes by adopting novel and innovative technologies for different stakeholders
- Provide hands on training for the students to become a potential entrepreneur
- Facilitate lifelong learning and produce skilled food and nutrition professionals for ensuring the food security around the globe
- Advance knowledge through basic and applied research

Program Education Objectives (PEOs)

After 3-5 years of graduation, the graduates of B.Sc. (Hons.) Human Nutrition and Dietetics will be able to achieve the following PEOs:

- Apply knowledge of human nutrition & dietetics to assess the nutritional status of the people and compositional analysis of the foods for meal/menu planning, health promotion and alleviate various health ailments
- Use evidence-based strategies and interventions for improved nutrition with focus on dietary diversification, food fortification, supplementation and judicious intake of food
- Enhance students' intellectual ability in taking initiatives and developing innovative ideas to address issues related to nutritional discrepancies in vulnerable segments of the community
- Work effectively as trained members of multidisciplinary health care team in public health related departments and non-governmental organizations
- Utilize requisite knowledge for the development, implementation, and evaluation of regulatory framework, nutrition policies, and programs

Program Learning Outcomes (PLOs)

By the time of graduation, the students of B.Sc. (Hons.) Human Nutrition & Dietetics have acquired the following graduate attributes (PLO-01 to PLO-12) related to knowledge, skills and behavioral traits:

PLO-01: Knowledge: An ability to apply knowledge of human nutrition and dietetics and allied sciences for better understanding about the nutrient requirements for optimal health and their role towards management of nutritional health disorders

PLO-02: Problem Analysis: An ability to identify, formulate, search literature, and analyse complex problems related to human health and nutrition security reaching substantiated conclusions using principles of food, nutrition, physiology, biochemistry, and food service

PLO-03: Design/Development of Solutions: An ability to modify normal diet for nutrients, texture, calories, consistency considering factors affecting the acceptance of food; design menu and meal planning for individual from various physiological needs and health issues

PLO-04: Investigation: An ability to investigate complex problems due to nutritional discrepancies in the population in a methodical way including literature survey, design and conduct of experiments, assessment of the individuals and composition of the dietary intake to derive valid conclusions

PLO-05: Modern Tool Usage: An ability to create, select and apply appropriate techniques, resources, latest software, and IT tools including body composition analyser, blood chemistry and haematology analyser, nutrient databases, and nutrition apps

PLO-06: The Human Nutritionist and Society: An ability to apply reasoning informed by contextual knowledge to assess societal, cultural issues and the consequent responsibilities relevant to professional practice and solution to professional dietetic practices and solution to complex nutrition related health problems

PLO-07: Environment and Sustainability: An ability to understand the impact of professional nutritional solutions in societal and environmental contexts and demonstrate knowledge of, and need for, sustainable development

PLO-08: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of practice according to principles of bioethics i.e., respect for autonomy, beneficence, non-maleficence, and justice

PLO-09: Individual and Teamwork: An ability to work effectively, as an individual or in a team, on multifaceted and /or multidisciplinary settings with special reference to surveys, diet and nutrition campus, nutrition-sensitive and -specific interventions.

PLO-10: Communication: An ability to communicate effectively, orally as well as in writing, for nutrition counselling, awareness of the masses, dietary advice in health care team, teaching and research settings

PLO-11: Project Management: Ability to demonstrate management skills and apply scientific principles of food and nutrition to one's own work, as a member and/or leader in a team, to manage projects in a multidisciplinary environment.

PLO-12: Lifelong Learning: An ability to recognize the need for, and have the preparation and ability to engage in, independent and life-long learning in the broadest context of technological change.

NATIONAL INSTITUTE OF FOOD SCIENCE AND TECHNOLOGY
FACULTY OF FOOD, NUTRITION AND HOME SCIENCES
SCHEME OF STUDIES FOR B.SC. (HONS.) HUMAN NUTRITION & DIETETICS DEGREE PROGRAM

SEMESTER-I

Existing				Proposed			
Course No.	**Title of the course**	**Credit Hours**	**Major/ Minor**	**Course No.**	**Title of the course**	**Credit Hours**	**Major/ Minor**
HND-301/ FST-507	Fundamentals of Human Nutrition	3(3-0)	MC	HND-301/ FST-507	Fundamentals of Human Nutrition	3(3-0)	MC
FST-301	Essentials of Food Science and Technology	3(2-1)	MC	FST-301	Essentials of Food Science and Technology	3(2-1)	MC
BIOCHEM-301	Elementary Biochemistry	3(2-1)	IDC	BIOCHEM-301	Elementary Biochemistry	3(2-1)	IDC
AGR-301/ AGR304	Basic Agriculture/ Weed Control Methods (For F.Sc. Pre-Agri.)	3(1-2)	IDC	AGR-301/ AGR304	Basic Agriculture/ Weed Control Methods (For F.Sc. Pre-Agri.)	3(1-2)	IDC
ENG-313	Functional English	3(3-0)	GEC	ENG-313	Functional English	3(3-0)	GEC
CS-305	Applications of Information and Communication Technologies (ICT)	3(2-1)	GEC	CS-305	Applications of Information and Communication Technologies (ICT)	3(2-1)	GEC
TGM-301	Tutorial Group Meeting for Soft Skills	-	NCC	TGM-301	Tutorial Group Meeting for Soft Skills	-	NCC
Total credit hours			**18**	**Total credit hours**		**18**	

SEMESTER-II

Existing				Proposed			
Course No.	**Title of the course**	**Credit Hours**	**Major/ Minor**	**Course No.**	**Title of the course**	**Credit Hours**	**Major/ Minor**
HND-302	Macronutrients in Human Nutrition	3(3-0)	MC	HND-302	Macronutrients in Human Nutrition	3(3-0)	MC
HND-304/ FST-304	Global Food Issues	3(3-0)	MC	**Course Deleted**			
	New Course			HND-304/ FST-304	Fundamentals of Food Systems	3(3-0)	MC
PHYSIO-401	Human Physiology-I	3(2-1)	IDC	PHYSIO-401	Human Physiology-I	3(2-1)	IDC
ANAT-502	Fundamentals of Human Anatomy	3(2-1)	IDC	ANAT-502	Fundamentals of Human Anatomy	3(2-1)	IDC
SSH-303	Ideology and Constitution of Pakistan	2(2-0)	GEC	SSH-303	Ideology and Constitution of Pakistan	2(2-0)	GEC
ENG-314	Expository Writing	3(3-0)	GEC	ENG-314	Expository Writing	3(3-0)	GEC
PY-307	Fundamentals of Natural Sciences	3 (2-1)	GEC	PY-307	Fundamentals of Natural Sciences	3 (2-1)	GEC

TGM-302	Tutorial Group Meeting for Soft Skills	-	NCC	TGM-302	Tutorial Group Meeting for Soft Skills	-	NCC
Total credit hours			**20**	**Total credit hours**		**20**	

SEMESTER-III

Existing				**Proposed**			
Course No.	**Title of the course**	**Credit Hours**	**Major/ Minor**	**Course No.**	**Title of the course**	**Credit Hours**	**Major/ Minor**
HND-401	Micronutrients in Human Nutrition	3(3-0)	MC	HND-401	Micronutrients in Human Nutrition	3(3-0)	MC
HND-403/ FST-403	Public Health Nutrition	2(2-0)	MC	HND-403/ FST-403	Public Health Nutrition	2(2-0)	MC
PHYSIO-402	Human Physiology-II	3(2-1)	IDC	PHYSIO-402	Human Physiology-II	3(2-1)	IDC
BMS-402	Entrepreneurship	2(2-0)	GEC	BMS-402	Entrepreneurship	2(2-0)	GEC
IS-401/ SSH-306	Islamic Studies/ Basic Ethics (For Foreign / Non-Muslim students)	2(2-0)	GEC	IS-401/ SSH-306	Islamic Studies/ Basic Ethics (For Foreign / Non-Muslim students)	2(2-0)	GEC
Math-408	Quantitative Reasoning-I	3(3-0)	GEC	Math-408	Quantitative Reasoning-I	3(3-0)	GEC
IS-402/ SSH-403	Quran Translation /Interfaith Harmony (For Non-Muslims and Foreigners)	1(1-0)	NCC	IS-402/ SSH-403	Quran Translation /Interfaith Harmony (For Non-Muslims and Foreigners)	1(1-0)	NCC
TGM-401	Tutorial Group Meeting for Soft Skills	-	NCC	TGM-401	Tutorial Group Meeting for Soft Skills	-	NCC
Total credit hours		**15**		**Total credit hours**		**15**	

SEMESTER-IV

Existing				**Proposed**			
Course No.	**Title of the course**	**Credit Hours**	**Major/ Minor**	**Course No.**	**Title of the course**	**Credit Hours**	**Major/ Minor**
HND-402	Nutrition Through the Life Cycle	3(3-0)	MC	HND-402	Nutrition Through the Life Cycle	3(3-0)	MC
HND-404/ FST-404	Functional Foods and Nutraceuticals	3(2-1)	MC	HND-404/ FST-404	Functional Foods and Nutraceuticals	3(2-1)	MC
HND-406/	Food and Nutrition Entrepreneurship	3(3-0)	MC	HND-406/	Food and Nutrition Entrepreneurship	3(3-0)	MC

FST-402				FST-402			
SOC-311	Introduction to Sociology	2(2-0)	GEC	SOC-311	Introduction to Sociology	2(2-0)	GEC
STAT-408	Quantitative Reasoning-II	3(3-0)	GEC	STAT-408	Quantitative Reasoning-II	3(3-0)	GEC
EDU-306	Civics and Community Engagement	2(2-0)	GEC	EDU-306	Civics and Community Engagement	2(2-0)	GEC
FA-310	Introduction to Art and Humanities	2(2-0)	GEC	FA-310	Introduction to Art and Humanities	2(2-0)	GEC
IS-403	Moral Philosophy/ روحانیت (for non-Muslim and foreigners' students)	1 (1-0)	NCC	IS-403	Moral Philosophy/ روحانیت (for non-Muslim and foreigners' students)	1 (1-0)	NCC
TGM-402	Tutorial Group Meeting for Soft Skills	-	NCC	TGM-402	Tutorial Group Meeting for Soft Skills	-	NCC
Total credit hours			**18**	**Total credit hours**		**18**	

SEMESTER-V

Existing				**Proposed**			
Course No.	**Title of the course**	**Credit Hours**	**Major/ Minor**	**Course No.**	**Title of the course**	**Credit Hours**	**Major/ Minor**
HND-501	Fundamentals of Dietetics	3(2-1)	MC	HND-501	Fundamentals of Dietetics	3(2-1)	MC
HND-503	Assessment of Nutritional Status	3(2-1)	MC	HND-503	Assessment of Nutritional Status	3(2-1)	MC
HND-505/ FN-503	Infant and Young Child Feeding	3(2-1)	MC	HND-505/ FN-503	Infant and Young Child Feeding	3(2-1)	MC
HND-507	Sports Nutrition	3(2-1)	MC	HND-507	Sports Nutrition	3(2-1)	MC
PATH-504	Introduction to Pathology	3(2-1)	IDC	PATH-504	Introduction to Pathology	3(2-1)	IDC
BIOCHEM-503	Clinical Biochemistry	3(1-2)	IDC	BIOCHEM-503	Clinical Biochemistry	3(1-2)	IDC
TGM-501	Tutorial Group Meeting for Soft Skills	-	NCC	TGM-501	Tutorial Group Meeting for Soft Skills	-	NCC
Total credit hours			**18**	**Total credit hours**		**18**	

SEMESTER-VI

Existing				**Proposed**			
Course No.	**Title of the course**	**Credit Hours**	**Major/ Minor**	**Course No.**	**Title of the course**	**Credit Hours**	**Major/ Minor**
HND-502	Hospital Dietetics-I	3(2-1)	MC	HND-502	Hospital Dietetics-I	3(2-1)	MC

HND-504/ HE-302	Meal Planning and Management	3(2-1)	MC	HND-504/ HE-302	Meal Planning and Management	3(2-1)	MC
HND-506/ FN-508	Nutrition in Emergencies	3(3-0)	MC	HND-506/ FN-508	Nutrition in Emergencies	3(3-0)	MC
HND-508/ FN-603	Clinical Nutrition	3(2-1)	MC	HND-508/ FN-603	Clinical Nutrition	3(2-1)	MC
HND-510	Nutritional Immunology	2(2-0)	MC	HND-510	Nutritional Immunology	2(2-0)	MC
HND-512/ FST-502/ FN-510	Food Analysis and Sensory Evaluation	3(2-1)	MC	HND-512/ FST-502/ FN-510	Food Analysis and Sensory Evaluation	3(2-1)	MC
TGM-502	Tutorial Group Meeting for Soft Skills	-	NCC	TGM-502	Tutorial Group Meeting for Soft Skills	-	NCC
Total credit hours			**17**	**Total credit hours**		**17**	

Internship 3(0-3) will be enrolled in summer time after 6th semester. Moreover, students will be distributed among the faculty members for supervision and efficient working on capstone project 3(0-3).

SEMESTER-VII

Existing				Proposed			
Course No.	**Title of the course**	**Credit Hours**	**Major/ Minor**	**Course No.**	**Title of the course**	**Credit Hours**	**Major/ Minor**
HND-601	Hospital Dietetics-II	3(2-1)	MC	HND-601	Hospital Dietetics-II	3(2-1)	MC
HND-603/ FST-511/ FN-507	Food Service Management	3(3-0)	MC	HND-603/ FST-511/ FN-507	Food Service Management	3(3-0)	MC
HND-605/ FST-607	Nutrition Policies and Programs	3(3-0)	MC	HND-605/ FST-607	Nutrition Policies and Programs	3(3-0)	MC
FST-601/ HND-607	Instrumental Techniques in Food and Nutrition	3(2-1)	MC	FST-601/ HND-607	Instrumental Techniques in Food and Nutrition	3(2-1)	MC
HND-609	Food Supplements	2(2-0)	MC	HND-609	Food Supplements	2(2-0)	MC
HND-613/ FST-501/	Food Microbiology and Biotechnology	3(2-1)	MC	**HND-613/** FST-501/	Food Microbiology and Biotechnology	3(2-1)	MC
TGM-601	Tutorial Group Meeting for Soft Skills	-	NCC	TGM-601	Tutorial Group Meeting for Soft Skills	-	NCC
Total credit hours			**17**	**Total credit hours**		**17**	

SEMESTER-VIII

Existing				Proposed			
Course No.	**Title of the course**	**Credit Hours**	**Major/ Minor**	**Course No.**	**Title of the course**	**Credit Hours**	**Major/ Minor**
HND-602/ PHARM-601	Drug-Nutrient Interactions	3(2-1)	MC	HND-602/ PHARM-601	Drug-Nutrient Interactions	3(2-1)	MC
HND-604	Nutrition Through Social Protection	2(2-0)	MC	HND-604	Nutrition Through Social Protection	2(2-0)	MC
HND-606	Research Methods in Nutrition	3(3-0)	MC	HND-606	Research Methods in Nutrition	3(3-0)	MC
HND-608	Food and Drug Laws	2(2-0)	MC	HND-608	Food and Drug Laws	2(2-0)	MC
HND-610	Capstone Project	3(0-3)	MC	HND-610	Capstone Project	3(0-3)	MC
HND-612	Internship/ Field Experience	3(0-3)	MC	HND-612	Internship/ Field Experience	3(0-3)	MC
HND-614/ FST-503	Food Quality Management	2(2-0)	MC	**HND-614/** FST-503	Food Quality Management	2(2-0)	MC
Total credit hours			**18**	**Total credit hours**		**18**	

Total = 141 Credit Hours; GEC = 12 (30 CH); IDC = 7 (21 CH); MC = 32 (84 CH); Capstone Project and Internship = 2 (6 CH).

Semester No.	GEC	IDC	MC	NCC	Total Credit Hours
1	2 (6)	2 (6)	2 (6)	1	18
2	2 (5)	2 (6)	2 (6)	1	20
3	4 (10)	1 (3)	2 (5)	2	15
4	4 (9)	-	3 (9)	2	18
5	-	2 (6)	4 (12)	1	18
6	-	-	6 (17)	1	17
7	-	-	6 (17)	1	17
8		-	7 (18)	-	18
Total	**12 (30)**	**7 (21)**	**32 (90)**	**9**	**51 (141)**

Category	Number of Courses	Number of Credit Hour
Major Courses	30	84
General Education Courses	12	30
Inter-Disciplinary Courses	7	21
Internship and Capstone Project	2	6

COURSE CONTENTS

Existing	Revised
First Semester	
HND-301/FST-507 FUNDAMENTALS OF HUMAN NUTRITION 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate an understanding about the basic concepts of food and nutrition. 2. Apply the role of macro- and micro-nutrients in optimum human nutrition and disease prevention. 3. Discuss the absorption, digestion and metabolism of nutrients in the human. 4. Explain the causes of nutrition related health disorders due to consumption of non-optimal quantities of the nutrients **Theory** Introduction: Food, nutrients, nutrition, malnutrition - global and local scenario, diet, balanced diet, food groups, foundations of healthy diet, meal planning; Water: Functions, regulation in body, dietary requirements, electrolytes and acid-base balance; Carbohydrates: Types, role in body, dietary fiber, basal metabolic rate bulk and alternative sweeteners, recommended intake and energy value; Fats and oils: Types, functions, biosynthesis, recommendations concerning fat intake, fat substitutes; Proteins: Amino acids, protein synthesis and degradation, classification, functions, quality of proteins, dietary requirements; Vitamins: Classification, types, sources, role in body; Mineral elements: Types, requirements, sources, role in body; Digestion: Alimentary tract, digestive juices, secretions; Absorption and metabolism of nutrients: Carbohydrates, protein, lipids; Nutrient and dietary deficiency disorders. **Suggested Readings** 1. Awan, J.A. 2020. Elements of Food and Nutrition. Unitech Communications, Faisalabad, Pakistan. 2. Bamji, M.S., K. Krishnaswamy and G.N.V. Brahmam. 2019. Textbook of Human Nutrition. 4th Ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India. 3. Geissler, C. and H. Powers. 2017. Human Nutrition. 13th Ed. Oxford University Press, Oxford, UK. 4. Lanham-New, S.A., T.R. Hill, A.M. Gallagher and H.H. Vorster. 2019. Introduction to Human Nutrition. 3rd Ed. John Wiley & Sons Ltd., The Atrium, Chichester, West Sussex, UK. Mann, J. and A.S. 2017. Truswell. Essentials of Human Nutrition. 5th Ed. Oxford University Press, Oxford, UK.	**HND-301/FST-507 FUNDAMENTALS OF HUMAN NUTRITION 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate an understanding about the basic concepts of food and nutrition. 2. Apply the role of macro- and micro-nutrients in optimum human nutrition and disease prevention. 3. Discuss the absorption, digestion and metabolism of nutrients in the human. 4. Explain the causes of nutrition related health disorders due to consumption of non-optimal quantities of the nutrients **Theory** Introduction: Food, nutrients, nutrition, malnutrition - global and local scenario, diet, balanced diet, food groups, foundations of healthy diet, meal planning; Water: Functions, regulation in body, dietary requirements, electrolytes and acid-base balance; Carbohydrates: Types, role in body, dietary fiber, basal metabolic rate bulk and alternative sweeteners, recommended intake and energy value; Fats and oils: Types, functions, biosynthesis, recommendations concerning fat intake, fat substitutes; Proteins: Amino acids, protein synthesis and degradation, classification, functions, quality of proteins, dietary requirements; Vitamins: Classification, types, sources, role in body; Mineral elements: Types, requirements, sources, role in body; Digestion: Alimentary tract, digestive juices, secretions; Absorption and metabolism of nutrients: Carbohydrates, protein, lipids; Nutrient and dietary deficiency disorders. **Suggested Readings** 1. Awan, J.A. 2020. Elements of Food and Nutrition. Unitech Communications, Faisalabad, Pakistan. 2. Bamji, M.S., K. Krishnaswamy and G.N.V. Brahmam. 2019. Textbook of Human Nutrition. 4th Ed. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, India. 3. Geissler, C. and H. Powers. 2017. Human Nutrition. 13th Ed. Oxford University Press, Oxford, UK. 4. Lanham-New, S.A., T.R. Hill, A.M. Gallagher and H.H. Vorster. 2019. Introduction to Human Nutrition. 3rd Ed. John Wiley & Sons Ltd., The Atrium, Chichester, West Sussex, UK.

	5. Mann, J. and A.S. 2017. Truswell. Essentials of Human Nutrition. 5th Ed. Oxford University Press, Oxford, UK.
FST-301 ESSENTIALS OF FOOD SCIENCE AND TECHNOLOGY 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the knowledge of food processing and preservation techniques. 2. Demonstrate the food sources and their status. 3. Know the food constituents and their behaviour during the processing. 4. Learn practically about the processing and preservation techniques of food products. **Theory** Introduction: Food science and technology, food processing and preservation; Food safety and security; Food sources and global food situation; Food constituents and their functions: Water, carbohydrates, lipids, proteins, vitamins and minerals; Food classification based on perishability and pH; Spoilage agents in food: Enzymes, microorganisms, insects, rodents, birds and physical factors; Principles of food preservation; Preparatory operations in food processing; Food preservation techniques: High temperature: Pasteurization, sterilization and canning; Low temperature: Refrigeration and freezing; Removal of moisture: Drying and dehydration; Use of chemical additives; Fermentation techniques: Alcoholic, acetic and lactic; Irradiation technology; Food packaging and labelling. **Practical** Bottling/canning of selected fruits and vegetables; Dehydration of fruits and vegetables; Blanching of fruits and vegetables; Preparation and evaluation of various fruit/vegetable products: jams, jellies, squashes, syrups, juices, pickles; Production of vinegar. **Suggested Readings** 1. Awan, J.A. 2000. Food Science and Technology. Unitech Communications, Faisalabad, Pakistan. 2. Awan, J.A. 2020. Food Processing and Preservation. Unitech Communications, Faisalabad, Pakistan. 3. Raheem, M.I.U and R. M. Aadil. 2019. Practical Manual for: Fruits and Vegetable Processing and Preservation. Pak TM Printers, Faisalabad. 4. Rehman, M.S. 2007. Handbook of Food Preservation. CRC Press Taylor & Francis Group, Boca Raton, FL, USA. Zahoor, T. and M.S. Butt. 2017. Handbook of Food	**FST-301 ESSENTIALS OF FOOD SCIENCE AND TECHNOLOGY 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the knowledge of food processing and preservation techniques. 2. Demonstrate the food sources and their status. 3. Know the food constituents and their behaviour during the processing. 4. Learn practically about the processing and preservation techniques of food products. **Theory** Introduction: Food science and technology, food processing and preservation; Food safety and security; Food sources and global food situation; Food constituents and their functions: Water, carbohydrates, lipids, proteins, vitamins and minerals; Food classification based on perishability and pH; Spoilage agents in food: Enzymes, microorganisms, insects, rodents, birds and physical factors; Principles of food preservation; Preparatory operations in food processing; Food preservation techniques: High temperature: Pasteurization, sterilization and canning; Low temperature: Refrigeration and freezing; Removal of moisture: Drying and dehydration; Use of chemical additives; Fermentation techniques: Alcoholic, acetic and lactic; Irradiation technology; Food packaging and labelling. **Practical** Bottling/canning of selected fruits and vegetables; Dehydration of fruits and vegetables; Blanching of fruits and vegetables; Preparation and evaluation of various fruit/vegetable products: jams, jellies, squashes, syrups, juices, pickles; Production of vinegar. **Suggested Readings** 1. Awan, J.A. 2000. Food Science and Technology. Unitech Communications, Faisalabad, Pakistan.. **2.** Raheem, M.I.U and R. M. Aadil. 2019. Practical Manual for: Fruits and Vegetable Processing and Preservation. Pak TM Printers, Faisalabad. 3. Rehman, M.S. 2007. Handbook of Food Preservation. CRC Press Taylor & Francis Group, Boca Raton, FL, USA. 4. Zahoor, T. and M.S. Butt. 2017. Handbook of Food Science and Technology. University of Agriculture, Faisalabad, Pakistan.

Science and Technology. University of Agriculture, Faisalabad, Pakistan.	
BIOCHEM-301 ELEMENTARY BIOCHEMISTRY 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the knowledge of buffers and will also be able to learn its preparation practically. 2. Learn the basic knowledge about enzymes. 3. Describe the basics of major biomolecules like carbohydrates, lipids, proteins and nucleic acids. 4. Formulate the qualitative/quantitative analysis of biological molecules that are also nutritional important like carbohydrates, proteins, lipids, etc. **Theory** An introduction to science of biochemistry; Ionization of water, weak acid and weak bases, pH, buffers, characteristics of buffer, diffusion, osmosis and osmatic pressure; Enzymes: Classification, nomenclature, characteristics, coenzymes, cofactors and prosthetic groups, mechanism of enzyme action, enzyme inhibition; Carbohydrates: Classification, characteristics, aerobic and anaerobic oxidation of glucose, biological functions of carbohydrates; Lipids: Composition and classification, structure of saturated and unsaturated fatty acids and their properties, characteristics of fats and oils, general metabolism of fats and oils; Proteins: Composition and classification, characteristics and classification of amino acids, peptides and levels of structural organization of proteins, physiological function and general metabolism of proteins; Nucleic acids: Chemical composition, structure of DNA and RNA, functions of DNA and different types of RNA in the cell. **Practical** Documentation of pH value of different biological fluids; Preparation of buffers of definite pH; Estimation of optical activity by polarimetry; Qualitative analysis of carbohydrates; Qualitative analysis of urine for normal and abnormal constituents - albumins, acetone bodies and sugar; Estimation of glucose in biological fluids; Determination of acid, saponification and iodine values of fats/oils; Estimation of lactose and casein in milk. **Suggested Readings** 1. Ahmad, M. 2019. Essentials of Medical Biochemistry, Vol-I. 9th Ed. Nishtar Publications Press, Multan, Pakistan. 2. Boyer, R. F. 2012. Modern Experimental Biochemistry, 4th Ed. Pearson Education, NJ, USA. 3. Nelson, D.L. and M.M. Cox. 2021. Lehninger Principles of Biochemistry. 8th Ed. WH Freeman	**BIOCHEM-301 ELEMENTARY BIOCHEMISTRY 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the knowledge of buffers and will also be able to learn its preparation practically. 2. Learn the basic knowledge about enzymes. 3. Describe the basics of major biomolecules like carbohydrates, lipids, proteins and nucleic acids. 4. Formulate the qualitative/quantitative analysis of biological molecules that are also nutritional important like carbohydrates, proteins, lipids, etc. **Theory** An introduction to science of biochemistry; Ionization of water, weak acid and weak bases, pH, buffers, characteristics of buffer, diffusion, osmosis and osmatic pressure; Enzymes: Classification, nomenclature, characteristics, coenzymes, cofactors and prosthetic groups, mechanism of enzyme action, enzyme inhibition; Carbohydrates: Classification, characteristics, aerobic and anaerobic oxidation of glucose, biological functions of carbohydrates; Lipids: Composition and classification, structure of saturated and unsaturated fatty acids and their properties, characteristics of fats and oils, general metabolism of fats and oils; Proteins: Composition and classification, characteristics and classification of amino acids, peptides and levels of structural organization of proteins, physiological function and general metabolism of proteins; Nucleic acids: Chemical composition, structure of DNA and RNA, functions of DNA and different types of RNA in the cell. **Practical** Documentation of pH value of different biological fluids; Preparation of buffers of definite pH; Estimation of optical activity by polarimetry; Qualitative analysis of carbohydrates; Qualitative analysis of urine for normal and abnormal constituents - albumins, acetone bodies and sugar; Estimation of glucose in biological fluids; Determination of acid, saponification and iodine values of fats/oils; Estimation of lactose and casein in milk. **Suggested Readings** 1. Ahmad, M. 2019. Essentials of Medical Biochemistry, Vol-I. 9th Ed. Nishtar Publications Press, Multan, Pakistan. 2. Boyer, R. F. 2012. Modern Experimental Biochemistry, 4th Ed. Pearson Education, NJ, USA. 3. Nelson, D.L. and M.M. Cox. 2021. Lehninger Principles of Biochemistry. 8th Ed. WH Freeman

& Company, NY, USA. 4. Rodwell, V.W., D. A. Bender, K.M. Botham, P.J. Kennelly, V. Rodwell and P.A. Weil. 2018. 2022. Harper's Illustrated Biochemistry. 32nd Ed. The McGraw-Hill Education, USA. 5. Sawhney, C.K. and R. Singh. 2014. Introductory Practical Biochemistry. 5th Ed. Norosa Pub. House, New Delhi, India	& Company, NY, USA. 4. Rodwell, V.W., D. A. Bender, K.M. Botham, P.J. Kennelly, V. Rodwell and P.A. Weil. 2018. 2022. Harper's Illustrated Biochemistry. 32nd Ed. The McGraw-Hill Education, USA. 5. Sawhney, C.K. and R. Singh. 2014. Introductory Practical Biochemistry. 5th Ed. Norosa Pub. House, New Delhi, India
AGR-301 BASIC AGRICULTURE 3(1-2) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe and narrate the significance of agriculture in the economy and rural livelihood. 2. Recognize the influence of different climatic variables on crop production. 3. Develop an understanding of the land and water resources of Pakistan. 4. Comprehend the principles of agronomy for sustainable crop production. **Theory** Introduction to agriculture: importance, branches, and allied sciences; Salient features of Pakistan's agriculture; Climatic diversity and its impact on crop production; Land and water resources; Canal irrigation system; Principles, and practical framework of Agronomy in agriculture: tillage, seed, crop nutrition, irrigation management, crop protection, and harvesting; Major constraints limiting crop productivity in the country; Agriculture as a resource base for agro-industry-scope and opportunities. **Practical** Systems of land measurement; Demonstration of basic practices in crop production (tillage, sowing, weeding, irrigation, fertilizers, and harvesting) with emphasis on mechanized farming; Methods of soil moisture determination; Calculation of nutrient cum fertilizer unit value; Demonstration of various instruments for recording weather data; Use of conventional tools and implements; Visits of university/progressive farms. **Suggested Readings** 1. Arnon, I. 1992. Agriculture in Dry Lands-Principles and Practices. Elsevier, Amsterdam, the Netherlands. 2. Chandrasekran, B., K. Annadurai and E. Somasundaram. 2010. A Textbook of Agronomy. New Age International Ltd. Publishers, New Delhi, India. 3. Martin, J.H. R.P. Waldren and D.L. Stamp. 2006.	**AGR-301 BASIC AGRICULTURE 3(1-2)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe and narrate the significance of agriculture in the economy and rural livelihood. 2. Recognize the influence of different climatic variables on crop production. 3. Develop an understanding of the land and water resources of Pakistan. 4. Comprehend the principles of agronomy for sustainable crop production. **Theory** Introduction to agriculture: importance, branches, and allied sciences; Salient features of Pakistan's agriculture; Climatic diversity and its impact on crop production; Land and water resources; Canal irrigation system; Principles, and practical framework of Agronomy in agriculture: tillage, seed, crop nutrition, irrigation management, crop protection, and harvesting; Major constraints limiting crop productivity in the country; Agriculture as a resource base for agro-industry-scope and opportunities. **Practical** Systems of land measurement; Demonstration of basic practices in crop production (tillage, sowing, weeding, irrigation, fertilizers, and harvesting) with emphasis on mechanized farming; Methods of soil moisture determination; Calculation of nutrient cum fertilizer unit value; Demonstration of various instruments for recording weather data; Use of conventional tools and implements; Visits of university/progressive farms. **Suggested Readings** 1. Arnon, I. 1992. Agriculture in Dry Lands-Principles and Practices. Elsevier, Amsterdam, the Netherlands. 2. Chandrasekran, B., K. Annadurai and E. Somasundaram. 2010. A Textbook of Agronomy. New Age International Ltd. Publishers, New Delhi, India. **3.** Martin, J.H. R.P. Waldren and D.L. Stamp. 2006.

Principles of Field Crop Production. 4th Ed., the McMillan Co., NY, USA. Reddy, G.H.S. and T.Y. Reddy. 2020. Principles of Agronomy. Kalyani Publishers, New Delhi, India.	Principles of Field Crop Production. 4th Ed., the McMillan Co., NY, USA. **4.** Reddy, G.H.S. and T.Y. Reddy. 2020. Principles of Agronomy. Kalyani Publishers, New Delhi, India.
AGR-304 WEED CONTROL METHODS 3(1-2) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Identify various weeds and describe the damage caused by weeds. 2. Practice various methods of weed control. 3. Classify various herbicides on the basis of their use and applicability. 4. Calculate the herbicide dose and calibrate/determine volume of spray for weed control. **Theory** Losses caused by weeds; Classification of weeds; Weeds of major field crops; Methods of weed control: cultural, physical, mechanical, organic, biological and chemical; Herbicide classification; Harmful effects of chemical weed control; Safety consideration in weed control. **Practical** Identification of important weeds; Demonstration of weed control methods: physical, cultural, mechanical, and chemical; Herbicide application and calibration of sprayer; Herbicide dosage calculation. **Suggested Readings** 1. Anderson, W.P. 2007. Weed Science: Principles and Applications. 4th Ed. Waveland Press Inc., Illinois, USA. 2. Chauhan, B.S. 2021. Biology and Management of Problematic Crop Weed Species. Academic Press, NY, USA. 3. Kumar, R.J. and R. Jagannathan. 2007. Weed Science Principles. Kalyani Pub., New Delhi, India. 4. Walia, U.S. 2014. Weed Management. Kalyani Pub., Ludhiana, India. 1. Zimdhal, R. 2013. Fundamentals of Weed Science. 4th Ed. Academic Press, NY, USA.	**AGR-304 WEED CONTROL METHODS 3(1-2)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Identify various weeds and describe the damage caused by weeds. 2. Practice various methods of weed control. 3. Classify various herbicides on the basis of their use and applicability. 4. Calculate the herbicide dose and calibrate/determine volume of spray for weed control. **Theory** Losses caused by weeds; Classification of weeds; Weeds of major field crops; Methods of weed control: cultural, physical, mechanical, organic, biological and chemical; Herbicide classification; Harmful effects of chemical weed control; Safety consideration in weed control. **Practical** Identification of important weeds; Demonstration of weed control methods: physical, cultural, mechanical, and chemical; Herbicide application and calibration of sprayer; Herbicide dosage calculation. **Suggested Readings** 1. Anderson, W.P. 2007. Weed Science: Principles and Applications. 4th Ed. Waveland Press Inc., Illinois, USA. 2. Chauhan, B.S. 2021. Biology and Management of Problematic Crop Weed Species. Academic Press, NY, USA. 3. Kumar, R.J. and R. Jagannathan. 2007. Weed Science Principles. Kalyani Pub., New Delhi, India. 4. Walia, U.S. 2014. Weed Management. Kalyani Pub., Ludhiana, India. 5. Zimdhal, R. 2013. Fundamentals of Weed Science. 4th Ed. Academic Press, NY, USA.
ENG-313 FUNCTIONAL ENGLISH 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Apply the enhanced English communication skills through effective use of word choices, grammar and sentence structure. 2. Demonstrate an understating a variety of literary/non-literary written and spoken texts in	**ENG-313 FUNCTIONAL ENGLISH 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Apply the enhanced English communication skills through effective use of word choices, grammar and sentence structure. 2. Demonstrate an understating a variety of literary/non-literary written and spoken texts in

English. 3. Effectively express information, ideas and opinions in written and spoken English. 4. Recognize inter-cultural variations in the use of English language and to effectively adapt their communication style and content based on diverse cultural and social context.	English. 3. Effectively express information, ideas and opinions in written and spoken English. Recognize inter-cultural variations in the use of English language and to effectively adapt their communication style and content based on diverse cultural and social context
Theory Foundations of functional English; Vocabulary building: Contextual usage, synonyms, antonyms and idiomatic expressions; Communicative Grammar: Subject-verb agreement, verb tenses, fragments, run-ons, modifiers, articles and word classes; Word Formation: Affixation, compounding, clipping, back-formation; Sentence Structure: Simple, compound, complex and compound-complex; Sound Production And Pronunciation; Comprehension and analysis; Understanding Purpose, audience and context; Contextual Interpretation: Tone, biases, stereotypes, assumptions, inferences; Reading Strategies: Skimming, scanning, SQ4R and critical reading; Active Listening: Overcoming listening barriers, focused listening; Effective Communication: Principles of Communication: Clarity, coherence, conciseness, courtesy, courteousness, correctness, concreteness; Structuring Documents: Introduction, body, conclusion and formatting; Inclusivity In Communication: Gender-neutral language, stereotypes and cross cultural communication; Public Speaking: Overcoming stage fright, voice modulation and body language; Presentation Skills: Organizing content, visual aids and engaging the audience; Informal Communication: Small talk, networking and conversation skills; Professional Writing: Business Emails, memos, reports and formal letters.	**Theory** Foundations of functional English; Vocabulary building: Contextual usage, synonyms, antonyms and idiomatic expressions; Communicative Grammar: Subject-verb agreement, verb tenses, fragments, run-ons, modifiers, articles and word classes; Word Formation: Affixation, compounding, clipping, back-formation; Sentence Structure: Simple, compound, complex and compound-complex; Sound Production And Pronunciation; Comprehension and analysis; Understanding Purpose, audience and context; Contextual Interpretation: Tone, biases, stereotypes, assumptions, inferences; Reading Strategies: Skimming, scanning, SQ4R and critical reading; Active Listening: Overcoming listening barriers, focused listening; Effective Communication: Principles of Communication: Clarity, coherence, conciseness, courtesy, courteousness, correctness, concreteness; Structuring Documents: Introduction, body, conclusion and formatting; Inclusivity In Communication: Gender-neutral language, stereotypes and cross cultural communication; Public Speaking: Overcoming stage fright, voice modulation and body language; Presentation Skills: Organizing content, visual aids and engaging the audience; Informal Communication: Small talk, networking and conversation skills; Professional Writing: Business Emails, memos, reports and formal letters.
Suggested Readings 1. Murphy. R. 2019. English grammar in use 5th Ed. Cambridge University Press, USA. 2. Straus, J. 2014.The blue book of grammar and punctuation. Jossey-Bass, San Francisco. 3. Hutchinson, T. and Waters. A. 2018. English for specific purposes are learning centre approach. Cambridge University Press. 4. Downes. D. 2013. Cambridge English for job hunting. Cambridge University Press. 5. Varma, J.P. and Raman, M. 2019. Communication Skills for Business Professionals.	**Suggested Readings** 1. Murphy. R. 2019. English grammar in use 5th Ed. Cambridge University Press, USA. 2. Straus, J. 2014.The blue book of grammar and punctuation. Jossey-Bass, San Francisco. 3. Hutchinson, T. and Waters. A. 2018. English for specific purposes are learning centre approach. Cambridge University Press. 4. Downes. D. 2013. Cambridge English for job hunting. Cambridge University Press. 5. Varma, J.P. and Raman, M. 2019. Communication Skills for Business

Cambridge University Press.	Professionals. Cambridge University Press.
CS-305 APPLICATIONS OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) 3(2-1)	**CS-305 APPLICATIONS OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) 3(2-1)**
Course Learning Outcomes By the end of this course, students will be able to: 1. Explain the fundamental concepts, components and scope of Information and Communication Technologies (ICT). 2. Describe uses of various ICT platforms and tools for different purposes. 3. Apply ICT platforms and tools for different purpose to address basic needs in different domains of daily, academic and professional life. 4. Demonstrate the ethical and legal considerations in use of ICT platforms and tools.	**Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the fundamental concepts, components and scope of Information and Communication Technologies (ICT). 2. Describe uses of various ICT platforms and tools for different purposes. 3. Apply ICT platforms and tools for different purpose to address basic needs in different domains of daily, academic and professional life. 4. Demonstrate the ethical and legal considerations in use of ICT platforms and tools.
Theory Introduction to Information and communication technology: Components of Information and communication technologies; Basics of hardware, software, ICT platforms, networks, local and cloud data storage; Scope of Information and communication technologies: Use of ICT in education business, Governance, healthcare, digital media and entertainment; Emerging technologies and future trends; Basic ICT productivity tools: Effective use of popular search engines (e.g. Google, Bing, etc.); Formal communication tools, and etiquettes (Gmail, Microsoft Outlook, etc.); Microsoft Office Suites: Word, excel, power point; Google Workspace: Google Docs, Sheets, slides; Dropbox; Cloud storage and file sharing, Google Drive: Cloud storage with Google Docs integration; Evernote: Note-taking and organization applications; OneNote; Video conferencing: Google Meet, microsoft teams, Zoom; Social media applications: Linkedin, facebook, instagram; ICT in Education: Learning Management Systems: Moodle, canvas, google classrooms; Sources of online education courses: Coursera, edX, udemy, khan academy; Interactive multimedia and virtual classroom; ICT in Health and well-being: Health and fitness tracking devices and applications: Google Fit, samsung health, apple health, xiaomi mi band, runkeeper; telemedicine and online health consultation: OLADOC, sehat kahani, marham; ICT in Personal Finance and Shopping: Online banking and financial management tools: JazzCash, easypaisa, zong paymax, 1 LINK and MNET, keenu Wallet; E-Commerce platforms: Daraz.pk, telemart, shophive; Digital Citizenship and Online Etiquette:	**Theory** Introduction to Information and communication technology: Components of Information and communication technologies; Basics of hardware, software, ICT platforms, networks, local and cloud data storage; Scope of Information and communication technologies: Use of ICT in education business, Governance, healthcare, digital media and entertainment; Emerging technologies and future trends; Basic ICT productivity tools: Effective use of popular search engines (e.g. Google, Bing, etc.); Formal communication tools, and etiquettes (Gmail, Microsoft Outlook, etc.); Microsoft Office Suites: Word, excel, power point; Google Workspace: Google Docs, Sheets, slides; Dropbox; Cloud storage and file sharing, Google Drive: Cloud storage with Google Docs integration; Evernote: Note-taking and organization applications; OneNote; Video conferencing: Google Meet, microsoft teams, Zoom; Social media applications: Linkedin, facebook, instagram; ICT in Education: Learning Management Systems: Moodle, canvas, google classrooms; Sources of online education courses: Coursera, edX, udemy, khan academy; Interactive multimedia and virtual classroom; ICT in Health and well-being: Health and fitness tracking devices and applications: Google Fit, samsung health, apple health, xiaomi mi band, runkeeper; telemedicine and online health consultation: OLADOC, sehat kahani, marham; ICT in Personal Finance and Shopping: Online banking and financial management tools: JazzCash, easypaisa, zong paymax, 1 LINK and MNET, keenu Wallet; E-Commerce platforms: Daraz.pk, telemart, shophive; Digital Citizenship and Online Etiquette:

Digital Identity and online reputation; Netiquette and respectful online communication; Cyberbullying and online harassment; Ethical Considerations in Use of ICT Platforms and Tools: Intellectual property and copyright issues; Ensuring originality in content creation by avoiding plagiarism and unauthorized use of information sources; Content accuracy and integrity. **Practical** Working with office productivity tools: working with MS-word: creating files, editing, formatting, layout, working with MS-excel: creating worksheet, applying formula, Math and Stat Functions; working with MS power point: creating power point slides, animations, transitions; Creating, managing and organizing files and folders on local and cloud storage systems: using Google drive and one-drive; Working with Communication tools: Internet, use of different search engines; searching and surfing; Email clients; Instant messaging and collaboration platforms; Working with collaboration tools: working with document sharing and collaboration platforms; using online learning management system: access courses materials; submit assignments on LMS; participating in discussion forums; taking quizzes and tests. **Suggested Readings** 1. Evans, A., K. Martin and M.A. Poatsy. 2021. Technology in Action. 17th Edition, Pearson Publishers. 2. Gaskin, S., A. Vargas and C. McLellan. 2021. GO! with Microsoft Office. 1st Edition, Pearson Publishers. 3. Morley, D. and C.S. Parker. 2016. Understanding Computers: Today and Tomorrow, Comprehensive. 16th Edition, Cengage Leaning, USA. 4. Poatsy, M.A., K. Mulbery, C. Krebs, L. Hogan, E. Cameron, J. Davidson, L. Lau, R. Lawson, R. Lawson, J. Williams and R. Grauer. 2016. Exploring Microsoft Office. 1st Edition, Pearson. 5. Vermat, M.E., S.L. Sebok, S.M. Freund, J.T. Campbell and M. Frydenberg. 2018. Discovering Computers 2018 Digital Technology, Data, and Devices. Cengage Learning, USA.	Digital Identity and online reputation; Netiquette and respectful online communication; Cyberbullying and online harassment; Ethical Considerations in Use of ICT Platforms and Tools: Intellectual property and copyright issues; Ensuring originality in content creation by avoiding plagiarism and unauthorized use of information sources; Content accuracy and integrity. **Practical** Working with office productivity tools: working with MS-word: creating files, editing, formatting, layout, working with MS-excel: creating worksheet, applying formula, Math and Stat Functions; working with MS power point: creating power point slides, animations, transitions; Creating, managing and organizing files and folders on local and cloud storage systems: using Google drive and one-drive; Working with Communication tools: Internet, use of different search engines; searching and surfing; Email clients; Instant messaging and collaboration platforms; Working with collaboration tools: working with document sharing and collaboration platforms; using online learning management system: access courses materials; submit assignments on LMS; participating in discussion forums; taking quizzes and tests. **Suggested Readings** 1. Evans, A., K. Martin and M.A. Poatsy. 2021. Technology in Action. 17th Edition, Pearson Publishers. 2. Gaskin, S., A. Vargas and C. McLellan. 2021. GO! with Microsoft Office. 1st Edition, Pearson Publishers. 3. Morley, D. and C.S. Parker. 2016. Understanding Computers: Today and Tomorrow, Comprehensive. 16th Edition, Cengage Leaning, USA. 4. Poatsy, M.A., K. Mulbery, C. Krebs, L. Hogan, E. Cameron, J. Davidson, L. Lau, R. Lawson, R. Lawson, J. Williams and R. Grauer. 2016. Exploring Microsoft Office. 1st Edition, Pearson. 5. Vermat, M.E., S.L. Sebok, S.M. Freund, J.T. Campbell and M. Frydenberg. 2018. Discovering Computers 2018 Digital Technology, Data, and Devices. Cengage Learning, USA.
TGM-301 TUTORIAL GROUP MEETING FOR SOFT SKILLS	**TGM-301 TUTORIAL GROUP MEETING FOR SOFT SKILLS**
Second Semester	
HND-302 MACRONUTRIENTS IN HUMAN NUTRITION 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to:	**HND-302 MACRONUTRIENTS IN HUMAN NUTRITION 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to:

1. Describe the functional roles of macronutrients in human nutrition.
2. Discuss deficiency symptoms and health disorders associated with improper intake of macronutrients.
3. Explain regulation of metabolic homeostasis in the intact organism.
4. Demonstrate the understanding about the role of diet on current and future health.

Theory

Carbohydrates: Nature, structures; Classification and functions of carbohydrates: Mono-, di-, oligo & -poly-saccharides; Digestion, absorption and storage of carbohydrates: Glycolytic pathway, glycolysis, glycogenesis, glycogen catabolism, tricarboxylic acid cycle and pentose phosphate pathway; Biosynthesis of carbohydrates: Gluconeogenesis; Regulation of carbohydrate metabolism pathways; CH_2O metabolism in diabetes; Proteins: Structural features, characteristics, functions; Dynamic, catalytic and fibrous protein; Amino acids: Biosynthesis and degradation, food sources (on the basis of their functions in human body); Digestion and absorption; Metabolic fates of amino acids: Deamination, transamination, urea cycle, ketogenic amino acids, glucogenic amino acids, protein metabolism in liver and kidney diseases, protein energy malnutrition; Lipids – nature, classification; Fatty acids: types; Lipoprotein systems; Fats biosynthesis: Lipids, phospholipids and sphingolipids; Lipid biosynthesis: Cholesterol, sterol; lipid oxidation; Digestion, absorption, metabolism and transportation of lipids; Oxidation of fatty acids (beta oxidation); Ketone bodies; Macronutrients in daily life, balancing macronutrients for optimal health.

Suggested Readings

1. Berdanier, C.D. and J. Zempleni. 2009. Advances Nutrition: Macronutrients, Micronutrients and Metabolism. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.
2. Byrd-Bredbenner, C., G. Moe, D. Beshgetoor and J. Berning. 2015. Wardlaw's Perspectives in Nutrition. 10th Ed. McGraw-Hill Education, Columbus, OH, USA.
3. Dustin, M.2020. Macronutrient Basics - Your Guide to the Essentials of Macronutrients and How a Macro Diet Can Work for You. Simon & Schuster, Inc., NY, USA.
4. Gropper, S.S. and J.L. Smith. 2021. Advanced Nutrition and Human Metabolism. 8th Ed. Cengage Learning, Belmont, CA, USA.
5. Nelson, D.L. and M.M. Cox. 2021. Lehninger Principles of Biochemistry. 8th Ed. W.H. Freeman and Company, NY. USA.

1. Describe the functional roles of macronutrients in human nutrition.
2. Discuss deficiency symptoms and health disorders associated with improper intake of macronutrients.
3. Explain regulation of metabolic homeostasis in the intact organism.
4. Demonstrate the understanding about the role of diet on current and future health.

Theory

Carbohydrates: Nature, structures; Classification and functions of carbohydrates: Mono-, di-, oligo & -poly-saccharides; Digestion, absorption and storage of carbohydrates: Glycolytic pathway, glycolysis, glycogenesis, glycogen catabolism, tricarboxylic acid cycle and pentose phosphate pathway; Biosynthesis of carbohydrates: Gluconeogenesis; Regulation of carbohydrate metabolism pathways; CH_2O metabolism in diabetes; Proteins: Structural features, characteristics, functions; Dynamic, catalytic and fibrous protein; Amino acids: Biosynthesis and degradation, food sources (on the basis of their functions in human body); Digestion and absorption; Metabolic fates of amino acids: Deamination, transamination, urea cycle, ketogenic amino acids, glucogenic amino acids, protein metabolism in liver and kidney diseases, protein energy malnutrition; Lipids – nature, classification; Fatty acids: types; Lipoprotein systems; Fats biosynthesis: Lipids, phospholipids and sphingolipids; Lipid biosynthesis: Cholesterol, sterol; lipid oxidation; Digestion, absorption, metabolism and transportation of lipids; Oxidation of fatty acids (beta oxidation); Ketone bodies; Macronutrients in daily life, balancing macronutrients for optimal health.

Suggested Readings

1. Berdanier, C.D. and J. Zempleni. 2009. Advances Nutrition: Macronutrients, Micronutrients and Metabolism. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.
2. Byrd-Bredbenner, C., G. Moe, D. Beshgetoor and J. Berning. 2015. Wardlaw's Perspectives in Nutrition. 10th Ed. McGraw-Hill Education, Columbus, OH, USA.
3. Dustin, M.2020. Macronutrient Basics - Your Guide to the Essentials of Macronutrients and How a Macro Diet Can Work for You. Simon & Schuster, Inc., NY, USA.
4. Gropper, S.S. and J.L. Smith. 2021. Advanced Nutrition and Human Metabolism. 8th Ed. Cengage Learning, Belmont, CA, USA.
5. Nelson, D.L. and M.M. Cox. 2021. Lehninger Principles of Biochemistry. 8th Ed. W.H. Freeman and Company, NY. USA.

	Cengage Learning, Belmont, CA, USA. 6. Nelson, D.L. and M.M. Cox. 2021. Lehninger Principles of Biochemistry. 8th Ed. W.H. Freeman and Company, NY. USA.
HND-304/FST-304 GLOBAL FOOD ISSUES 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Apply the knowledge about global food issues having impact on food and nutrition security. 2. Describe the role of global organizations in food production, consumption and trade. 3. Demonstrate an understanding about the impact of climate change and other threats on global food availability. 4. Explain the global market of organic, functional, Kosher and Halal foods. **Theory** World food situation; Food and nutrition security; The green revolution: Worldwide post-harvest losses; Global malnutrition: protein energy malnutrition and hidden hunger, overweight & obesity, Worldwide food price fluctuations: Importance of per capita earning, consumption and purchase power; Irrational food consumption behavior; Contribution of cereals, legumes, roots, tubers and animal products; World food policy; WTO's trade regulations; Food bioterrorism; International food laws: European and American; Potentials of modern biotechnology to combat food insecurity; Genetically modified foods; Functional, organic, kosher and halal foods; Millennium development goals to sustainable development goals; Global trends; Climate change; COVID-19 Epidemic. **Suggested Readings** 1. Avery, M.L., B. Kreit and R. Falcon. 2020. Food Web 2020: Forces Shaping Future of Food. Institute for the Future. Palo Alto, CA, USA. 2. Barbosa-Canovas, G., A. Mortimer, D. Lineback, W. Spices, K. Buckle and P. Colonna. 2009. Global Issues in Food Science and Technology. Academic Press, Elsevier Inc., Burlington, MA, USA. 3. Hajra, M.A. 2013. Global Food Security: Emerging Issues and Economic Implications. Nova Science Publishers, NY, USA. 4. Shenggen, F., S. Yosef and R. Pandya-Lorch. 2019. Agriculture for Improved Nutrition: Seizing the Momentum. International Food Policy Research Institute (IFPRI), Washington, DC, USA. 5. Swinnen, J. and J. McDermott. 2020. COVID-19 and Global Food Security. International Food Policy Research Institute (IFPRI), Washington, DC, USA.	**Course Deleted**

New Course	**HND-304/ FST-304 Fundamentals of Food Systems 3(3-0)** **COURSE LEARNING OUTCOMES:** At the end of this course, students will be able to; 1. Define and explain the dimensions and determinants of food security. 2. Gain insights into historical overview, components and significance of sustainable food systems. 3. Evaluate impact of climate change, gender and youth mainstreaming on food, nutrition, and health 4. Understand Pakistan Food System Dashboard (PFSD) and its utilization for data acquisition 5. Examine global food issues, including malnutrition, food price fluctuations, and sustainable dietary practices **Theory** Food security: Definition, dimensions, and determinants of food and nutrition security; national and global food security trends; nutritional outcomes of food security; food security and human rights; youth and gender mainstreaming; regional challenges and disparities. Food systems: Overview, definition, components, and stakeholders of the food system; historical perspectives and pathways of food systems transformation; socioeconomic, technological, innovation, and policy drivers of food systems. Sustainable food systems: Definition and significance; components such as environment, innovation, technologies, and policies; conventional and sustainable food production practices; foods of plant and animal origin; food value chain including production, processing, and distribution; food losses and waste. Climate change: Basics of climate change; its impact on food, nutrition, and health; adaptation and mitigation strategies. Global food issues: Overview of world food situations and security challenges, including global malnutrition such as protein-energy malnutrition, hidden hunger, and obesity; worldwide post-harvest losses and food price fluctuations. Economic influences on food access, including income, consumption patterns, and purchasing power, are examined briefly, alongside irrational food consumption behaviors and their global implications. Functional, organic, kosher, and halal foods: Introduction to their global markets and relevance to food systems with a focus on sustainability and consumer preferences. Food system dashboards: Introduction and importance; components of food system dashboards and databases; global and national dashboards; data types, sources, and indicators; user interface elements, menus, filters; data visualization tools with hands-on practice. Emerging challenges: Overview of global trends and challenges,

	focusing on climate change and the impact of pandemics like COVID-19. **RECOMMENDED READINGS:** 1. **"Food Security and Nutrition".** Academic Press, Galanakis, C. M. (Ed.). (2020). 2. **Sustainable Food systems**. *Building a new paradigm, Earthscan from Routledge*. Marsden, T., & Morley, A. (2014). 3. Future Food Systems - Exploring Global Production, Processing, Distribution and Consumption (1st edition), Yada, R.Y., Acker, R.V., Scanlon, M., Gray, D. 2024. Academic Press. 4. **Pakistan Food System Dashboard**. Available at: https://www.foodsystemsdashboard.org/countries/pak; https://www.foodsystemsdashboard.org/ 5. **"Food Systems in an Unequal World:** Pesticides, Vegetables, and Agrarian Capitalism in Costa Rica" by Ryan E. Galt)
PHYSIO-401 HUMAN PHYSIOLOGY-I 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the basic principles of human body physiology. 2. Explain the functioning of various body systems. 3. Conduct analysis of body fluids for various biomarkers. 4. Interpret the findings of analysis against lab values. **Theory** Basic principles of human physiology and functional organizations; Homeostasis; Thermoregulation; Body fluids; Classification and functions; Regulation of acid base balance; Urinary system and its mechanisms of functioning; Functions of kidney and nephron, glomerular filtration, tubular reabsorption, tubular secretion, urine excretion and plasma clearance; The circulatory system; Hematology; Blood constituents and their functions; Blood groups; Blood clotting; Heart functions and control; Electrical activity of heart, mechanical events of heart, cardiac output and its control; Blood pressure; Effects of low and high blood pressure; Pathophysiology of anemia and thalassemia; Respiratory system: Respiratory mechanics, gas transport and exchange mechanisms, control of respiration, respiratory capacities and volumes, non-respiratory functions of lungs. **Practical** Blood typing; Hb estimation; Counting of blood cells; Complete blood count (CBC); Electrolyte estimation;	**PHYSIO-401 HUMAN PHYSIOLOGY-I 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the basic principles of human body physiology. 2. Explain the functioning of various body systems. 3. Conduct analysis of body fluids for various biomarkers. 4. Interpret the findings of analysis against lab values. **Theory** Basic principles of human physiology and functional organizations; Homeostasis; Thermoregulation; Body fluids; Classification and functions; Regulation of acid base balance; Urinary system and its mechanisms of functioning; Functions of kidney and nephron, glomerular filtration, tubular reabsorption, tubular secretion, urine excretion and plasma clearance; The circulatory system; Hematology; Blood constituents and their functions; Blood groups; Blood clotting; Heart functions and control; Electrical activity of heart, mechanical events of heart, cardiac output and its control; Blood pressure; Effects of low and high blood pressure; Pathophysiology of anemia and thalassemia; Respiratory system: Respiratory mechanics, gas transport and exchange mechanisms, control of respiration, respiratory capacities and volumes, non-respiratory functions of lungs. **Practical** Blood typing; Hb estimation; Counting of blood cells; Complete blood count (CBC); Electrolyte estimation;

Hydration test; Determination of coagulation time, determination of bleeding time, blood pressure, pulse recording; Respiratory movement; Maximum breathing capacity, pulmonary function test; Heart activity – electrocardiography; Tests for saliva; Intestinal motility; Renal function tests and urine analysis. **Suggested Readings** 1. Debasis, P. 2015. Principles of Physiology. 5th Ed. Jaypee Brothers Medical Publishers Pvt. Limited, New Delhi, India. 2. Ganong, W.F. 2019. Review of Medical Physiology. 26th Ed. McGraw Hill Professional Publishing, New York City, NY, USA. 3. Guyton, A.C. and J.E. Hall. 2021. Textbook of Medical Physiology. 14th Ed. W.B. Saunders Company, Philadelphia, PA, USA. 4. Moyes, C.D. and P.M. Schulte. 2015. Principles of Animal Physiology. 3rd Ed. New Delhi, India. 5. Sabyasachi, S. 2018. Principles of Medical Physiology. 2nd Ed. George Thieme Verlag, Stuttgart, Germany.	Hydration test; Determination of coagulation time, determination of bleeding time, blood pressure, pulse recording; Respiratory movement; Maximum breathing capacity, pulmonary function test; Heart activity – electrocardiography; Tests for saliva; Intestinal motility; Renal function tests and urine analysis. **Suggested Readings** 1. Debasis, P. 2015. Principles of Physiology. 5th Ed. Jaypee Brothers Medical Publishers Pvt. Limited, New Delhi, India. 2. Ganong, W.F. 2019. Review of Medical Physiology. 26th Ed. McGraw Hill Professional Publishing, New York City, NY, USA. 3. Guyton, A.C. and J.E. Hall. 2021. Textbook of Medical Physiology. 14th Ed. W.B. Saunders Company, Philadelphia, PA, USA. 4. Moyes, C.D. and P.M. Schulte. 2015. Principles of Animal Physiology. 3rd Ed. New Delhi, India. 5. Sabyasachi, S. 2018. Principles of Medical Physiology. 2nd Ed. George Thieme Verlag, Stuttgart, Germany.
ANAT-502 FUNDAMENTALS OF HUMAN ANATOMY 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate an understanding about the fundamental concepts of human body structure. 2. Differentiate various organs and systems of human body. 3. Describe the complete blood count. 4. Prepare and elaborate the microscopic structure of human body tissues and cells. **Theory** Introduction: Grass anatomy, histology; Terminology: Bones & joints, muscles, cartilage, body structure, tissue, cell, organs; Digestive system: Oral cavity, stomach, small & large intestine; Urinary system/ excretory: Kidneys, ureter, bladder, urethra; Cardio-vascular system: Heart and pericardium, arteries system, venous system/ major arteries & veins; Respiratory system: Upper respiratory - pharynx, larynx, trachea sinuses; Lower respiratory - bronchus, lungs, diaphragm; Reproduction system: Male-testis, spermatic cord, penis, prostate, bulbourethral gland/ other glands; Female: Ovaries, fallopian tubes, uterus, vagina, vulva, breast; Endocrinology: Pituitary, thyroid, parathyroid, thymus, adrenal, renal, super renal; Lymphatic system: Lymph, lymph vessel, lymph node; Nervous system: Brain, spinal cord, cranial nerves, brachial plexus, sciatic nerve; Sensory organs: Eyes, ears, taste buds, smell, touch.	**ANAT-502 FUNDAMENTALS OF HUMAN ANATOMY 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate an understanding about the fundamental concepts of human body structure. 2. Differentiate various organs and systems of human body. 3. Describe the complete blood count. 4. Prepare and elaborate the microscopic structure of human body tissues and cells. **Theory** Introduction: Grass anatomy, histology; Terminology: Bones & joints, muscles, cartilage, body structure, tissue, cell, organs; Digestive system: Oral cavity, stomach, small & large intestine; Urinary system/ excretory: Kidneys, ureter, bladder, urethra; Cardio-vascular system: Heart and pericardium, arteries system, venous system/ major arteries & veins; Respiratory system: Upper respiratory - pharynx, larynx, trachea sinuses; Lower respiratory - bronchus, lungs, diaphragm; Reproduction system: Male-testis, spermatic cord, penis, prostate, bulbourethral gland/ other glands; Female: Ovaries, fallopian tubes, uterus, vagina, vulva, breast; Endocrinology: Pituitary, thyroid, parathyroid, thymus, adrenal, renal, super renal; Lymphatic system: Lymph, lymph vessel, lymph node; Nervous system: Brain, spinal cord, cranial nerves, brachial plexus, sciatic nerve; Sensory organs: Eyes, ears, taste buds, smell, touch.

Practical Four primary tissues of body - epithelium tissues: types, epithelial glands - endocrine & exocrine, connective tissues: Loose connective tissue, collagenous, elastic and reticular fiber; T-cell of loose cartilage (fibroblast, fat cell, plasma cell, macrophages, mast cell); Blood: Leukocytes, WBC, RBC & Platelets; Cartilage and its types; Muscle and its types; Histology in GIT, respiratory, urinary systems, breast, uterus; Microscopy and preparation of histological slides. **Suggested Readings** 1. Agur, M.R. and F.D. Arthur. 2020. Grant's Atlas of Anatomy. 15th Ed. Lippincott Williams and Wilkins, NY, USA. 2. Eroschenko, V.P., 2012. diFiore's Atlas of Histology: with Functional Correlations. 12th Ed. Lippincott Williams and Wilkins, PA, USA. 3. Eroschenko, V.P. 2017. Atlas of Histology with Functional Correlations. 13th Ed. LWW, Philadelphia., USA. 4. Frederic, M., J. Nath and E. Bartholomew. 2017. Fundamentals of Anatomy & Physiology. 11th Ed. Pearson Publisher, London, UK. 5. Gerard, J. T. and T.N. Mark. 2016. Principles of Human Anatomy. 14th Ed. John Wiley and Sons, Inc., NY, USA.	**Practical** Four primary tissues of body - epithelium tissues: types, epithelial glands - endocrine & exocrine, connective tissues: Loose connective tissue, collagenous, elastic and reticular fiber; T-cell of loose cartilage (fibroblast, fat cell, plasma cell, macrophages, mast cell); Blood: Leukocytes, WBC, RBC & Platelets; Cartilage and its types; Muscle and its types; Histology in GIT, respiratory, urinary systems, breast, uterus; Microscopy and preparation of histological slides. **Suggested Readings** 1. Agur, M.R. and F.D. Arthur. 2020. Grant's Atlas of Anatomy. 15th Ed. Lippincott Williams and Wilkins, NY, USA. 2. Eroschenko, V.P., 2012. diFiore's Atlas of Histology: with Functional Correlations. 12th Ed. Lippincott Williams and Wilkins, PA, USA. 3. Eroschenko, V.P. 2017. Atlas of Histology with Functional Correlations. 13th Ed. LWW, Philadelphia., USA. **4.** Frederic, M., J. Nath and E. Bartholomew. 2017. Fundamentals of Anatomy & Physiology. 11th Ed. Pearson Publisher, London, UK. **5.** Gerard, J. T. and T.N. Mark. 2016. Principles of Human Anatomy. 14th Ed. John Wiley and Sons, Inc., NY, USA.
SSH-303 IDEOLOGY AND CONSTITUTION OF PAKISTAN 2(2-0) **Course Learning Outcomes (CLOs)** After completion of course, students will be able to: 1. Elaborate historical foundations of an ideological state. 2. Envision Pakistan's constitutional and political development. 3. Examine major issues rising from changing political realities. 4. Impart core constitutional rights. **Theory** Nation, nationalism, theocratic state, secular state, ideological foundations of Pakistan, All India Muslim League, Jinnah's political ideology, ideas of partition, constitution of Pakistan; constitutional deadlocks from 1947-1971, role of non state actors, 1973 constitution, amendments, fundamental rights, federal and provincial government structure. **Suggested Readings**	**SSH-303 IDEOLOGY AND CONSTITUTION OF PAKISTAN 2(2-0)** **Course Learning Outcomes (CLOs)** After completion of course, students will be able to: 1. Elaborate historical foundations of an ideological state. 2. Envision Pakistan's constitutional and political development. 3. Examine major issues rising from changing political realities. 4. Impart core constitutional rights. **Theory** Nation, nationalism, theocratic state, secular state, ideological foundations of Pakistan, All India Muslim League, Jinnah's political ideology, ideas of partition, constitution of Pakistan; constitutional deadlocks from 1947-1971, role of non state actors, 1973 constitution, amendments, fundamental rights, federal and provincial government structure. **Suggested Readings**

1. Ahmad, S.,2022, Ideology of Pakistan, National Institute of Historical and Cultural Research, Islamabad. 2. Farooq, B., 2023, Pakistan: A Historical and Contemporary Look, Oxford University Press, Karachi. 3. Hamid, K., 2022, Constitutional and Political History of Pakistan, Oxford University Press, Karachi. 4. Jabbar, J., 2022, Pakistan- Unique Origins; Unique Destiny, BPH Publishers, Lahore. 5. Zaka, A., 2022, Constitution of Islamic Republic of Pakistan, Oxford University Press, Lahore.	1.Ahmad, S.,2022, Ideology of Pakistan, National Institute of Historical and Cultural Research, Islamabad. 2.Farooq, B., 2023, Pakistan: A Historical and Contemporary Look, Oxford University Press, Karachi. 3.Hamid, K., 2022, Constitutional and Political History of Pakistan, Oxford University Press, Karachi. 4.Jabbar, J., 2022, Pakistan- Unique Origins; Unique Destiny, BPH Publishers, Lahore. 5.Zaka, A., 2022, Constitution of Islamic Republic of Pakistan, Oxford University Press, Lahore.
New Course	**PY-307 FUNDAMENTALS OF NATURAL SCIENCES 3(2-1)** **Course Learning Outcomes** By the end of this course students will be able to: 1. Describe various branches of Science, their underlying core ideas, and compare their applications. 2. Discuss about different renewable systems and devices. 3. Articulate the development of scientific thought and compare it to the modern scientific method. 4. Demonstration and practice application of the scientific method in the natural sciences. **Theory** Introduction to some key scientific advancements and role of Muslim Scientists; The modern scientific method; Introduction to areas/branches of science; Energy, its types and applications; Forces of nature; Science, technology and society; Diversity and classification of living organisms; Branches of life sciences; Evolution of life and geological time scale; Ecology; Climate change; The future of science and nanotechnology. **Practical** Introduction to the experimental laboratories of Physics, Chemistry and Biological Sciences; Use of various measurement equipment and meters in everyday life; Measurement of noise level; light intensity; Use of optical microscope; Basic chromatography; Visit of zoological museum to identify different taxa in kingdom animalia; Survey of plant diversity in herbarium. **Suggested Readings** 1. Bliss, D.W. 2021. Modern Communications: A

	Systematic Introduction. 1st Ed. Cambridge University Press, UK. 2. Carey, S. 2011. A Beginner's Guide to Scientific Method. 4th Ed. Clark Baxter, Boston, USA. 3. Farret, F.A., and M.G. Simoes. 2017. Integration of Alternative Sources of Energy, 2nd Ed. John Wiley and Sons, NJ, USA. 4. Trefil J. and R. M. Hazen. 2019. The Sciences: An Integrated Approach, 8th Ed. John Wiley & Sons Inc. New Jersy, USA. 5. Raymond, C. 2008. General Chemistry: The Essential Concepts, 5th Ed. McGraw-Hill, USA. 6. Twidell, J. 2021. Renewable Energy Resources, 4th Ed. Routledge. Taylor and Francis, NY, USA.
ENG-314 EXPOSITORY WRITING 3(3-0) **Course Learning Outcomes** By the end of the course, the students will be able to: 1. Demonstrate the essentials of the writing process integrating pre-writing, drafting, editing, and proof reading to produce well structured essays. 2. Demonstrate mastery of diverse expository types to address different purposes and audiences. 3. Uphold ethical practices to maintain originality in expository writing. 4. Demonstrate analytical writing skills to address various writing situations **Theory** Introduction to expository writing: Understanding expository writing: Definition, types, purpose and applications; Characteristics of effective expository writing: Clarity, coherence and organization; Introduction to paragraph writing; The writing process: Pre-writing techniques: Brainstorming, free writing, mind mapping, listing, questioning, and outlining etc.; Drafting: Three stage process of drafting techniques; Revising and editing: Ensuring correct grammar, clarity, coherence, conciseness etc.; Proof reading: Fine-tuning of the draft; Peer review and feedback: Providing and receiving critique; Essay organization and structure: Introduction and hook: Engaging readers and introducing the topic; Thesis statement: Crafting a clear and focused central idea; Body paragraphs: Topic sentences, supporting evidence and transitional devices; Conclusion: Types of concluding paragraphs and leaving an impact; Ensuring cohesion and coherence: Creating seamless connections between paragraphs; Different types of	**ENG-314 EXPOSITORY WRITING 3(3-0)** **Course Learning Outcomes** By the end of the course, the students will be able to: 1. Demonstrate the essentials of the writing process integrating pre-writing, drafting, editing, and proof reading to produce well structured essays. 2. Demonstrate mastery of diverse expository types to address different purposes and audiences. 3. Uphold ethical practices to maintain originality in expository writing. 4. Demonstrate analytical writing skills to address various writing situations **Theory** Introduction to expository writing: Understanding expository writing: Definition, types, purpose and applications; Characteristics of effective expository writing: Clarity, coherence and organization; Introduction to paragraph writing; The writing process: Pre-writing techniques: Brainstorming, free writing, mind mapping, listing, questioning, and outlining etc.; Drafting: Three stage process of drafting techniques; Revising and editing: Ensuring correct grammar, clarity, coherence, conciseness etc.; Proof reading: Fine-tuning of the draft; Peer review and feedback: Providing and receiving critique; Essay organization and structure: Introduction and hook: Engaging readers and introducing the topic; Thesis statement: Crafting a clear and focused central idea; Body paragraphs: Topic sentences, supporting evidence and transitional devices; Conclusion: Types of concluding paragraphs and leaving an impact; Ensuring cohesion and coherence: Creating seamless

expository writing: Description; Illustration; Classification; Cause and effect: Exploring causal relationships and outcomes; Process analysis: Explaining step-by-step procedures; Comparative analysis: analyzing similarities and differences; Writing for Specific purposes and audiences: Different types of purposes: To inform, to analyze, to persuade, to entertain etc.; Writing for academic audiences: Formality, objectivity, and academic conventions; Writing for public audiences: Engaging, informative and persuasive language; Different tones and styles for specific purposes and audiences; Ethical Considerations: Enduring original writing: Finding credible sources, evaluating information etc.; Proper citation and referencing: APA, MLA, or other citation styles; Integrating quotes and evidences: Quoting, paraphrasing, and summarizing; Avoiding plagiarism: Ethical considerations and best practices. **Suggested Readings** 1. Axlerod, R. B., Cooper, C. R. and Cleaves, W. 2022. The St. Martin's Guide to Writing. 13th Ed. . Bedford/St. Martin's. 2. Rosenwasser, D. and Stephen, J. 2018. Writing Analytically. 5th Ed. Cengage Learning. 3. Williams, J. M. and Bizup, J. 2013. Style: Lessons in Clarity and Grace. 11th Ed. Pearson. 4. E. B, White, W. S. and Angell, R. 1999. The Elements of Style.4th Ed. Longman Publishers. 5. Faigley, L. and Selzer, J. 2018. Good Reasons with Contemporary Arguments. 7th Ed. Pearson Publishers.	connections between paragraphs; Different types of expository writing: Description; Illustration; Classification; Cause and effect: Exploring causal relationships and outcomes; Process analysis: Explaining step-by-step procedures; Comparative analysis: analyzing similarities and differences; Writing for Specific purposes and audiences: Different types of purposes: To inform, to analyze, to persuade, to entertain etc.; Writing for academic audiences: Formality, objectivity, and academic conventions; Writing for public audiences: Engaging, informative and persuasive language; Different tones and styles for specific purposes and audiences; Ethical Considerations: Enduring original writing: Finding credible sources, evaluating information etc.; Proper citation and referencing: APA, MLA, or other citation styles; Integrating quotes and evidences: Quoting, paraphrasing, and summarizing; Avoiding plagiarism: Ethical considerations and best practices. **Suggested Readings** 1. Axlerod, R. B., Cooper, C. R. and Cleaves, W. 2022. The St. Martin's Guide to Writing. 13th Ed. . Bedford/St. Martin's. 2. Rosenwasser, D. and Stephen, J. 2018. Writing Analytically. 5th Ed. Cengage Learning. 3. Williams, J. M. and Bizup, J. 2013. Style: Lessons in Clarity and Grace. 11th Ed. Pearson. 4. E. B, White, W. S. and Angell, R. 1999. The Elements of Style.4th Ed. Longman Publishers. 5. Faigley, L. and Selzer, J. 2018. Good Reasons with Contemporary Arguments. 7th Ed. Pearson Publishers.
TGM-302 TUTORIAL GROUP MEETING FOR SOFT SKILLS	**TGM-302 TUTORIAL GROUP MEETING FOR SOFT SKILLS**
Third Semester	
HND-401 MICRONUTRIENTS IN HUMAN NUTRITION 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Familiarize with the role of micro-nutrients in human nutrition. 2. Discuss the absorption, digestion and metabolism of micronutrients in the human body. 3. Elaborate health disorders emerging due to	**HND-401 MICRONUTRIENTS IN HUMAN NUTRITION 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Familiarize with the role of micro-nutrients in human nutrition. 2. Discuss the absorption, digestion and metabolism of micronutrients in the human body.

consumption of non-optimal quantities of the micronutrient's nutrients. 4. Explain the functions and sources of vitamins and minerals. **Theory** Vitamins: Nomenclature, history, development of the vitamins concept; Fat and water soluble vitamins: Sources, chemistry, absorption, transport and storage, metabolism, function, deficiency, bioassay, interaction with other nutrients, recommended daily allowances and toxicities, diagnosis, treatments and prevention of vitamin deficiencies in human; Stability of vitamins under different storage conditions; Vitamin like compounds; Losses of vitamin during food processing; Minerals: Types, history and developments of the minerals concept; Criteria of essentiality of minerals and their classification; Minerals distribution in human body; Macro- and micro-minerals: Dietary sources, absorption, metabolism, metabolic function, deficiency symptoms and disorders, recommended daily allowances, diagnosis, treatments and prevention of mineral deficiencies in human; Nutraceutical and functional foods with special reference to micronutrients; Water and electrolytes. **Suggested Readings** 1. Allen, L. 2006. Guidelines on Food Fortification with Micronutrients. World Health Organization, Geneva, Switzerland. 2. Combs, Jr. G.F, and McClung, J.P. 2022. The Vitamins: Fundamental Aspects in Nutrition and Health. 6th Ed. The Boulevard, Langford Lane, Kidlington, Oxford, UK. 3. DiSilvestro, R.A. 2004. Handbook of Minerals as Nutritional Supplements. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 4. Gropper, S.S., J.L. Smith and T.P. Carr. 2021. Advanced Nutrition and Human Metabolism. 8th Ed. Wadsworth Cengage Learning, Belmont, CA, USA. 5. Medeiros, D.M. and Wildman, R.E.C. 2018. Advanced Human Nutrition. 4th Ed. Jones & Bartlett Learning, Burlington, MA, USA.	3. Elaborate health disorders emerging due to consumption of non-optimal quantities of the micronutrient's nutrients. **4.** Explain the functions and sources of vitamins and minerals. **Theory** Vitamins: Nomenclature, history, development of the vitamins concept; Fat and water soluble vitamins: Sources, chemistry, absorption, transport and storage, metabolism, function, deficiency, bioassay, interaction with other nutrients, recommended daily allowances and toxicities, diagnosis, treatments and prevention of vitamin deficiencies in human; Stability of vitamins under different storage conditions; Vitamin like compounds; Losses of vitamin during food processing; Minerals: Types, history and developments of the minerals concept; Criteria of essentiality of minerals and their classification; Minerals distribution in human body; Macro- and micro-minerals: Dietary sources, absorption, metabolism, metabolic function, deficiency symptoms and disorders, recommended daily allowances, diagnosis, treatments and prevention of mineral deficiencies in human; Nutraceutical and functional foods with special reference to micronutrients; Water and electrolytes. **Suggested Readings** 1. Allen, L. 2006. Guidelines on Food Fortification with Micronutrients. World Health Organization, Geneva, Switzerland. 2. Combs, Jr. G.F, and McClung, J.P. 2022. The Vitamins: Fundamental Aspects in Nutrition and Health. 6th Ed. The Boulevard, Langford Lane, Kidlington, Oxford, UK. 3. DiSilvestro, R.A. 2004. Handbook of Minerals as Nutritional Supplements. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 4. Gropper, S.S., J.L. Smith and T.P. Carr. 2021. Advanced Nutrition and Human Metabolism. 8th Ed. Wadsworth Cengage Learning, Belmont, CA, USA. 5. Medeiros, D.M. and Wildman, R.E.C. 2018. Advanced Human Nutrition. 4th Ed. Jones & Bartlett Learning, Burlington, MA, USA.
HND-403/FST-403 PUBLIC HEALTH NUTRITION 2(2-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the domain of public health nutrition. 2. Identify the role of health promotion and disease prevention in health care systems. 3. Devise and assess the public health nutrition programs, policies and strategies.	**HND-403/FST-403 PUBLIC HEALTH NUTRITION 2(2-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the domain of public health nutrition. 2. Identify the role of health promotion and disease prevention in health care systems. 3. Devise and assess the public health nutrition

4. Demonstrate the ability to conduct surveys for the assessment of prevailing health concerns and intervening for the improvement of health and nutrition. **Theory** Public health nutrition: Overview, concepts, determinants, foundations; Disease burden and its control; Health promotion and disease prevention; Modes of intervention, monitoring and surveillance; Safety and health at work place; Public health nutrition assessment and programs; Nutritional surveillance and growth monitoring; Public health policies and strategies; Marketing nutrition programs in public; Public health nutrition: a field of practice; Public health nutritionist: Competencies, responsibilities, duties, ethics. **Suggested Readings** 1. Edelstein, S. 2017. Nutrition in Public Health: A Handbook for Developing Programs and Services. 4th Ed. Jones & Bartlett Learning, Sudbury, M.A, USA. 2. Lawrence, M. and T. Worsley. 2020. Public Health Nutrition: From Principles to Practice. Allen & Unwin Book Publishers, Australia. 3. McKenzie, J.F. and R.R. Pinger. 2016. An Introduction to Community & Public Health. 9th Ed. Jones & Bartlett Learning, LLC Burlington, MA, USA. 4. Spark, A. 2015. Nutrition in Public Health: Principles, Policies and Practice. 2nd Ed. CRC Press, Taylor & Francis, Boca Raton, FL, USA. 5. Seabert, D., J.F. McKenzie and R.R. Pinger. 2021. McKenzie's An Introduction to Community & Public Health. Jones & Bartlett Learning, Sudbury, M.A, USA.	programs, policies and strategies. 4. Demonstrate the ability to conduct surveys for the assessment of prevailing health concerns and intervening for the improvement of health and nutrition. **Theory** Public health nutrition: Overview, concepts, determinants, foundations; Disease burden and its control; Health promotion and disease prevention; Modes of intervention, monitoring and surveillance; Safety and health at work place; Public health nutrition assessment and programs; Nutritional surveillance and growth monitoring; Public health policies and strategies; Marketing nutrition programs in public; Public health nutrition: a field of practice; Public health nutritionist: Competencies, responsibilities, duties, ethics. **Suggested Readings** 1. Edelstein, S. 2017. Nutrition in Public Health: A Handbook for Developing Programs and Services. 4th Ed. Jones & Bartlett Learning, Sudbury, M.A, USA. 2. Lawrence, M. and T. Worsley. 2020. Public Health Nutrition: From Principles to Practice. Allen & Unwin Book Publishers, Australia. 3. McKenzie, J.F. and R.R. Pinger. 2016. An Introduction to Community & Public Health. 9th Ed. Jones & Bartlett Learning, LLC Burlington, MA, USA. 4. Spark, A. 2015. Nutrition in Public Health: Principles, Policies and Practice. 2nd Ed. CRC Press, Taylor & Francis, Boca Raton, FL, USA. 5. Seabert, D., J.F. McKenzie and R.R. Pinger. 2021. McKenzie's An Introduction to Community & Public Health. Jones & Bartlett Learning, Sudbury, M.A, USA.
PHYSIO-402 HUMAN PHYSIOLOGY-II 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain inter-relationship of endocrine hormones, neuromuscular and reproductive systems. 2. Describe the inter play of immunity and principles of neuromuscular physiology. 3. Demonstrate an understanding about the location of glands and mechanism of action of various hormones. 4. Conduct analysis of hormonal of different body systems. **Theory** Endocrinology; Importance of hormones and their	**PHYSIO-402 HUMAN PHYSIOLOGY-II 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain inter-relationship of endocrine hormones, neuromuscular and reproductive systems. 2. Describe the inter play of immunity and principles of neuromuscular physiology. 3. Demonstrate an understanding about the location of glands and mechanism of action of various hormones. 4. Conduct analysis of hormonal of different body systems. **Theory** Endocrinology; Importance of hormones and their

mechanism of actions; Reproductive physiology, role of hormones in spermatogenesis, menstrual cycles and pregnancy, energy balance and temperature regulation; Immunity and its types; Hypersensitivity and its types; Allergy and shock Nervous system: Principles of neuronal and hormonal communication systems, functional organization of nervous system, central, peripheral and autonomic nervous system, action potentials, types of neurotransmitters and their role in pathophysiological integration in body; Musculoskeletal system: Principles of neuromuscular physiology; Introduction to principles and functions of gastrointestinal tract; Propulsion and mixing of food in alimentary tract; Secretary function of the alimentary tract; Mechanism of digestion and absorption. **Practical** Demonstration of the location of endocrine glands in laboratory animal; Adrenalectomy and the effect of adrenaline on metabolism in rats; Effect of adrenaline on metabolism; Effect of hormones on vaginal cytology; Nerve muscle preparation, effect of temperature on single muscle twitch, muscle and nerve irritability, neuromuscular fatigue; Hormonal assay for Digestive system, growth & reproductive system. **Suggested Readings** 1. Debasis, P. 2015. Principles of Physiology. 5th Ed. Jaypee Brothers Medical Publishers Pvt. Limited, New Delhi, India. 2. Ganong, W.F. 2019. Review of Medical Physiology. 26th Ed. McGraw Hill Professional Publishing, New York City, NY, USA. 3. Guyton, A.C. and J.E. Hall. 2021. Textbook of Medical Physiology. 14th Ed. W.B. Saunders Company, PA, USA. 4. Moyes, C.D. and P.M. Schulte. 2015. Principles of Animal Physiology. 3rd Ed. Pearson's, New Delhi, India. 1. Sabyasachi, S. 2018. Principles of Medical Physiology. 2nd Ed. George Thieme Verlag, Stuttgart, Germany.	mechanism of actions; Reproductive physiology, role of hormones in spermatogenesis, menstrual cycles and pregnancy, energy balance and temperature regulation; Immunity and its types; Hypersensitivity and its types; Allergy and shock Nervous system: Principles of neuronal and hormonal communication systems, functional organization of nervous system, central, peripheral and autonomic nervous system, action potentials, types of neurotransmitters and their role in pathophysiological integration in body; Musculoskeletal system: Principles of neuromuscular physiology; Introduction to principles and functions of gastrointestinal tract; Propulsion and mixing of food in alimentary tract; Secretary function of the alimentary tract; Mechanism of digestion and absorption. **Practical** Demonstration of the location of endocrine glands in laboratory animal; Adrenalectomy and the effect of adrenaline on metabolism in rats; Effect of adrenaline on metabolism; Effect of hormones on vaginal cytology; Nerve muscle preparation, effect of temperature on single muscle twitch, muscle and nerve irritability, neuromuscular fatigue; Hormonal assay for Digestive system, growth & reproductive system. **Suggested Readings** 1. Debasis, P. 2015. Principles of Physiology. 5th Ed. Jaypee Brothers Medical Publishers Pvt. Limited, New Delhi, India. 2. Ganong, W.F. 2019. Review of Medical Physiology. 26th Ed. McGraw Hill Professional Publishing, New York City, NY, USA. 3. Guyton, A.C. and J.E. Hall. 2021. Textbook of Medical Physiology. 14th Ed. W.B. Saunders Company, PA, USA. 4. Moyes, C.D. and P.M. Schulte. 2015. Principles of Animal Physiology. 3rd Ed. Pearson's, New Delhi, India. 5. Sabyasachi, S. 2018. Principles of Medical Physiology. 2nd Ed. George Thieme Verlag, Stuttgart, Germany.
BMS-402 ENTREPRENEURSHIP 2(2-0) **Course Learning Outcomes** By the end of this course, the students will be able to: 1. Describe the principles, practices and opportunities of entrepreneurship. 2. Apply financial literacy knowledge and avenues of export management. 3. Develop business plans for the existing and new ventures. **Theory** Entrepreneurship: concept importance, principles,	**BMS-402 ENTREPRENEURSHIP 2(2-0)** **Course Learning Outcomes** By the end of this course, the students will be able to: 1. Describe the principles, practices and opportunities of entrepreneurship. 2. Apply financial literacy knowledge and avenues of export management. 3. Develop business plans for the existing and new ventures. **Theory** Entrepreneurship: concept importance, principles,

evolution and theories; Entrepreneurial opportunities: motivation, mind-set, skills and ethical perspectives; Financial literacy and export management: financial literacy concepts, application and practices, export management documentation and application; Nature and dynamics of different entrepreneurial ventures; Creation of business plan: operational plan, basic marketing concepts and marketing plan, fundamentals of human resources and plan, principles of financial management and financial plan; Challenges faced by entrepreneurs; Case studies particularly from Pakistan about successful entrepreneurs and their ventures. **Suggested Readings** 1. Hisrich, R., M. Peter and D. Shepherd. 2021. Entrepreneurship. McGraw-Hill Education, New Jersey, USA. 2. Kuratko, D.F. 2019. Entrepreneurship: Theory, Process and Practice. South-Western College Publishers, New York, USA. 3. Morabito, V. 2022. Digital Entrepreneurship: Management, Systems and Practice. Cambridge University Press, UK. 4. Neck, M.H. and P.C. Neck. 2017. Entrepreneurship: The Practice and Mindset. Sage Publications Inc. London, UK. 5. Soltanifar, M., M. Hughes and L. Göcke. 2021. Digital Entrepreneurship: Impact on Business and Society. Springer Nature.	evolution and theories; Entrepreneurial opportunities: motivation, mind-set, skills and ethical perspectives; Financial literacy and export management: financial literacy concepts, application and practices, export management documentation and application; Nature and dynamics of different entrepreneurial ventures; Creation of business plan: operational plan, basic marketing concepts and marketing plan, fundamentals of human resources and plan, principles of financial management and financial plan; Challenges faced by entrepreneurs; Case studies particularly from Pakistan about successful entrepreneurs and their ventures. **Suggested Readings** 1. Hisrich, R., M. Peter and D. Shepherd. 2021. Entrepreneurship. McGraw-Hill Education, New Jersey, USA. 2. Kuratko, D.F. 2019. Entrepreneurship: Theory, Process and Practice. South-Western College Publishers, New York, USA. 3. Morabito, V. 2022. Digital Entrepreneurship: Management, Systems and Practice. Cambridge University Press, UK. 4. Neck, M.H. and P.C. Neck. 2017. Entrepreneurship: The Practice and Mindset. Sage Publications Inc. London, UK. 5. Soltanifar, M., M. Hughes and L. Göcke. 2021. Digital Entrepreneurship: Impact on Business and Society. Springer Nature.
IS-401 ISLAMIC STUDIES 2(2-0) **اہداف و مقاصد** اس کورس کے اختتام پر طلبہ اس قابل ہوجائینگے : 1. اسلامی بنیادی عقائد ، عملی اظہار، تاریخی ترقی، روحانی اقدار اور اخلاقی اصولوں کا عملی علمی اظہار کرسکیں۔ 2. اسلامی قانون اور روزمرہ زندگی میں اس کا اطلاق کے بنیادی ذرائع بیان کرسکیں۔ 3. مسلم دنیا بشمول سماجی چیلنجز، صنفی کردار اور بین المذاہب کردار کے حوالے سے معاصر مسائل کی تشخیص اور حل پیش کرسکیں۔ **اسلام کا تعارف** o اسلام اور اس کے بنیادی عقائد کا تعارف o قرآن کریم (تعارف، وحی اور تدوین قرآن) o حدیث اور سنت (تدوین، اقسام اور اہمیت) **سیرت طیبہ ﷺ اور اسوہ حسنہ** o نبی کریم ﷺ کی زندگی مطہرہ o نبی کریم ﷺ کا کردار بطور (انفرادی شخص، معلم،	**IS-401 ISLAMIC STUDIES 2(2-0)** **اہداف و مقاصد** اس کورس کے اختتام پر طلبہ اس قابل ہوجائینگے : 1. اسلامی بنیادی عقائد ، عملی اظہار، تاریخی ترقی، روحانی اقدار اور اخلاقی اصولوں کا عملی علمی اظہار کرسکیں۔ 2. اسلامی قانون اور روزمرہ زندگی میں اس کا اطلاق کے بنیادی ذرائع بیان کرسکیں۔ 3. مسلم دنیا بشمول سماجی چیلنجز، صنفی کردار اور بین المذاہب کردار کے حوالے سے معاصر مسائل کی تشخیص اور حل پیش کرسکیں۔ **اسلام کا تعارف** o اسلام اور اس کے بنیادی عقائد کا تعارف o قرآن کریم (تعارف، وحی اور تدوین قرآن) o حدیث اور سنت (تدوین، اقسام اور اہمیت) **سیرت طیبہ ﷺ اور اسوہ حسنہ** o نبی کریم ﷺ کی زندگی مطہرہ

- نبی کریم ﷺ کا کردار بطور (انفرادی شخص، معلم، امن قائم کرنے والے اور ایک رہنما کے طور پر)

اسلامی تاریخ و تہذیب

- قبل از اسلام عالم دنیا کی حالت
- خلفائے راشدین اور وسعت سلطنت اسلامیہ
- اسلامی تہذیب کے ارتقاء میں مسلم سائنسدانوں اور فلاسفرز کا کردار

فقہ اسلامی

- فقہ اسلامی کے بنیادی ذرائع
- ارکان اسلام اور ان کی اہمیت
- فقہ اسلامی کے مختلف ادارے
- اجتہادکی اہمیت اور اس کے اصول

اسلام میں خاندان اور معاشرہ کا تصور

- اسلامی تعلیمات کی روشنی میں خواتین کے حقوق، مقام اور کردار
- شادی، خاندان اور مسلم معاشرہ میں صنفی کردار
- خاندان کی ساخت اور مسلم معاشرہ میں اس کی اقدار

اسلام اور جدید دنیا

- جدید دنیا میں اسلام کا تعلق(گلوبلائزیشن، چیلنجز اور مواقع)
- اسلامو فوبیا، بین المذاہب مکالمہ اور کثیر الثقافت معاشرہ
- سماجی ثقافت اور تکنیکی تبدیلیوں کے حوالے سے اسلامی نظریات

مجوزہ کتب

- ڈاکٹر خالد علوی، اسلام کا معاشرتی نظام، الفیصل ناشران کتب لاہور، 2018ء
- ڈاکٹر خالد علوی، علوم الحدیث، الفیصل ناشران کتب لاہور،2021ء
- قاضی سلیمان منصور پوری، رحمۃ للعالمین، مکتبہ اسلامیہ لاہور، 2018ء
- صفی الرحمان، الرحیق المختوم، المکتبہ السلفیہ لاہور، 2021 ء
- شیخ محمد بن صالح العثیمین، اسلام میں بنیادی حقوق، دارالسلام لاہور، 2017ء
- محمد حسین ذھبی، تاریخ التفسیر والمفسرون، ملک سنز فیصل آباد، 2015ء
- اسلام، پاکستان اور جدید دنیا، ایس ایم شاہد، علامہ اقبال اوپن یونیورسٹی اسلام آباد، 2018ء

- The Five pillars of Islam, A journey through the Divine acts of worship by Muhammad Mustafa Al-Azami.

امن قائم کرنے والے اور ایک رہنما کے طور پر)

اسلامی تاریخ و تہذیب

- قبل از اسلام عالم دنیا کی حالت
- خلفائے راشدین اور وسعت سلطنت اسلامیہ
- اسلامی تہذیب کے ارتقاء میں مسلم سائنسدانوں اور فلاسفرز کا کردار

فقہ اسلامی

- فقہ اسلامی کے بنیادی ذرائع
- ارکان اسلام اور ان کی اہمیت
- فقہ اسلامی کے مختلف ادارے
- اجتہادکی اہمیت اور اس کے اصول

اسلام میں خاندان اور معاشرہ کا تصور

- اسلامی تعلیمات کی روشنی میں خواتین کے حقوق، مقام اور کردار
- شادی، خاندان اور مسلم معاشرہ میں صنفی کردار
- خاندان کی ساخت اور مسلم معاشرہ میں اس کی اقدار

اسلام اور جدید دنیا

- جدید دنیا میں اسلام کا تعلق(گلوبلائزیشن، چیلنجز اور مواقع)
- اسلامو فوبیا، بین المذاہب مکالمہ اور کثیر الثقافت معاشرہ
- سماجی ثقافت اور تکنیکی تبدیلیوں کے حوالے سے اسلامی نظریات

مجوزہ کتب

- ڈاکٹر خالد علوی، اسلام کا معاشرتی نظام، الفیصل ناشران کتب لاہور، 2018ء
- ڈاکٹر خالد علوی، علوم الحدیث، الفیصل ناشران کتب لاہور،2021ء
- قاضی سلیمان منصور پوری، رحمۃ للعالمین، مکتبہ اسلامیہ لاہور، 2018ء
- صفی الرحمان، الرحیق المختوم، المکتبہ السلفیہ لاہور، 2021 ء
- شیخ محمد بن صالح العثیمین، اسلام میں بنیادی حقوق، دارالسلام لاہور، 2017ء
- محمد حسین ذھبی، تاریخ التفسیر والمفسرون، ملک سنز فیصل آباد، 2015ء
- اسلام، پاکستان اور جدید دنیا، ایس ایم شاہد، علامہ اقبال اوپن یونیورسٹی اسلام آباد، 2018ء

- The Five pillars of Islam, A journey through the Divine acts of worship by Muhammad Mustafa Al-Azami.
- The five pillars of Islam, A framework for Islamic values and character building by Musharraf

Hussain. • Towards understanding Islam by Abul A La Mawdudi. • Islami Nazria e Hayat by Khurshid Ahmad. • An introduction to Islamic theology by John Renard. • Islamic civilization foundations belief & principles by Abul A la Mawdudi. • Women and social justice: An Islamic paradigm by Dr. Anis Ahmad. • Islam: its meaning and message by Khurshid Ahmad.	• The five pillars of Islam, A framework for Islamic values and character building by Musharraf Hussain. • Towards understanding Islam by Abul A La Mawdudi. • Islami Nazria e Hayat by Khurshid Ahmad. • An introduction to Islamic theology by John Renard. • Islamic civilization foundations belief & principles by Abul A la Mawdudi. • Women and social justice: An Islamic paradigm by Dr. Anis Ahmad. • Islam: its meaning and message by Khurshid Ahmad.
SSH-306 BASIC ETHICS 2(2-0) (For Foreigners/Non-Muslim Students) **Course Learning Outcomes (CLOs)** After completion of course, students will be able to: 1. Examine various concepts of human rights and the UNO Declaration. 2. Discuss the duties of competent and socialized professionals. 3. Analyze the progress of responsible moral agent. 4. Explain a wide variety of ethical views. **Theory** Etiquettes, morality, ethics, law, importance of ethics, concept of good and evil, freedom and responsibilities, ethical teaching of worlds religion, human rights, ethics at work place, ethics in business, war ethics, social media ethics, ethics in research. **Suggested Readings** 1. Lewis, P., 2020, The Moral Life: An Introductory Reader in Ethics Fifth Edition, Oxford University Press, UK. 2. McGraw, H., 2019, The Right Thing to Do: Basic Readings in Moral Philosophy. McMillan Press USA. 3. Nonathan. J., 2018, Humanity: A Moral History, Amazon Publishers, USA. 4. Peter. S., 2019, Writings On an Ethical Life, Oxford University Press, London. Ruth,C., 2018, Encyclopedia of Applied Ethics, McMillian Press USA.	**SSH-306 BASIC ETHICS 2(2-0)** (For Foreigners/Non-Muslim Students) **Course Learning Outcomes (CLOs)** After completion of course, students will be able to: 1. Examine various concepts of human rights and the UNO Declaration. 2. Discuss the duties of competent and socialized professionals. 3. Analyze the progress of responsible moral agent. 4. Explain a wide variety of ethical views. **Theory** Etiquettes, morality, ethics, law, importance of ethics, concept of good and evil, freedom and responsibilities, ethical teaching of worlds religion, human rights, ethics at work place, ethics in business, war ethics, social media ethics, ethics in research. **Suggested Readings** 1. Lewis, P., 2020, The Moral Life: An Introductory Reader in Ethics Fifth Edition, Oxford University Press, UK. 2. McGraw, H., 2019, The Right Thing to Do: Basic Readings in Moral Philosophy. McMillan Press USA. 3. Nonathan. J., 2018, Humanity: A Moral History, Amazon Publishers, USA. 4. Peter. S., 2019, Writings On an Ethical Life, Oxford University Press, London. 5. Ruth,C., 2018, Encyclopedia of Applied Ethics, McMillian Press USA.
MATH-408 QUANTITATIVE REASONING-I 3(3-0) **Course Learning Outcomes:**	**MATH-408 QUANTITATIVE REASONING-I 3(3-0)** **Course Learning Outcomes:**

At the end of the course, the students will be able to: 1. Create and develop quantitative reasoning skills and apply to daily life challenges involving social and economic issues. 2. Apply the learned principles of quantitative reasoning skills in other disciplines. 3. Acquire and use quantitative reasoning skills in different disciplines. 4. Make decisions in a logical manner. 5. Apply geometrical models to solve real life problems. **Theory** Numerical Literacy: Number system and basic arithmetic operations, Units and their conversions, dimensions, area, perimeter and volume, Rates, ratios, proportions and percentages, Types and sources of data, Measurement scales, Tabular and graphical presentation of data, Quantitative reasoning exercises using number knowledge; Fundamental Mathematical Concepts: Basics of geometry (lines, angles, circles, polygons etc.), Sets and their operations, Relations, functions, and their graphs, Exponents, factoring and simplifying algebraic expressions, Algebraic and graphical solutions of linear and quadratic equations and inequalities, Quantitative reasoning exercises using fundamental mathematical concepts; Fundamental Statistical Concepts: Population and sample, Measures of central tendency, dispersion and data interpretation, Rules of counting (multiplicative, permutation and combination), Basic probability theory, Introduction to random variables and their probability distributions, Quantitative reasoning exercises using fundamental statistical concepts. **Suggested Readings:** 1. Akar, G.K., I.O. Zembat, S. Arslan and P.W. Thompson. 2023. Quantitative Reasoning in Mathematics and Science Education. Springer Nature, London. 2. Aufmann, R., J. Lockwood, R. Nation and D. Clegg. 2007. Mathematical Thinking and Reasoning. Brooks Cole, USA. 3. Bennett, J. and W. Briggs. 2015. Using and Understanding Mathematics. Pearson Education Limited, London. 4. Blitzer, R. 2014. Precalculus. Pearson Education Limited, London. 5. Bennet, J. and W. Briggs. 2015. Using and Understanding Mathematics: A Quantitative Reasoning Approach. Pearson Addison Wesley, London. 6. Dekkers, G. 2022. Thinking clearly with Data: A Guide to Quantitative Reasoning and Analysis. Princeton University Press.UK.	At the end of the course, the students will be able to: 1. Create and develop quantitative reasoning skills and apply to daily life challenges involving social and economic issues. 2. Apply the learned principles of quantitative reasoning skills in other disciplines. 3. Acquire and use quantitative reasoning skills in different disciplines. 4. Make decisions in a logical manner. 5. Apply geometrical models to solve real life problems. **Theory** Numerical Literacy: Number system and basic arithmetic operations, Units and their conversions, dimensions, area, perimeter and volume, Rates, ratios, proportions and percentages, Types and sources of data, Measurement scales, Tabular and graphical presentation of data, Quantitative reasoning exercises using number knowledge; Fundamental Mathematical Concepts: Basics of geometry (lines, angles, circles, polygons etc.), Sets and their operations, Relations, functions, and their graphs, Exponents, factoring and simplifying algebraic expressions, Algebraic and graphical solutions of linear and quadratic equations and inequalities, Quantitative reasoning exercises using fundamental mathematical concepts; Fundamental Statistical Concepts: Population and sample, Measures of central tendency, dispersion and data interpretation, Rules of counting (multiplicative, permutation and combination), Basic probability theory, Introduction to random variables and their probability distributions, Quantitative reasoning exercises using fundamental statistical concepts. **Suggested Readings:** 1. Akar, G.K., I.O. Zembat, S. Arslan and P.W. Thompson. 2023. Quantitative Reasoning in Mathematics and Science Education. Springer Nature, London. 2. Aufmann, R., J. Lockwood, R. Nation and D. Clegg. 2007. Mathematical Thinking and Reasoning. Brooks Cole, USA. 3. Bennett, J. and W. Briggs. 2015. Using and Understanding Mathematics. Pearson Education Limited, London. 4. Blitzer, R. 2014. Precalculus. Pearson Education Limited, London. 5. Bennet, J. and W. Briggs. 2015. Using and Understanding Mathematics: A Quantitative Reasoning Approach. Pearson Addison Wesley, London. 6. Dekkers, G. 2022. Thinking clearly with Data: A Guide to Quantitative Reasoning and Analysis. Princeton University Press.UK.

IS-402 QURAN TRANSLATION 1(1-0) ترجمۃ القرآن (انڈر گریجویٹ پروگرامز) کورس کا عنوان: ترجمۃ القرآن Type: NCC کورس کوڈ IS-402 --- **اہداف ومقاصد** اس کورس کو پڑھنے کے بعد طلباء وطالبات اس قابل ہو سکے کہ: 1۔ قرآن کریم کے نصاب کے معانی ومفہوم کو سمجھ سکیں۔ 2۔ تعلیمات قرآن کی روشنی میں بنیادی اسلامی علوم کو فہم آسان بنایا جائے اور طلبہ کی اسلامی بنیادوں پر تربیت کی جائے۔ 3۔ طلبہ وطالبات میں مذہبی وسماجی اخلاقیات کا شعور اجاگر کیا جائے۔ **مشمولات نصاب** **ایمانیات:** توحید، رسالت، آخرت، فرشتوں پر ایمان، آسمانی کتب پر ایمان **عبادات:** نماز، روزہ، زکوٰۃ، حج، جہاد **معاملات:** جادو کا تصور، طلاق کے احکامات، خلع، رضاعت، مہر، عدت، انفاق فی سبیل اللہ، غرباء وفقراء میں تقسیم دولت، لین دین کے احکامات، حرمت سود، عورتوں کے حقوق، وراثت، حرمت کے رشتے، قیمتوں کے حقوق، زوجین کے حقوق، قتل کے احکامات، تعدد ازواج، چوری، ڈاکہ زنی، حدود وقصاص، یہود ونصاریٰ سے دوستی، شراب وجوا، کی حرمت، گواہی کے احکامات، جہاد، مال غنیمت کے احکامات، کفار ومنافقین سے تعلق، لعان، زنا کاری، قذف کی مذمت، فحاشی، اجازت کے احکام، پردہ، متبنیٰ کے احکام، ختم نبوتؐ، حضرت مُحَمَّدٌ رَّسُوْلُ اللّٰهِ خَاتَمُ النَّبِيِّيْنَ صَلَّى اللّٰهُ عَلَيْهِ وَعَلٰى اٰلِهٖ وَأَصْحَابِهٖ وَسَلَّمَ کو نکاح کے اختیارات، تحقیق وجستجو کی اہمیت، صلح کی اہمیت، اخوت وبھائی چارہ، ظہار، سرگوشیوں کے احکام، آداب مجالس، جود وسخا، حلال وحرام کے احکام، توبہ، تربیت اولاد، حقوق والدین **اخلاقیات:** فضائل اخلاق/رزائل اخلاق فضائل اخلاق: دیانت داری، ایفائے عہد، سچائی، عدل وانصاف، حلم وبردباری رزائل اخلاق: تکبر، حسد، منافقت، جھوٹ، خیانت **مجوزہ کتب** (1) مطالعہ قرآن حکیم (سات جلدیں)، اتحاد تنظیمات مدارس پاکستان، شعبہ تصنیف وتالیف، دی علم فاؤنڈیشن، کراچی، 2020ء (2) مولانا محمد جوناگڑھی، ترجمۃ القرآن، سنگ فہد پبلیکیشنز، ریاض، سعودی عرب، 2019ء (3) حافظ صلاح الدین یوسف، معانی القرآن الکریم، مکتبہ دارالسلام ریاض، سعودی عرب، 2020ء (4) پیر محمد کرم شاہ الازہری، جمال القرآن، ضیاء القرآن پبلی کیشنز لاہور، پاکستان، 2018ء (5) مفتی محمد تقی عثمانی، آسان ترجمہ قرآن، مکتبہ معارف القرآن، کراچی، پاکستان، 2017ء (6) ڈاکٹر محمد طاہر القادری، عرفان القرآن، منہاج القرآن پبلی کیشنز لاہور، پاکستان، 2012ء	**IS-402 QURAN TRANSLATION 1(1-0)** ترجمۃ القرآن (انڈر گریجویٹ پروگرامز) کورس کا عنوان: ترجمۃ القرآن Type: NCC کورس کوڈ IS-402 --- **اہداف ومقاصد** اس کورس کو پڑھنے کے بعد طلباء وطالبات اس قابل ہو سکے کہ: 1۔ قرآن کریم کے نصاب کے معانی ومفہوم کو سمجھ سکیں۔ 2۔ تعلیمات قرآن کی روشنی میں بنیادی اسلامی علوم کو فہم آسان بنایا جائے اور طلبہ کی اسلامی بنیادوں پر تربیت کی جائے۔ 3۔ طلبہ وطالبات میں مذہبی وسماجی اخلاقیات کا شعور اجاگر کیا جائے۔ **مشمولات نصاب** **ایمانیات:** توحید، رسالت، آخرت، فرشتوں پر ایمان، آسمانی کتب پر ایمان **عبادات:** نماز، روزہ، زکوٰۃ، حج، جہاد **معاملات:** جادو کا تصور، طلاق کے احکامات، خلع، رضاعت، مہر، عدت، انفاق فی سبیل اللہ، غرباء وفقراء میں تقسیم دولت، لین دین کے احکامات، حرمت سود، عورتوں کے حقوق، وراثت، حرمت کے رشتے، قیمتوں کے حقوق، زوجین کے حقوق، قتل کے احکامات، تعدد ازواج، چوری، ڈاکہ زنی، حدود وقصاص، یہود ونصاریٰ سے دوستی، شراب وجوا، کی حرمت، گواہی کے احکامات، جہاد، مال غنیمت کے احکامات، کفار ومنافقین سے تعلق، لعان، زنا کاری، قذف کی مذمت، فحاشی، اجازت کے احکام، پردہ، متبنیٰ کے احکام، ختم نبوتؐ، حضرت مُحَمَّدٌ رَّسُوْلُ اللّٰهِ خَاتَمُ النَّبِيِّيْنَ صَلَّى اللّٰهُ عَلَيْهِ وَعَلٰى اٰلِهٖ وَأَصْحَابِهٖ وَسَلَّمَ کو نکاح کے اختیارات، تحقیق وجستجو کی اہمیت، صلح کی اہمیت، اخوت وبھائی چارہ، ظہار، سرگوشیوں کے احکام، آداب مجالس، جود وسخا، حلال وحرام کے احکام، توبہ، تربیت اولاد، حقوق والدین **اخلاقیات:** فضائل اخلاق/رزائل اخلاق فضائل اخلاق: دیانت داری، ایفائے عہد، سچائی، عدل وانصاف، حلم وبردباری رزائل اخلاق: تکبر، حسد، منافقت، جھوٹ، خیانت **مجوزہ کتب** (1) مطالعہ قرآن حکیم (سات جلدیں)، اتحاد تنظیمات مدارس پاکستان، شعبہ تصنیف وتالیف، دی علم فاؤنڈیشن، کراچی، 2020ء (2) مولانا محمد جوناگڑھی، ترجمۃ القرآن، سنگ فہد پبلیکیشنز، ریاض، سعودی عرب، 2019ء (3) حافظ صلاح الدین یوسف، معانی القرآن الکریم، مکتبہ دارالسلام ریاض، سعودی عرب، 2020ء (4) پیر محمد کرم شاہ الازہری، جمال القرآن، ضیاء القرآن پبلی کیشنز لاہور، پاکستان، 2018ء (5) مفتی محمد تقی عثمانی، آسان ترجمہ قرآن، مکتبہ معارف القرآن، کراچی، پاکستان، 2017ء (6) ڈاکٹر محمد طاہر القادری، عرفان القرآن، منہاج القرآن پبلی کیشنز لاہور، پاکستان، 2012ء
TGM-401 TUTORIAL GROUP MEETING FOR SOFT SKILLS	**TGM-401 TUTORIAL GROUP MEETING FOR SOFT SKILLS**
Fourth Semester	
HND-402 NUTRITION THROUGH THE LIFE CYCLE 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate an understanding about the role of different nutrients from conception to old age. 2. Familiarize with different conditions and problems during the course of life and their nutritional interventions. 3. Develop dietary recommendations for different age groups to stay healthy. 4. Identify dietary sources to meet different nutritional needs. **Theory** Preconception nutrition: Overview, reproductive physiology, nutrition related disruption in fertility, nutrition and contraceptives, other nutrition concerns, premenstrual and polycystic ovary syndrome, obesity and fertility, diabetes prior to pregnancy, disorders of metabolism; Nutrition during pregnancy: Status of pregnancy outcomes, embryonic and fetal growth & development, pregnancy weight gain, nutrition and outcome of the pregnancy, common health problems during pregnancy, nutrient needs and dietary guidelines	**HND-402 NUTRITION THROUGH THE LIFE CYCLE 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate an understanding about the role of different nutrients from conception to old age. 2. Familiarize with different conditions and problems during the course of life and their nutritional interventions. 3. Develop dietary recommendations for different age groups to stay healthy. 4. Identify dietary sources to meet different nutritional needs. **Theory** Preconception nutrition: Overview, reproductive physiology, nutrition related disruption in fertility, nutrition and contraceptives, other nutrition concerns, premenstrual and polycystic ovary syndrome, obesity and fertility, diabetes prior to pregnancy, disorders of metabolism; Nutrition during pregnancy: Status of pregnancy outcomes, embryonic and fetal growth & development, pregnancy weight gain, nutrition and outcome of the pregnancy, common health problems

during pregnancy; Nutrition and lactation: milk composition, breast feeding, maternal diet during lactation, factors influencing breastfeeding, common breast feeding conditions and medical contradictions; Infant nutrition: Assessing new born health, energy and nutrient needs, development of infant feeding skills, common nutritional problems and concerns, infants at risk; Toddlers and preschooler nutrition: energy and nutrient needs, common nutritional problems, nutrition related conditions, food allergies and intolerances; Child and pre-adolescent nutrition: energy and nutrient needs, common nutritional problems and their prevention, dietary recommendations; Adolescent nutrition: health and eating related behavior, energy and nutrient requirements, overweight and obesity, eating disorders; Adult nutrition: Physiological changes of adulthood, maintaining a healthy body, dietary recommendations, nutrition intervention for risk reduction; Geriatric nutrition: Physiological changes, nutritional risk factors, dietary recommendations and food safety, nutrient recommendations, nutrition in special clinical conditions. **Suggested Readings** 1. Brown, J.E. 2021. Nutrition Through The Life Cycle. 7th Ed. Cengage Learning, Belmont, CA, USA. 2. Edelstein, S. 2014. Life Cycle Nutrition: An Evidence-Based Approach. 2nd Ed. Jones & Bartlett Learning, Burlington, MA, USA 3. Geissler, C. and H. Powers. 2017. Human Nutrition. 13th Ed. Oxford University Press, Oxford, UK. 4. Lanham-New, S.A., T.R. Hill, A.M. Gallagher and H.H. Vorster. 2019. Introduction to Human Nutrition. 3rd Ed. John Wiley & Sons Ltd., The Atrium, Chichester, West Sussex, UK. 5. Rolfes, S.R. and E. Whitney. 2020. Understanding Normal and Clinical Nutrition. 12th Ed. Cengage Learning Custom Publication, Boston, USA.	during pregnancy, nutrient needs and dietary guidelines during pregnancy; Nutrition and lactation: milk composition, breast feeding, maternal diet during lactation, factors influencing breastfeeding, common breast feeding conditions and medical contradictions; Infant nutrition: Assessing new born health, energy and nutrient needs, development of infant feeding skills, common nutritional problems and concerns, infants at risk; Toddlers and preschooler nutrition: energy and nutrient needs, common nutritional problems, nutrition related conditions, food allergies and intolerances; Child and pre-adolescent nutrition: energy and nutrient needs, common nutritional problems and their prevention, dietary recommendations; Adolescent nutrition: health and eating related behavior, energy and nutrient requirements, overweight and obesity, eating disorders; Adult nutrition: Physiological changes of adulthood, maintaining a healthy body, dietary recommendations, nutrition intervention for risk reduction; Geriatric nutrition: Physiological changes, nutritional risk factors, dietary recommendations and food safety, nutrient recommendations, nutrition in special clinical conditions. **Suggested Readings** 1. Brown, J.E. 2021. Nutrition Through The Life Cycle. 7th Ed. Cengage Learning, Belmont, CA, USA. 2. Edelstein, S. 2014. Life Cycle Nutrition: An Evidence-Based Approach. 2nd Ed. Jones & Bartlett Learning, Burlington, MA, USA 3. Geissler, C. and H. Powers. 2017. Human Nutrition. 13th Ed. Oxford University Press, Oxford, UK. **4.** Lanham-New, S.A., T.R. Hill, A.M. Gallagher and H.H. Vorster. 2019. Introduction to Human Nutrition. 3rd Ed. John Wiley & Sons Ltd., The Atrium, Chichester, West Sussex, UK. **5.** Rolfes, S.R. and E. Whitney. 2020. Understanding Normal and Clinical Nutrition. 12th Ed. Cengage Learning Custom Publication, Boston, USA.
HND-404/ FST-404 FUNCTIONAL FOODS AND NUTRACEUTICALS 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Familiarize with the field of functional foods and nutraceuticals. 2. Describe about active component of functional foods and nutraceuticals and their role in disease prevention. 3. Recognize the health claims of nutraceuticals and	**HND-404/ FST-404 FUNCTIONAL FOODS AND NUTRACEUTICALS 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Familiarize with the field of functional foods and nutraceuticals. 2. Describe about active component of functional foods and nutraceuticals and their role in disease prevention. 3. Recognize the health claims of nutraceuticals and

functional foods based on scientific criteria.

4. Evaluate and compare the national and international regulatory framework governing the functional foods and nutraceuticals.

Theory

Functional foods and nutraceuticals: Past, present, future and health claims; Functional foods and their impact on nutrition and health: obesity, diabetes, cardiovascular diseases, hypertension and cancer; Functional ingredients and bioactive molecules: Isoflavones, lycopene, polyphenols, dietary fiber, omega-3 & -6 fatty acids, conjugated linoleic acid, antioxidants, prebiotic and probiotic; Functional foods from different food groups: Cereals, dairy, meat, fruits and vegetables; National and International legislations and regulatory systems governing the production and distribution of functional foods; Standards and regulations of various agencies: FDA, EC, FAO/WHO, Health Canada; Guidelines for the assessment of functional foods; Conventional and emerging food processing technologies for functional food production; Toxicological and safety aspects of functional foods; Asian functional foods; Functional foods in international market and growth in Pakistan. An overview of dietary supplements and their market; Forms of food supplements; Safety of vitamins and minerals added to foods; Implications of mega doses; DRAP Alternative Medicines and Health Products Enlistment Rules 2014.

Practical

Development of healthy functional foods and nutraceuticals from locally grown commodities: for health and nutritional issues, micronutrient deficiencies, cultural/religious beliefs, rich in bioactive compounds; extraction techniques of bioactive molecules.

Suggested Readings

1. Aluko, R.E. 2012. Functional Foods and Nutraceutical. Springer Science+Bussiness Media LLC, N.Y., USA.
2. Egbuna, C. and G.D. Tupas. 2020. Functional Foods and Nutraceuticals; Bioactive Components, Formulations and Innovations. Springer International, NY, USA.
3. FAO (Food and Agriculture Organization of the United Nations). 2007. Report on Functional Foods. Food and Agriculture Organization of the United Nations, Rome, Italy.
4. Khan, M.I. and A. Rakha. 2020. Basics of Functional Foods & Nutraceuticals. F-Tech Communication, Faisalabad, Pakistan.

Verma, A., K. Srivastava, S. Singh and H. Singh. 2018. Nutraceuticals and Innovative Food Products for Health Living and Preventive Care. IGI Global, Chocolate

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4. Khan, M.I. and A. Rakha. 2020. Basics of Functional Foods & Nutraceuticals. F-Tech Communication, Faisalabad, Pakistan.
5. Verma, A., K. Srivastava, S. Singh and H. Singh. 2018. Nutraceuticals and Innovative Food Products for Health Living and Preventive Care.

Avenue, Hershey PA, USA.	IGI Global, Chocolate Avenue, Hershey PA, USA.
HND-406/FST-402 FOOD AND NUTRITION ENTREPRENEURSHIP 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the basics of entrepreneurship management 2. Analyze the environment for establishing small business. 3. Develop entrepreneurial skills for craft products and retail food business 4. Analyze and develop the factors for promoting the business **Theory** Concept of entrepreneurship: Entrepreneurial and managerial characteristics; Assessing overall business environment: Idea generation, planning, SWOT analyses, commercialization of ideas and innovations, monitoring & evaluation; Intellectual property rights and business registration procedures; Human resource and talent hunting; Communication and presentation skills; Financial controls: Concepts of marketing and managing competition, product Policy, retailing, wholesaling and distribution; Pricing decisions: Budget, advertising and sales promotion strategies; Factors affecting entrepreneurship; Government policies and schemes to encourage entrepreneurship: Small to medium-sized enterprise SMEs, export & import policies and public-private partnerships; Social responsibilities of business; World food consumption pattern and types; International marketing; World trade agreements related to food business: Food business laws and regulations; Developing business models; Restaurants/food retail business, current food trends and feasibility studies; Factors affecting business growth; E-commerce: Online apps, online business promotion; Women entrepreneurship with challenges and opportunities. **Suggested Readings** 1. Badi, R.V. and N.V. Badi. 2014. Business Ethics. 2nd Ed. Vrinda Publications Ltd, Delhi, India. 2. Ogbe, A.A. 2019. Fundamentals of Dairy Entrepreneurship Development. 1st Ed. Panamaline Books Distributors Ltd, Kampala, Uganda. 3. Ratten, V and L.P. Dana. 2021. Research Anthology on Strategies for Maintaining Successful Firms. 1st Ed. IGI Global Publishers, PA, USA. 4. Galindo, M.A and R. Domingo. 2012. Women's Entrepreneurship and Economics: New Perspectives, Practices, and Policies. 1st Ed.	**HND-406/FST-402 FOOD AND NUTRITION ENTREPRENEURSHIP 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the basics of entrepreneurship management 2. Analyze the environment for establishing small business. 3. Develop entrepreneurial skills for craft products and retail food business 4. Analyze and develop the factors for promoting the business **Theory** Concept of entrepreneurship: Entrepreneurial and managerial characteristics; Assessing overall business environment: Idea generation, planning, SWOT analyses, commercialization of ideas and innovations, monitoring & evaluation; Intellectual property rights and business registration procedures; Human resource and talent hunting; Communication and presentation skills; Financial controls: Concepts of marketing and managing competition, product Policy, retailing, wholesaling and distribution; Pricing decisions: Budget, advertising and sales promotion strategies; Factors affecting entrepreneurship; Government policies and schemes to encourage entrepreneurship: Small to medium-sized enterprise SMEs, export & import policies and public-private partnerships; Social responsibilities of business; World food consumption pattern and types; International marketing; World trade agreements related to food business: Food business laws and regulations; Developing business models; Restaurants/food retail business, current food trends and feasibility studies; Factors affecting business growth; E-commerce: Online apps, online business promotion; Women entrepreneurship with challenges and opportunities. **Suggested Readings** 1. Badi, R.V. and N.V. Badi. 2014. Business Ethics. 2nd Ed. Vrinda Publications Ltd, Delhi, India. 2. Ogbe, A.A. 2019. Fundamentals of Dairy Entrepreneurship Development. 1st Ed. Panamaline Books Distributors Ltd, Kampala, Uganda. 3. Ratten, V and L.P. Dana. 2021. Research Anthology on Strategies for Maintaining Successful Firms. 1st Ed. IGI Global Publishers, PA, USA. **4.** Galindo, M.A and R. Domingo. 2012. Women's Entrepreneurship and Economics:

Springer, London, England. 1. Nadine, R. 2016. Forks in the Road: Adventures in Food Entrepreneurship with Enrico Ianni-Palarchio, the Man Who Never Quit.1st Ed. Carpe Machinam Inc., CA, USA.	New Perspectives, Practices, and Policies. 1st Ed. Springer, London, England. **5.** Nadine, R. 2016. Forks in the Road: Adventures in Food Entrepreneurship with Enrico Ianni-Palarchio, the Man Who Never Quit.1st Ed. Carpe Machinam Inc., CA, USA.
SOC-311 INTRODUCTION TO SOCIOLOGY 2(2-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate the knowledge about the basic concepts in sociology. 2. Use a sociological imagination to see how society shapes and forms our individual perspectives and actions. 3. Apply the notion that there are different perspectives in making sense of social phenomena. 4. Analyze the relative influence of culture and social structure on behavior. **Theory** Understanding Sociology; Meanings and definitions, sociological imagination, development of sociology, Society; Types of society, social interaction in everyday life; Social processes, Social structure; Elements of social structure, Social organizations; Social institutions; Family, education, religion, economy, politics, Culture: Culture variation, cultural universals, ethnocentrism, cultural relativism, language, norms and values, Socialization; Agents of socialization, social and cultural change; Factors in acceptance and resistance to change. **Suggested Readings** 1. Alexander, J. C., K. Thompson, and L. D. Edles. 2016. Contemporary Introduction to Sociology: Culture and Society in Transition. Routledge. New York, USA. 2. Henslin, G. 2016. Sociology: A Down-to Earth Approach, 13th edition. South- Western Cangage Learning, USA. 3. Kendall, M. 2021. Sociology in our Times: The Essentials, 12th edition. Cangage Learning. Boston, USA. 4. Macionis. J. J., and M. G. Linda. 2012. Sociology. 14th edition. Pearson Education Inc. New York, USA. 5. Ritzer, G., and W. W. Murphy. 2019. Introduction to Sociology. Sage Publications. New York, USA. 6. Schaefer, R. T. 2013. Sociology- A Brief Introduction. 10th edition. McGraw-Hill. New York, USA.	**SOC-311 INTRODUCTION TO SOCIOLOGY 2(2-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate the knowledge about the basic concepts in sociology. 2. Use a sociological imagination to see how society shapes and forms our individual perspectives and actions. **3.** Apply the notion that there are different perspectives in making sense of social phenomena. 4. Analyze the relative influence of culture and social structure on behavior. **Theory** Understanding Sociology; Meanings and definitions, sociological imagination, development of sociology, Society; Types of society, social interaction in everyday life; Social processes, Social structure; Elements of social structure, Social organizations; Social institutions; Family, education, religion, economy, politics, Culture: Culture variation, cultural universals, ethnocentrism, cultural relativism, language, norms and values, Socialization; Agents of socialization, social and cultural change; Factors in acceptance and resistance to change. **Suggested Readings** 1. Alexander, J. C., K. Thompson, and L. D. Edles. 2016. Contemporary Introduction to Sociology: Culture and Society in Transition. Routledge. New York, USA. 2. Henslin, G. 2016. Sociology: A Down-to Earth Approach, 13th edition. South- Western Cangage Learning, USA. 3. Kendall, M. 2021. Sociology in our Times: The Essentials, 12th edition. Cangage Learning. Boston, USA. 4. Macionis. J. J., and M. G. Linda. 2012. Sociology. 14th edition. Pearson Education Inc. New York, USA. 5. Ritzer, G., and W. W. Murphy. 2019. Introduction to Sociology. Sage Publications. New York, USA. 6. Schaefer, R. T. 2013. Sociology- A Brief Introduction. 10th edition. McGraw-Hill. New York, USA.

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STAT-408 QUANTITATIVE REASONING-II 3(3-0) **Course Learning Outcomes:** At the end of the course, the students will be able to: 1. Deal with scenarios involving quantitative reasoning skills in a logical manner in their practical lives. 2. Deal with different forms of data occurring in professional, social, and natural sciences. 3. Solve scenarios involving functions and probability in different disciplines. 4. Apply the quantitative reasoning skills in other disciplines. 5. Use the quantitative reasoning skills for solving practical life problems. **Theory** Logic, Logical and critical reasoning; Introduction and importance of logic, inductive, deductive and abductive approaches of reasoning, propositions, arguments (valid, invalid), logical connectives, truth tables and propositional equivalences, logical fallacies, venn diagrams, predicates and quantifiers, quantitative reasoning exercises using logical reasoning concepts and techniques. Mathematical modeling and Analysis; Introduction to deterministic models, use of linear functions for modeling in real-world situations, modeling with the system of linear equations and their solutions, elementary introduction to derivatives in mathematical modeling, linear and exponential growth and decay models, quantitative reasoning exercises using mathematical modeling. Statistical Modeling and Analyses; Introduction to probabilistic models; bivariate analysis, scatter plots, simple linear regression model and correlation analysis, basics of estimation and confidence interval, testing of hypothesis (Z-test and t-test), statistical inference in decision making, quantitative reasoning exercises using statistical modeling. **Suggested Readings:** 1. Akar, G.K., I.O. Zembat, S. Arslan and P.W. Thompson. 2023. Quantitative Reasoning in Mathematics and Science Education. Springer Nature, London. 2. Babones, S. 2013. Applied Statistical Modeling. SAGE Publications Ltd. 3. Bennett, J. and W. Briggs. 2015. Using and Understanding Mathematics (6th Edition). Pearson Education Limited, London. 4. Bluman, A. (2014. Elementary Statistics: A step by step approach 9e. McGraw Hill. 5. Dekkers, G. 2022. Thinking clearly with Data: A Guide to Quantitative Reasoning and Analysis. Princeton University Press.UK. Rosen, K. H. 2007. Discrete Mathematics and its	**STAT-408 QUANTITATIVE REASONING-II 3(3-0)** **Course Learning Outcomes:** At the end of the course, the students will be able to: 1. Deal with scenarios involving quantitative reasoning skills in a logical manner in their practical lives. 2. Deal with different forms of data occurring in professional, social, and natural sciences. 3. Solve scenarios involving functions and probability in different disciplines. 4. Apply the quantitative reasoning skills in other disciplines. 5. Use the quantitative reasoning skills for solving practical life problems. **Theory** Logic, Logical and critical reasoning; Introduction and importance of logic, inductive, deductive and abductive approaches of reasoning, propositions, arguments (valid, invalid), logical connectives, truth tables and propositional equivalences, logical fallacies, venn diagrams, predicates and quantifiers, quantitative reasoning exercises using logical reasoning concepts and techniques. Mathematical modeling and Analysis; Introduction to deterministic models, use of linear functions for modeling in real-world situations, modeling with the system of linear equations and their solutions, elementary introduction to derivatives in mathematical modeling, linear and exponential growth and decay models, quantitative reasoning exercises using mathematical modeling. Statistical Modeling and Analyses; Introduction to probabilistic models; bivariate analysis, scatter plots, simple linear regression model and correlation analysis, basics of estimation and confidence interval, testing of hypothesis (Z-test and t-test), statistical inference in decision making, quantitative reasoning exercises using statistical modeling. **Suggested Readings:** 1. Akar, G.K., I.O. Zembat, S. Arslan and P.W. Thompson. 2023. Quantitative Reasoning in Mathematics and Science Education. Springer Nature, London. 2. Babones, S. 2013. Applied Statistical Modeling. SAGE Publications Ltd. 3. Bennett, J. and W. Briggs. 2015. Using and Understanding Mathematics (6th Edition). Pearson Education Limited, London. 4. Bluman, A. (2014. Elementary Statistics: A step by step approach 9e. McGraw Hill. 5. Dekkers, G. 2022. Thinking clearly with Data: A Guide to Quantitative Reasoning and Analysis. Princeton University Press.UK. 6. Rosen, K. H. 2007. Discrete Mathematics

Applications. The McGraw Hill Companies.	and its Applications. The McGraw Hill Companies.
EDU-306 CIVICS AND COMMUNITY ENGAGEMENT 2(2-0) **Course Learning Outcomes:** By the end of this course, students will be able to: 1. Demonstrate knowledge and understanding of community engagement and citizenship 2. Describe the solution of community based problems through use of problem solving and critical thinking exercises 3. Analyze leadership phenomenon through volunteer work and youth club worldwide 4. Demonstrate communication skills for resolving community issues **Theory** Community engagement: concepts and approaches, empowering communities; community engagement clubs; Case studies, stories and challenges; Active citizenship: public duties and responsibilities, civic engagement; Community participation and social mobilization: Importance of community participation in sustainable development, methods, models and techniques of community participation, Leadership: collaborative and community leadership, Types, qualities, role and responsibilities of a community leader, Community service and learning through outreach activities, social change projects; Communication skills for better citizenship. **Suggested Readings** 1. British Council, 2017. Active Citizen's Social Action Projects Guide, Scotland. 2. Brownlie, I., Guy S and G.W. Gill., 2010. Brownlie's Documents on Human rights, London Oxford University Press. 3. Kennedy, K. 1997. Citizenship Education and The Modern State. London: Routledge Falmmer. 4. Larsen, A.K. 2013., Participation community work: International perspectives (Vishanthie Sewpaul, Grete Oline Hole, 2013) 5. Samier, E.A., & P. Milley. 2020. Educational Administration and Leadership Identity Formation. International Theories, Problems and Challenges. 6. Zork, A. 2021. How to Communicate Effectively: Guide to Improve Conversations in Any Relationships and in Public Speaking. Non-Violent Communication, Francesco Pisciotta, Italy	**EDU-306 CIVICS AND COMMUNITY ENGAGEMENT 2(2-0)** **Course Learning Outcomes:** By the end of this course, students will be able to: 1. Demonstrate knowledge and understanding of community engagement and citizenship 2. Describe the solution of community based problems through use of problem solving and critical thinking exercises 3. Analyze leadership phenomenon through volunteer work and youth club worldwide 4. Demonstrate communication skills for resolving community issues **Theory** Community engagement: concepts and approaches, empowering communities; community engagement clubs; Case studies, stories and challenges; Active citizenship: public duties and responsibilities, civic engagement; Community participation and social mobilization: Importance of community participation in sustainable development, methods, models and techniques of community participation, Leadership: collaborative and community leadership, Types, qualities, role and responsibilities of a community leader, Community service and learning through outreach activities, social change projects; Communication skills for better citizenship. **Suggested Readings** 1. British Council, 2017. Active Citizen's Social Action Projects Guide, Scotland. 2. Brownlie, I., Guy S and G.W. Gill., 2010. Brownlie's Documents on Human rights, London Oxford University Press. 3. Kennedy, K. 1997. Citizenship Education and The Modern State. London: Routledge Falmmer. 4. Larsen, A.K. 2013., Participation community work: International perspectives (Vishanthie Sewpaul, Grete Oline Hole, 2013) 5. Samier, E.A., & P. Milley. 2020. Educational Administration and Leadership Identity Formation. International Theories, Problems and Challenges. 6. Zork, A. 2021. How to Communicate Effectively: Guide to Improve Conversations in Any Relationships and in Public Speaking. Non-Violent Communication, Francesco Pisciotta, Italy

FA-310 INTRODUCTION TO ART AND HUMANITIES 2(2-0) **Course Learning Outcomes** By the end of this course students will be able to: 1. Analyze the work of art in historical context. 2. Recognize specific artistic styles produced in different areas. 3. Realize the concept of humanities and critical thinking. 4. Discuss about analytical abilities. **Theory** Introduction to Art and Aesthetics; Greek Philosophy; Classical Period, Greek Philosophers ; Dark Ages; An age of Light; Renaissance period; Introduction & Late Medieval and Early Renaissance, Renaissance Art Movement in Europe; Modern Art movements: French Revolution, Neo Classicism, Realism, Romanticism, Impressionism, Neo Impressionism; Introduction to Humanities; Critical thinking, Analytical abilities; Organizational Skills; Problem Solving. **Suggested Readings** 1. Wood, C. S. 2019. A History of Art History. Princeton University Press., New Jersey, USA. 2. Lewis, R. and S.I. Lewis. 2018. The Power of Art. Cengage Learning, Boston, USA. 3. Raven, J. 2020. The Oxford Illustrated History of the Book. Oxford University Press., England, UK. 4. Nonathan. J., 2018, Humanity: A Moral History, Amazon Publishers, USA. 5. Gregory, S., 2020. The Seven Spiritual Laws, Amazon Publishers, USA.	**FA-310 INTRODUCTION TO ART AND HUMANITIES 2(2-0)** **Course Learning Outcomes** By the end of this course students will be able to: 1. Analyze the work of art in historical context. **2.** Recognize specific artistic styles produced in different areas. 3. Realize the concept of humanities and critical thinking. 4. Discuss about analytical abilities. **Theory** Introduction to Art and Aesthetics; Greek Philosophy; Classical Period, Greek Philosophers ; Dark Ages; An age of Light; Renaissance period; Introduction & Late Medieval and Early Renaissance, Renaissance Art Movement in Europe; Modern Art movements: French Revolution, Neo Classicism, Realism, Romanticism, Impressionism, Neo Impressionism; Introduction to Humanities; Critical thinking, Analytical abilities; Organizational Skills; Problem Solving. **Suggested Readings** 1. Wood, C. S. 2019. A History of Art History. Princeton University Press., New Jersey, USA. 2. Lewis, R. and S.I. Lewis. 2018. The Power of Art. Cengage Learning, Boston, USA. 3. Raven, J. 2020. The Oxford Illustrated History of the Book. Oxford University Press., England, UK. 4. Nonathan. J., 2018, Humanity: A Moral History, Amazon Publishers, USA. 5. Gregory, S., 2020. The Seven Spiritual Laws, Amazon Publishers, USA.
IS-403 MORAL PHILOSOPHY/ روحانیت (FOR NON-MUSLIM AND FOREIGNERS STUDENTS) 1(1-0)	**IS-403 MORAL PHILOSOPHY/ روحانیت (FOR NON-MUSLIM AND FOREIGNERS STUDENTS) 1(1-0)**

نصاب برائے ''روحانیت''

کورس کا عنوان: روحانیت Type: NCC کورس کوڈ IS-403

اہداف ومقاصد

اس کورس کو پڑھنے کے بعد طلباء وطالبات اس قابل ہو سکے گے کہ:

1:۔ طلبہ وطالبات میں روحانیت کے معانی ومفہوم سے آگاہی پیدا کی جاسکے۔

2:۔ طلبہ وطالبات کے قلوب واذہان میں تزکیہ نفس وروحانیت کی بنیادی تعلیمات سے روشناس کرایا جائے

3:۔ روحانیت،تزکیہ نفس اور صوفیائے کرام کے مواعظ اور امت مسلمہ کی ان کی روشنی میں تربیت کی جاسکے۔

روحانیت

1۔ روحانیت کا مفہوم،اہمیت ومقصد

2۔ روحانیت کی حقیقت،آغاز وارتقاء

3۔ انبیائے کرام کی وحی اور اولیائے کرام کے کشف والہام میں امتیاز

4۔ روحانیت کے افکار(مولانا رومی،مولانا مجدد الف ثانی،علامہ محمد اقبالؒ)

5۔ برصغیر پاک وہند میں صوفیائے کرام کی دعوتی وتبلیغی سرگرمیوں کا ایک جائزہ

6۔ راہبانی نظریات وتحریکات کا تنقیدی جائزہ

7۔ تزکیہ نفس/روحانیت کیلئے اہم ضرورت

8۔ دور جدید میں روحانیت کی نوعیت،کردار،اصلاح طلب پہلو

9۔ روحانیت کے غیر اسلامی تہذیبوں پر اثرات کا جائزہ

مجوزہ کتب

(1) سید علی ہجویری،کشف المحجوب،ضیاء القرآن پبلی کیشنز لاہور،2018ء

(2) پروفیسر سلیم چشتی،تاریخ تصوف،علماء اکیڈمی محکمہ اوقات لاہور،2011ء

(3) احسان الٰہی ظہیر،تصوف:تاریخ وحقائق،ادارہ ترجمان السنۃ لاہور،2014ء

(4) ابن جوزی،منہاج القاصدین،ادارہ معارف اسلامی لاہور،2012ء

(5) مولانا جلال الدین رومی،مثنوی مولوی معنوی،الفیصل ناشران لاہور،2016ء

(6) ڈاکٹر طاہر القادری،حقیقت تصوف،منہاج القرآن پبلی کیشنز لاہور،2000ء

(7) ابو حامد غزالی،احیاء علوم الدین،دارالاشاعت کراچی،2011ء

TGM-402 TUTORIAL GROUP MEETING FOR SOFT SKILLS

نصاب برائے ''روحانیت''

کورس کا عنوان: روحانیت Type: NCC کورس کوڈ IS-403

اہداف ومقاصد

اس کورس کو پڑھنے کے بعد طلباء وطالبات اس قابل ہو سکے گے کہ:

1:۔ طلبہ وطالبات میں روحانیت کے معانی ومفہوم سے آگاہی پیدا کی جاسکے۔

2:۔ طلبہ وطالبات کے قلوب واذہان میں تزکیہ نفس وروحانیت کی بنیادی تعلیمات سے روشناس کرایا جائے

3:۔ روحانیت،تزکیہ نفس اور صوفیائے کرام کے مواعظ اور امت مسلمہ کی ان کی روشنی میں تربیت کی جاسکے۔

روحانیت

1۔ روحانیت کا مفہوم،اہمیت ومقصد

2۔ روحانیت کی حقیقت،آغاز وارتقاء

3۔ انبیائے کرام کی وحی اور اولیائے کرام کے کشف والہام میں امتیاز

4۔ روحانیت کے افکار(مولانا رومی،مولانا مجدد الف ثانی،علامہ محمد اقبالؒ)

5۔ برصغیر پاک وہند میں صوفیائے کرام کی دعوتی وتبلیغی سرگرمیوں کا ایک جائزہ

6۔ راہبانی نظریات وتحریکات کا تنقیدی جائزہ

7۔ تزکیہ نفس/روحانیت کیلئے اہم ضرورت

8۔ دور جدید میں روحانیت کی نوعیت،کردار،اصلاح طلب پہلو

9۔ روحانیت کے غیر اسلامی تہذیبوں پر اثرات کا جائزہ

مجوزہ کتب

(1) سید علی ہجویری،کشف المحجوب،ضیاء القرآن پبلی کیشنز لاہور،2018ء

(2) پروفیسر سلیم چشتی،تاریخ تصوف،علماء اکیڈمی محکمہ اوقات لاہور،2011ء

(3) احسان الٰہی ظہیر،تصوف:تاریخ وحقائق،ادارہ ترجمان السنۃ لاہور،2014ء

(4) ابن جوزی،منہاج القاصدین،ادارہ معارف اسلامی لاہور،2012ء

(5) مولانا جلال الدین رومی،مثنوی مولوی معنوی،الفیصل ناشران لاہور،2016ء

(6) ڈاکٹر طاہر القادری،حقیقت تصوف،منہاج القرآن پبلی کیشنز لاہور،2000ء

(7) ابو حامد غزالی،احیاء علوم الدین،دارالاشاعت کراچی،2011ء

TGM-402 TUTORIAL GROUP MEETING FOR SOFT SKILLS

Fifth Semester

HND-501 FUNDAMENTALS OF DIETETICS 3(2-1)

Course Learning Outcomes

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

1. Demonstrate the understanding of the discipline of dietetics and its role in human wellbeing.
2. Explain the foundations of healthy diets and their role in disease prevention and management.
3. Generate calorie calculations and menu planning using food composition table and data bases.
4. Assess BMI and energy expenditures in relation to overweight and obesity.

Theory

Dietetics: Definitions, history, importance; Dietitian: Role in food service and clinical practice, responsibilities in multidisciplinary team, code of ethics, professional societies; Foundations of healthy diet: Dietary reference intakes, recommended dietary allowance, food guide pyramid and allied approaches; Dietary guidelines; Exchange system and menu planning; Energy expenditure

HND-501 FUNDAMENTALS OF DIETETICS 3(2-1)

Course Learning Outcomes

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

1. Demonstrate the understanding of the discipline of dietetics and its role in human wellbeing.
2. Explain the foundations of healthy diets and their role in disease prevention and management.
3. Generate calorie calculations and menu planning using food composition table and data bases.
4. Assess BMI and energy expenditures in relation to overweight and obesity.

Theory

Dietetics: Definitions, history, importance; Dietitian: Role in food service and clinical practice, responsibilities in multidisciplinary team, code of ethics, professional societies; Foundations of healthy diet: Dietary reference

and basal metabolism; Body mass index; Diet therapy and its principles; Food selection and factors affecting its acceptance; Nutrient density; Alternative patterns of food consumption; Nutritional counseling in clinical practice; Critical diet assessment; Role of diet in disease conditions; Nutrition and diet clinics. **Practical** Interpretation of food guide pyramid: MyPyramid, MyPlate, Eatwell Plate, Dietary Guidelines, Nutrition Fact Panel; Energy value of different foods: Carbohydrates, fats, proteins; Calculating energy requirements: BMI in relation to obesity and overweight, energy and calorie requirements; Balanced diet and menu planning using exchange lists, food composition tables & data bases; Food intake analysis: Dietary recall, food frequency questionnaires, food surveys; Nutrition Camps. **Suggested Readings** 1. Lutz, C.A., E. Mazur and N. Litch, N. 2021. Lutz's Nutrition and Diet Therapy. 7th Ed. F.A. Davis Company, PA, USA. 2. Mahan, L.K., S. Escott-Stump and J.L. Raymond. 2021. Krause's Food, Nutrition & Diet Therapy. 15th Ed. Elsevier Saunders, St. Louis, MO, USA. 3. Mudambi, S.R. and M.V. Rajagopal. 2010. Fundamentals of Foods, Nutrition & Diet Therapy. 6th Ed. New Age International Pvt. Ltd. Publishers, New Delhi, India. 4. Rolfes, S.R. and E. Whitney. 2020. Understanding Normal and Clinical Nutrition. 12th Ed. CENGAGE Learning Custom Publication, Boston, USA. 1. Schlenker, E. and J.A. Gilbert. 2018. Williams' Essentials of Nutrition and Diet Therapy, 12th ed. Elsevier/Mosby Inc., Louis, Missouri, USA.	intakes, recommended dietary allowance, food guide pyramid and allied approaches; Dietary guidelines; Exchange system and menu planning; Energy expenditure and basal metabolism; Body mass index; Diet therapy and its principles; Food selection and factors affecting its acceptance; Nutrient density; Alternative patterns of food consumption; Nutritional counseling in clinical practice; Critical diet assessment; Role of diet in disease conditions; Nutrition and diet clinics. **Practical** Interpretation of food guide pyramid: MyPyramid, MyPlate, Eatwell Plate, Dietary Guidelines, Nutrition Fact Panel; Energy value of different foods: Carbohydrates, fats, proteins; Calculating energy requirements: BMI in relation to obesity and overweight, energy and calorie requirements; Balanced diet and menu planning using exchange lists, food composition tables & data bases; Food intake analysis: Dietary recall, food frequency questionnaires, food surveys; Nutrition Camps. **Suggested Readings** 1. Lutz, C.A., E. Mazur and N. Litch, N. 2021. Lutz's Nutrition and Diet Therapy. 7th Ed. F.A. Davis Company, PA, USA. 2. Mahan, L.K., S. Escott-Stump and J.L. Raymond. 2021. Krause's Food, Nutrition & Diet Therapy. 15th Ed. Elsevier Saunders, St. Louis, MO, USA. 3. Mudambi, S.R. and M.V. Rajagopal. 2010. Fundamentals of Foods, Nutrition & Diet Therapy. 6th Ed. New Age International Pvt. Ltd. Publishers, New Delhi, India. 4. Rolfes, S.R. and E. Whitney. 2020. Understanding Normal and Clinical Nutrition. 12th Ed. CENGAGE Learning Custom Publication, Boston, USA. 5. Schlenker, E. and J.A. Gilbert. 2018. Williams' Essentials of Nutrition and Diet Therapy, 12th ed. Elsevier/Mosby Inc., Louis, Missouri, USA.
HND-503 ASSESSMENT OF NUTRITIONAL STATUS 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Perform the nutritional assessment of different age groups through multiple methods. 2. Know the energy requirements of variable segment of population. 3. Employ various nutritional screening tools to rapidly screen vulnerable individuals. 4. Practice nutrient required for optimal growth and development.	**HND-503 ASSESSMENT OF NUTRITIONAL STATUS 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Perform the nutritional assessment of different age groups through multiple methods. 2. Know the energy requirements of variable segment of population. 3. Employ various nutritional screening tools to rapidly screen vulnerable individuals. 4. Practice nutrient required for optimal growth and development.

Theory Nutritional assessment methods: Anthropometrics, biochemical, clinical, dietary; Measuring food consumption at national level: Food balance sheets, total diet consumptions; Food consumption at the household levels: Food account, household food records, household 24-hour food record; Measuring food consumption at individual levels: 24-hour recall, repeated 24-hour recall, weighed food records, diet history, food frequency questionnaire; Selecting an appropriate method: Determining the mean nutrient intake, calculating the population at risk, ranking individuals by food and nutrient intake; Body composition analysis; Calculating energy requirements; Nutritional assessment systems: Nutrition surveys, nutrition surveillance, nutrition screening tools. **Practical** Practicing methods of nutritional assessment (ABCD of Nutritional assessment); Comparison of the data with references values for drawing conclusions; Measuring energy requirements of individuals; Application of nutritional screening tools; Conducting nutritional surveys. **Suggested Readings** 1. Dains, J.E., L.C. Baumann and P. Scheibel. 2015. Advanced Health Assessment & Clinical Diagnosis in Primary Care-E-Book. Elsevier Health Sciences, Amsterdam, The Netherlands. 2. Gupta, A. 2020. Biochemical Parameters and the Nutritional Status of Children: Novel Tools for Assessment. Taylor & Francis Group, Boca Raton, FL, USA. 3. Lee, R.D. and D.C. Nieman. 2012. Nutritional Assessment. 6th Ed. The McGraw Hill Companies Inc., New York, USA. 4. Munoz, N., and M. Bernstein. 2018. Nutrition Assessment: Clinical and Research Applications: Clinical and Research Applications. Jones & Bartlett Learning, Boston, MA, USA. Rakha, A. and Butt, M.S. 2020. Assessment of Nutritional Status: A Household Guide. F-Tech Publishers, Faisalabad, Pakistan.	**Theory** Nutritional assessment methods: Anthropometrics, biochemical, clinical, dietary; Measuring food consumption at national level: Food balance sheets, total diet consumptions; Food consumption at the household levels: Food account, household food records, household 24-hour food record; Measuring food consumption at individual levels: 24-hour recall, repeated 24-hour recall, weighed food records, diet history, food frequency questionnaire; Selecting an appropriate method: Determining the mean nutrient intake, calculating the population at risk, ranking individuals by food and nutrient intake; Body composition analysis; Calculating energy requirements; Nutritional assessment systems: Nutrition surveys, nutrition surveillance, nutrition screening tools. **Practical** Practicing methods of nutritional assessment (ABCD of Nutritional assessment); Comparison of the data with references values for drawing conclusions; Measuring energy requirements of individuals; Application of nutritional screening tools; Conducting nutritional surveys. **Suggested Readings** 1. Dains, J.E., L.C. Baumann and P. Scheibel. 2015. Advanced Health Assessment & Clinical Diagnosis in Primary Care-E-Book. Elsevier Health Sciences, Amsterdam, The Netherlands. 2. Gupta, A. 2020. Biochemical Parameters and the Nutritional Status of Children: Novel Tools for Assessment. Taylor & Francis Group, Boca Raton, FL, USA. 3. Lee, R.D. and D.C. Nieman. 2012. Nutritional Assessment. 6th Ed. The McGraw Hill Companies Inc., New York, USA. **4.** Munoz, N., and M. Bernstein. 2018. Nutrition Assessment: Clinical and Research Applications: Clinical and Research Applications. Jones & Bartlett Learning, Boston, MA, USA. **5.** Rakha, A. and Butt, M.S. 2020. Assessment of Nutritional Status: A Household Guide. F-Tech Publishers, Faisalabad, Pakistan.
HND-505/FN-503 INFANT AND YOUNG CHILD FEEDING 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the national and global trends in breastfeeding and complementary feeding. 2. Analyse the existing feeding practices and apply	**HND-505/FN-503 INFANT AND YOUNG CHILD FEEDING 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 5. Describe the national and global trends in breastfeeding and complementary feeding. 6. Analyse the existing feeding practices and apply

globally practiced strategies for optimal feeding. 3. Establish standards to articulating a global strategy to guide the implementation of breastfeeding policies. 4. Design different complementary foods using locally grown raw materials. **Theory** Infant young child feeding: Introduction, global strategy, importance of breastfeeding, local and international scenario, breastfeeding working; Breastfeeding practices: Assessing a breastfeed, taking a feeding history, common breastfeeding difficulties, expressed breast milk; Breastfeeding counseling: Listening and learning, building confidence and giving support, counseling for infant feeding decisions, counseling cards tools; Nutrition management of the pre-term, full-Term and post-term infant**;** Complementary feeding practices: Importance, cup-feeding and hygienic preparation of food, replacement feeding in the first 6 months, foods to fill energy and micronutrients gap, quantity and frequency of feeding, feeding techniques, food demonstration; Nutrition management of the toddler and preschool child; Breastfeeding related topics: Growth charts, maternal illnesses and breast feeding, breast conditions, health care practices, international code of marketing of breast milk substitutes, checking understanding and arranging follow-up, feeding during illness and low-birth-weight babies; Meal planning guidelines for children and school going children; Feeding guidelines of various global agencies - WHO etc.; Complex challenges to implementing the global strategy for infant and young child feeding. **Practical** Breastfeeding counselling; Preparation of indigenous complementary foods; Therapeutic foods; Infant formulas for various needs; Growth monitoring: APGAR (Appearance, Pulse rate, Grimace, Activity and Respiration) score, Growth charts; Visits of hospitals and day care centers. **Suggested Readings** 1. Black, R.E., M. Makrides, S.A. Adelaide and K.K. Ong, K.K. 2017. Complementary Feeding: Building the Foundations for a Healthy Life. Karger AG, Basel, Switzerland. 2. Dykes, F. and V.H. Moran. 2009. Infant and Young Child Feeding: Challenges to Implementing a Global Strategy. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK. 3. Mahmood. S and U.A. Bajwa. 2019. A Text Book: Infant and Young Child Feeding (IYCF). 1st Ed. Moonstar Publisher, Faisalabad, Pakistan. 4. WHO. 2021. Global Strategy for Infant and	globally practiced strategies for optimal feeding. 7. Establish standards to articulating a global strategy to guide the implementation of breastfeeding policies. 8. Design different complementary foods using locally grown raw materials. **Theory** Infant young child feeding: Introduction, global strategy, importance of breastfeeding, local and international scenario, breastfeeding working; Breastfeeding practices: Assessing a breastfeed, taking a feeding history, common breastfeeding difficulties, expressed breast milk; Breastfeeding counseling: Listening and learning, building confidence and giving support, counseling for infant feeding decisions, counseling cards tools; Nutrition management of the pre-term, full-Term and post-term infant**;** Complementary feeding practices: Importance, cup-feeding and hygienic preparation of food, replacement feeding in the first 6 months, foods to fill energy and micronutrients gap, quantity and frequency of feeding, feeding techniques, food demonstration; Nutrition management of the toddler and preschool child; Breastfeeding related topics: Growth charts, maternal illnesses and breast feeding, breast conditions, health care practices, international code of marketing of breast milk substitutes, checking understanding and arranging follow-up, feeding during illness and low-birth-weight babies; Meal planning guidelines for children and school going children; Feeding guidelines of various global agencies - WHO etc.; Complex challenges to implementing the global strategy for infant and young child feeding. **Practical** Breastfeeding counselling; Preparation of indigenous complementary foods; Therapeutic foods; Infant formulas for various needs; Growth monitoring: APGAR (Appearance, Pulse rate, Grimace, Activity and Respiration) score, Growth charts; Visits of hospitals and day care centers. **Suggested Readings** 5. Black, R.E., M. Makrides, S.A. Adelaide and K.K. Ong, K.K. 2017. Complementary Feeding: Building the Foundations for a Healthy Life. Karger AG, Basel, Switzerland. 6. Dykes, F. and V.H. Moran. 2009. Infant and Young Child Feeding: Challenges to Implementing a Global Strategy. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK. 7. Mahmood. S and U.A. Bajwa. 2019. A Text Book: Infant and Young Child Feeding (IYCF). 1st Ed. Moonstar Publisher, Faisalabad, Pakistan. 8. WHO. 2021. Global Strategy for Infant and

Young Child Feeding. World Health Organization, Geneva, Switzerland. 1. WHO/UNICEF/GOP (World Health Organization/United Nation's Children Fund/Government of Pakistan). 2008. Infant and Young Child Feeding Counselling: An Integrated Course. Nutrition Wing, Ministry of Health, Government of the Pakistan, Islamabad.	Young Child Feeding. World Health Organization, Geneva, Switzerland. **1.** WHO/UNICEF/GOP (World Health Organization/United Nation's Children Fund/Government of Pakistan). 2008. Infant and Young Child Feeding Counselling: An Integrated Course. Nutrition Wing, Ministry of Health, Government of the Pakistan, Islamabad.
HND-507 SPORTS NUTRITION 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the types of sports & trainings and their effect on body. 2. Achieve the fitness goals with different nutritional and management principles and practices. 3. Explain the nutritional requirements for different types of athletes. 4. Formulate the diet plans to meet the energy requirement, regulate body metabolism and provide the nutrients to maintain and repair the muscle tissue. **Theory** The principles of fitness, motivation and conditioning, stress management, preventing accidents, stretching, posture and aerobics, High and low intensity exercise, cross training, walking for weight control; Nutrition for the athletes: Vitamins and minerals supplementation for fitness; Introduction to muscle contraction, fast and slow fibers, energy storage, fuels used for exercise; Energy balance, fluid balance, fueling cycle: Pre-exercise, during exercise and during recovery; Athletes eating plan, calorie goals, calorie values, carbohydrate goals, protein goals, fat, vitamins and mineral goals; Competition nutrition; Loosing, gaining and making weight for athletes; Eating disorder and athletes; Sports drink and supplementation; National and international regulations for supplements; Risks associated with performance enhancing drugs; Metabolic equivalent task; My Pyramid for sportsman. **Practical** Bioelectric impedance analysis; Sweat rate and hydration status calculation; Calculation of BMR and RMR; Diet planning for different sportsmen like body builders, athletes, swimmers, etc.; Preparation of sports drinks and food products according to accelerated needs; Use of sports supplements; Visit of sports centers and fitness clubs. **Suggested Readings** 1. Belski, R., A. Forsyth and E. Mantzioris. 2021. Nutrition for Sport, Exercise and Performance: A Practical Guide for Students, Sports Enthusiasts	**HND-507 SPORTS NUTRITION 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the types of sports & trainings and their effect on body. 2. Achieve the fitness goals with different nutritional and management principles and practices. 3. Explain the nutritional requirements for different types of athletes. 4. Formulate the diet plans to meet the energy requirement, regulate body metabolism and provide the nutrients to maintain and repair the muscle tissue. **Theory** The principles of fitness, motivation and conditioning, stress management, preventing accidents, stretching, posture and aerobics, High and low intensity exercise, cross training, walking for weight control; Nutrition for the athletes: Vitamins and minerals supplementation for fitness; Introduction to muscle contraction, fast and slow fibers, energy storage, fuels used for exercise; Energy balance, fluid balance, fueling cycle: Pre-exercise, during exercise and during recovery; Athletes eating plan, calorie goals, calorie values, carbohydrate goals, protein goals, fat, vitamins and mineral goals; Competition nutrition; Loosing, gaining and making weight for athletes; Eating disorder and athletes; Sports drink and supplementation; National and international regulations for supplements; Risks associated with performance enhancing drugs; Metabolic equivalent task; My Pyramid for sportsman. **Practical** Bioelectric impedance analysis; Sweat rate and hydration status calculation; Calculation of BMR and RMR; Diet planning for different sportsmen like body builders, athletes, swimmers, etc.; Preparation of sports drinks and food products according to accelerated needs; Use of sports supplements; Visit of sports centers and fitness clubs. **Suggested Readings** 1. Belski, R., A. Forsyth and E. Mantzioris.

and Professionals. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 2. Benardot, D. 2018. ACSM's Nutrition for Exercise Science. Wolters Kluwer, The Netherlands. 3. Benardot, D. 2021. Advanced Sports Nutrition. Human Kinetic. Champaign, IL, USA. 4. Fink, H.H. and A.E. Mikesky. 2018. Practical Applications in Sports Nutrition. 3rd Ed. Jones & Bartlett Learning, Burlington, MA, USA. 1. Haff, G.G. and C. Dumke. 2021. Laboratory Manual for Exercise Physiology. Human Kinetics, Champaign, IL, USA.	2021. Nutrition for Sport, Exercise and Performance: A Practical Guide for Students, Sports Enthusiasts and Professionals. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 2. Benardot, D. 2018. ACSM's Nutrition for Exercise Science. Wolters Kluwer, The Netherlands. 3. Benardot, D. 2021. Advanced Sports Nutrition. Human Kinetic. Champaign, IL, USA. **4.** Fink, H.H. and A.E. Mikesky. 2018. Practical Applications in Sports Nutrition. 3rd Ed. Jones & Bartlett Learning, Burlington, MA, USA. **5.** Haff, G.G. and C. Dumke. 2021. Laboratory Manual for Exercise Physiology. Human Kinetics, Champaign, IL, USA.
PATH-504 INTRODUCTION TO PATHOLOGY 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate molecular mechanisms involved in cellular pathology. 2. Explain the role of various factors in disease development. 3. Perform sample collection, and various hematological and biochemical techniques. 4. Interpret reports for disease diagnosis along with pathological alterations. **Theory** Health and disease; Language of pathology; Basic concepts; Cell injury, inflammation, wound healing and repair, growth disturbances Ischemia, hypoxia, necrosis, infarction, atrophy, hypertrophy, hyperplasia, metaplasia, plasia, anaplasia; Response of body to injury and infection, circulatory disturbances, neoplasia, fever, disturbance of mineral deposits and pigmentation, anaemia, diarrhoea, burn injury, infectious diseases, hypertension, acute & chronic inflammation, immunity, allergy, hypersensitivity, ulcer (peptic, duodenal), leukemia or blood cancer, environmental and nutritional diseases; Diagnosis and treatment of cancer in general, fate, survival and prognosis with tumors. **Practical** Selection, collection, preservation and dispatch of morbid material for laboratory examination; Demonstration of blood sampling; Diagnosis of anemia; Demonstration of routine urinalysis, Fecal examination and skin scrapping; Blood smears; Staining and examination; Hematology report interpretation; Basic concepts of contents and interpretation of pathology report (serum enzymes and	**PATH-504 INTRODUCTION TO PATHOLOGY 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate molecular mechanisms involved in cellular pathology. 2. Explain the role of various factors in disease development. 3. Perform sample collection, and various hematological and biochemical techniques. 4. Interpret reports for disease diagnosis along with pathological alterations. **Theory** Health and disease; Language of pathology; Basic concepts; Cell injury, inflammation, wound healing and repair, growth disturbances Ischemia, hypoxia, necrosis, infarction, atrophy, hypertrophy, hyperplasia, metaplasia, plasia, anaplasia; Response of body to injury and infection, circulatory disturbances, neoplasia, fever, disturbance of mineral deposits and pigmentation, anaemia, diarrhoea, burn injury, infectious diseases, hypertension, acute & chronic inflammation, immunity, allergy, hypersensitivity, ulcer (peptic, duodenal), leukemia or blood cancer, environmental and nutritional diseases; Diagnosis and treatment of cancer in general, fate, survival and prognosis with tumors. **Practical** Selection, collection, preservation and dispatch of morbid material for laboratory examination; Demonstration of blood sampling; Diagnosis of anemia; Demonstration of routine urinalysis, Fecal examination and skin scrapping; Blood smears; Staining and examination; Hematology report interpretation; Basic concepts of contents and interpretation of pathology report (serum enzymes and

other markers of disease). **Suggested Readings** 1. Elaine, S. J., N.L. Harris, D.A. Arber, E. Campo, L.Q. Martinez and A. Orazi. 2016. Hematopathology. 2nd Ed. Elsevier. Netherland. 2. Hudnall, S.D., M. Much and A. Siddon. 2019. Pocket Guide to Diagnostic Hematopathology. Springer International Publishing, Switzerland. 3. Hammer, G.D. and S.J. McPhee. 2018. Pathophysiology of Disease: An Introduction to Clinical Medicine. 8th Ed. McGraw-Hill Education, NY, USA. 4. Kumar, V., A. Abbas, and J. Aster. 2020. Robbins and Cotran Pathologic Basis of Disease. 10th Ed. Saunders Elsevier, USA. 5. Kathryn Foucar, D. Chabot-Richards, D. Czuchlewski, K.H. Karner, K. Reichard M.A. Vasef, C.S. Wilson, Q. Zhang and K. Culbreath. 2017. Diagnostic Pathology: Blood and Bone Marrow. Elsevier Sunders, Philadelphia, PA, USA.	other markers of disease). **Suggested Readings** 1. Elaine, S. J., N.L. Harris, D.A. Arber, E. Campo, L.Q. Martinez and A. Orazi. 2016. Hematopathology. 2nd Ed. Elsevier. Netherland. 2. Hudnall, S.D., M. Much and A. Siddon. 2019. Pocket Guide to Diagnostic Hematopathology. Springer International Publishing, Switzerland. 3. Hammer, G.D. and S.J. McPhee. 2018. Pathophysiology of Disease: An Introduction to Clinical Medicine. 8th Ed. McGraw-Hill Education, NY, USA. 4. Kumar, V., A. Abbas, and J. Aster. 2020. Robbins and Cotran Pathologic Basis of Disease. 10th Ed. Saunders Elsevier, USA. 5. Kathryn Foucar, D. Chabot-Richards, D. Czuchlewski, K.H. Karner, K. Reichard M.A. Vasef, C.S. Wilson, Q. Zhang and K. Culbreath. 2017. Diagnostic Pathology: Blood and Bone Marrow. Elsevier Sunders, Philadelphia, PA, USA.
BIOCHEM-503 CLINICAL BIOCHEMISTRY 3(1-2) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate the ability to organize and manage clinical laboratory. 2. Describe the working principles of commonly used equipments in clinical laboratory 3. Familiarize with blood sampling and analysis techniques. 4. Investigate molecular basis of diagnosis. **Theory** Clinical laboratory: Organization and management, safety, good lab practices, quality control and assurance, reference range and normal values, laboratory data processing; Handling and processing of clinical samples; Effect of storage on composition of samples; Commonly used instruments in clinical laboratory: Microscope, minilab apparatus, X-ray, ECG, MRI, ELISA reader, CT scan etc.; Symptomlogy and case histories of various diseases; Forensic science; Molecular basis of diagnosis. **Practical** Blood sampling techniques; Complete blood picture (CBP) like Hb, PCV, ESR, TLC, DLC, bleeding time, clotting time, prothrombin time and blood groups; Pregnancy test; Liver function tests; Kidney function test; Cardiac enzymes; Lipid profile; Total proteins: Albumin and serum minerals; Urine analysis for bile pigments, protein, urea, pH, ketone	**BIOCHEM-503 CLINICAL BIOCHEMISTRY 3(1-2)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate the ability to organize and manage clinical laboratory. 2. Describe the working principles of commonly used equipments in clinical laboratory 3. Familiarize with blood sampling and analysis techniques. 4. Investigate molecular basis of diagnosis. **Theory** Clinical laboratory: Organization and management, safety, good lab practices, quality control and assurance, reference range and normal values, laboratory data processing; Handling and processing of clinical samples; Effect of storage on composition of samples; Commonly used instruments in clinical laboratory: Microscope, minilab apparatus, X-ray, ECG, MRI, ELISA reader, CT scan etc.; Symptomlogy and case histories of various diseases; Forensic science; Molecular basis of diagnosis. **Practical** Blood sampling techniques; Complete blood picture (CBP) like Hb, PCV, ESR, TLC, DLC, bleeding time, clotting time, prothrombin time and blood groups; Pregnancy test; Liver function tests; Kidney function test; Cardiac enzymes; Lipid profile; Total proteins: Albumin and serum minerals; Urine analysis for bile pigments, protein, urea,

bodies, sugars, creatinine, pus cells, RBCs and uric acid; Sero-diagnosis of infectious diseases; Visit to clinical laboratory/concerned organization. **Suggested Readings** 1. Ahmed, N. 2011. Clinical Biochemistry. Oxford University Press, Oxford, UK. 2. Bain, B.J., I. Bates, M.A. Laffan and S.M. Lewis.2012. Practical Haematology. 11th Ed. Churchill Livingstone, Elsevier Ltd., NY, USA. 3. Burtis, C., E. Ashwood and D. Burns. 2006. Tietz Text Book of Clinical Chemistry and Molecular Diagnostics. 4th Ed. Elsevier Saunders Company, Philadelphia, USA. 4. Chawala, R. 2014. Practical Clinical Biochemistry: Methods and Interpretations. 4th Ed. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, India. 5. Devlin, T. M. 2005. Textbook of biochemistry with clinical correlations. 6th Ed. Wiley-Liss, Inc., USA. 1.	pH, ketone bodies, sugars, creatinine, pus cells, RBCs and uric acid; Sero-diagnosis of infectious diseases; Visit to clinical laboratory/concerned organization. **Suggested Readings** 1. Ahmed, N. 2011. Clinical Biochemistry. Oxford University Press, Oxford, UK. 2. Bain, B.J., I. Bates, M.A. Laffan and S.M. Lewis.2012. Practical Haematology. 11th Ed. Churchill Livingstone, Elsevier Ltd., NY, USA. 3. Burtis, C., E. Ashwood and D. Burns. 2006. Tietz Text Book of Clinical Chemistry and Molecular Diagnostics. 4th Ed. Elsevier Saunders Company, Philadelphia, USA. 4. Chawala, R. 2014. Practical Clinical Biochemistry: Methods and Interpretations. 4th Ed. Jaypee Brothers Medical Publishers (P) Ltd., New Delhi, India. 5. Devlin, T. M. 2005. Textbook of biochemistry with clinical correlations. 6th Ed. Wiley-Liss, Inc., USA.
TGM-501 TUTORIAL GROUP MEETING FOR SOFT SKILLS	**TGM-501 TUTORIAL GROUP MEETING FOR SOFT SKILLS**
Sixth Semester	
HND-502 HOSPITAL DIETETICS-I 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate the understanding of the principles of diet therapy and therapeutic nutrition. 2. Describe the role of dietary management in various health disorders related to upper and lower gastrointestinal tract as well as associated organs. 3. Design the specific diets for various health disorders including pre- and post-operative diets through the modification of normal diets. **Theory** Introduction to diet therapy; Principles of diet therapy and therapeutic nutrition; Therapeutic modifications of normal diets; Dietary management in various health disorders: Objective, physiology, food choices, diet plan; Diet in the diseases of the upper gastrointestinal tract: Mouth, dental disease, pharynx, esophagitis; hiatal hernia; gastritis; peptic ulcer; Diet in the diseases of the lower gastrointestinal tract: Constipation, diarrhea, lactose Intolerance, celiac disease, inflammatory bowel disease, crohn's disease, ulcerative colitis, irritable bowel syndrome, diverticular disease, gastric surgery, dumping syndrome, small bowel resections, short bowel	**HND-502 HOSPITAL DIETETICS-I 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate the understanding of the principles of diet therapy and therapeutic nutrition. 2. Describe the role of dietary management in various health disorders related to upper and lower gastrointestinal tract as well as associated organs. 3. Design the specific diets for various health disorders including pre- and post-operative diets through the modification of normal diets. **Theory** Introduction to diet therapy; Principles of diet therapy and therapeutic nutrition; Therapeutic modifications of normal diets; Dietary management in various health disorders: Objective, physiology, food choices, diet plan; Diet in the diseases of the upper gastrointestinal tract: Mouth, dental disease, pharynx, esophagitis; hiatal hernia; gastritis; peptic ulcer; Diet in the diseases of the lower gastrointestinal tract: Constipation, diarrhea, lactose Intolerance, celiac disease, inflammatory bowel disease, crohn's disease, ulcerative colitis, irritable bowel

syndromes, blind loop syndrome, ileostomy or colostomy; Diet in the diseases of liver and accessory organs: Hepatitis, hepatic steatosis, non-alcoholic hepatic steatosis, alcoholic liver disease, cirrhosis, hepatic encephalopathy, cholelithiasis, cholecystitis, cholangitis, pancreatitis; Nutrition education and primary health care camp. **Practical** Steps in nutrition care; Types of diets: Regular diet, clear liquid diet, full liquid diet, soft diet, bland diet; Dietary modification for texture, energy, nutrients and fluids; Planning of energy modified diets: High calorie diet, restricted calorie diet, high fiber diet, low residue diet, modified carbohydrates diet, moderate carbohydrate diet, modified fat diet, restricted fats diet; Planning and preparation of diets for various pathological conditions; Nutrition in surgical conditions: pre-and post-operative diets; Enteral and parenteral feeding; Hospital visits and nutrition camps. **Suggested Readings** 1. Lutz, C.A., E. Mazur and N. Litch, N. 2021. Lutz's Nutrition and Diet Therapy. 7th Ed. F.A. Davis Company, PA, USA. 2. Mahan, L.K., S. Escott-Stump and J.L. Raymond. 2021. Krause's Food, Nutrition & Diet Therapy. 15th Ed. Elsevier Saunders, St. Louis, MO, USA. 3. Mudambi, S.R. and M.V. Rajagopal. 2010. Fundamentals of Foods, Nutrition & Diet Therapy. 6th Ed. New Age International Pvt. Ltd. Publishers, New Delhi, India. 4. Nelms, M. and K.P. Sucher. 2019. Nutrition Therapy and Pathophysiology. 4th Ed. Cengage Learning Custom Publication, Boston, USA. 1. Rolfes, S.R. and E. Whitney. 2020. Understanding Normal and Clinical Nutrition. 12th Ed. Cengage Learning Custom Publication, Boston, USA.	syndrome, diverticular disease, gastric surgery, dumping syndrome, small bowel resections, short bowel syndromes, blind loop syndrome, ileostomy or colostomy; Diet in the diseases of liver and accessory organs: Hepatitis, hepatic steatosis, non-alcoholic hepatic steatosis, alcoholic liver disease, cirrhosis, hepatic encephalopathy, cholelithiasis, cholecystitis, cholangitis, pancreatitis; Nutrition education and primary health care camp. **Practical** Steps in nutrition care; Types of diets: Regular diet, clear liquid diet, full liquid diet, soft diet, bland diet; Dietary modification for texture, energy, nutrients and fluids; Planning of energy modified diets: High calorie diet, restricted calorie diet, high fiber diet, low residue diet, modified carbohydrates diet, moderate carbohydrate diet, modified fat diet, restricted fats diet; Planning and preparation of diets for various pathological conditions; Nutrition in surgical conditions: pre-and post-operative diets; Enteral and parenteral feeding; Hospital visits and nutrition camps. **Suggested Readings** 1. Lutz, C.A., E. Mazur and N. Litch, N. 2021. Lutz's Nutrition and Diet Therapy. 7th Ed. F.A. Davis Company, PA, USA. 2. Mahan, L.K., S. Escott-Stump and J.L. Raymond. 2021. Krause's Food, Nutrition & Diet Therapy. 15th Ed. Elsevier Saunders, St. Louis, MO, USA. 3. Mudambi, S.R. and M.V. Rajagopal. 2010. Fundamentals of Foods, Nutrition & Diet Therapy. 6th Ed. New Age International Pvt. Ltd. Publishers, New Delhi, India. **4.** Nelms, M. and K.P. Sucher. 2019. Nutrition Therapy and Pathophysiology. 4th Ed. Cengage Learning Custom Publication, Boston, USA. **5.** Rolfes, S.R. and E. Whitney. 2020. Understanding Normal and Clinical Nutrition. 12th Ed. Cengage Learning Custom Publication, Boston, USA.
HND-504/HE-302 MEAL PLANNING AND MANAGEMENT 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the importance of meal planning for different food settings. 2. Evaluate the quality of food based on their seasonal availability. 3. Design menus for families and events keeping in view the calorie requirement, balance food and budget.	**HND-504/HE-302 MEAL PLANNING AND MANAGEMENT 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 2. Explain the importance of meal planning for different food settings. 3. Evaluate the quality of food based on their seasonal availability. 4. Design menus for families and events keeping in view the calorie requirement, balance food and budget.

4. Demonstrate the etiquettes and manners in meal management and its serving. **Theory** Importance and principles of meal planning for family and occasions; Nutritional value of meal; Family meal budgeting; Rules for good menu planning; Menu planning for families; Selection of various foods in relation to season and market conditions; Composition and storage of food; Selection, use and care of table appointments; Study of different types of table settings, table manners and etiquettes; Kitchen safety and settings; Basics of food hygiene and sanitation; Food labeling; Menus for schools, geriatric and healthcare centers. **Practical** Survey and record keeping of market prices (retail & wholesale); Types of foods available in the market from different food groups. *e.g.* retail cuts of meat and types of milk; Comparison of weight, volume and effect of cooking on color, taste and texture of different foods; Planning, preparation and service of meals for different occasions at different income levels; Understanding food labels; Market visits for cost and quality and food marketing regulations; Food service visits (Restaurants, School, Colleges, Hospitals). **Suggested Readings** 1. Brown, A. 2015. Understanding Food Principles & Preparation. 5th Ed. Cengage Learning, Belmont, CA, USA. 2. McWilliams, M. 2012. Fundamentals of Meal Management. 5th Ed. Dorling Kindersley India Pvt. Ltd., New Delhi, India. 3. Narvaez-Soriano, S. 2004. A Guide to Meal Management and Table Services. Rex Book Store, Manilla, Philippine. 1. Sethi, M. 2008. Institutional Food Management. New Age International Pvt. Ltd. New Delhi, India.	5. Demonstrate the etiquettes and manners in meal management and its serving. **Theory** Importance and principles of meal planning for family and occasions; Nutritional value of meal; Family meal budgeting; Rules for good menu planning; Menu planning for families; Selection of various foods in relation to season and market conditions; Composition and storage of food; Selection, use and care of table appointments; Study of different types of table settings, table manners and etiquettes; Kitchen safety and settings; Basics of food hygiene and sanitation; Food labeling; Menus for schools, geriatric and healthcare centers. **Practical** Survey and record keeping of market prices (retail & wholesale); Types of foods available in the market from different food groups. *e.g.* retail cuts of meat and types of milk; Comparison of weight, volume and effect of cooking on color, taste and texture of different foods; Planning, preparation and service of meals for different occasions at different income levels; Understanding food labels; Market visits for cost and quality and food marketing regulations; Food service visits (Restaurants, School, Colleges, Hospitals). **Suggested Readings** 1. Brown, A. 2015. Understanding Food Principles & Preparation. 5th Ed. Cengage Learning, Belmont, CA, USA. 2. McWilliams, M. 2012. Fundamentals of Meal Management. 5th Ed. Dorling Kindersley India Pvt. Ltd., New Delhi, India. 3. Narvaez-Soriano, S. 2004. A Guide to Meal Management and Table Services. Rex Book Store, Manilla, Philippine. 4. Sethi, M. 2008. Institutional Food Management. New Age International Pvt. Ltd. New Delhi, India.
HND-506/FN-508 NUTRITION IN EMERGENCIES 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the role of nutrition in natural and manmade disasters. 2. Design and implement interventions to prevent and treat malnutrition in emergencies. 3. Recognize the importance of general food distribution and supplementary feeding especially for the vulnerable. 4. Describe functioning of different national and international agencies in emergencies	**HND-506/FN-508 NUTRITION IN EMERGENCIES 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the role of nutrition in natural and manmade disasters. 2. Design and implement interventions to prevent and treat malnutrition in emergencies. 3. Recognize the importance of general food distribution and supplementary feeding especially for the vulnerable. 4. Describe functioning of different national and international agencies in emergencies

Theory Introduction and concepts: Understanding malnutrition, micronutrient malnutrition, causes of malnutrition; Nutrition needs assessment and analysis: Individual and population assessment, health assessment and the link with nutrition, food security assessment and the link with nutrition, nutrition information and surveillance systems; Interventions to prevent and treat malnutrition: General food distribution, supplementary feeding, therapeutic care, micronutrient interventions, health and livelihood interventions, infant and young child feeding, HIV and AIDS nutrition; Immune boosting foods with reference to COVID-19; Nutrition information, education and communication; Monitoring and evaluation, standards and accountability; Role of national and international agencies: UNHCR, WFP, NCOC (National Command and Operation Center), NDMA (National disaster management authority); Civil defense; Hygiene and sanitation; Emergency foods; Role of public health nutritionists. **Suggested Readings** 1. ENN (Emergency Nutrition Network). 2011. The Harmonized Training Package (HTP): Resource Material for Training on Nutrition in Emergencies, Version 2. Nutrition Works, Emergency Nutrition Network, Global Nutrition Cluster. Oxford, U.K. 2. FAO. 2005. Protecting and Promoting Good Nutrition in Crisis and Recovery: Resource Guide. Food and Agriculture Organization of the United Nations, Rome, Italy. 3. SC (Save the Children Fund UK). 2004. Emergency Nutrition Assessment: Guidelines for Field Workers. Save the Children, Westport, U.K. 4. UNICEF. 2018. Nutrion in Emergency: Savings Lives Today, Strengthening Systems for Tomorrow. Nutrition Section Programme Division UNICEF, NY, USA. 1. WHO (World Health Organization). 2000. The Management of Nutrition in Major Emergencies. World Health Organization, Geneva, Switzerland.	**Theory** Introduction and concepts: Understanding malnutrition, micronutrient malnutrition, causes of malnutrition; Nutrition needs assessment and analysis: Individual and population assessment, health assessment and the link with nutrition, food security assessment and the link with nutrition, nutrition information and surveillance systems; Interventions to prevent and treat malnutrition: General food distribution, supplementary feeding, therapeutic care, micronutrient interventions, health and livelihood interventions, infant and young child feeding, HIV and AIDS nutrition; Immune boosting foods with reference to COVID-19; Nutrition information, education and communication; Monitoring and evaluation, standards and accountability; Role of national and international agencies: UNHCR, WFP, NCOC (National Command and Operation Center), NDMA (National disaster management authority); Civil defense; Hygiene and sanitation; Emergency foods; Role of public health nutritionists. **Suggested Readings** 1. ENN (Emergency Nutrition Network). 2011. The Harmonized Training Package (HTP): Resource Material for Training on Nutrition in Emergencies, Version 2. Nutrition Works, Emergency Nutrition Network, Global Nutrition Cluster. Oxford, U.K. 2. FAO. 2005. Protecting and Promoting Good Nutrition in Crisis and Recovery: Resource Guide. Food and Agriculture Organization of the United Nations, Rome, Italy. 3. SC (Save the Children Fund UK). 2004. Emergency Nutrition Assessment: Guidelines for Field Workers. Save the Children, Westport, U.K. 4. UNICEF. 2018. Nutrion in Emergency: Savings Lives Today, Strengthening Systems for Tomorrow. Nutrition Section Programme Division UNICEF, NY, USA. 5. WHO (World Health Organization). 2000. The Management of Nutrition in Major Emergencies. World Health Organization, Geneva, Switzerland.
HND-508/ FN-603 CLINICAL NUTRITION **3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Understand nutrition assessment, interventions and education of patients. 2. Explain nutrition needs of patients. 3. Demonstrate knowledge of nutrition principles and their application to disease prevention and	**HND-508/ FN-603 CLINICAL NUTRITION** **3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Understand nutrition assessment, interventions and education of patients. 2. Explain nutrition needs of patients. 3. Demonstrate knowledge of nutrition principles and their application to disease

management. 4. Familiarize with the scientific knowledge and principles of nutrition into practical information. **Theory** Importance of clinical nutrition; Nutritional screening and assessment: database and analysis, anthropometric test, biochemical test, clinical observation, dietary histories, analysis planning problem list and medical record, food planes management; Therapy in patient care: Therapeutic process, stress of therapeutic encounter, focus of care, faces of care processes; Modified diets for various physiological need; Basic concepts and mode of feeding: Enteral nutrition: Nutritional prescription, types of tubes, strategies to optimize delivery and minimize risks, pediatric enteral feeding; Total parenteral nutrition: Intravenous nutritional prescription for specific conditions; Complications in enteral and parenteral nutrition; Evaluation quality of patient care and role of nutritionist and nurse; Drug nutrient interactions: drug effects on food and nutrients, distribution metabolism and vitamin effects on drug; Dietary supplements; Nutrition therapy in disease of infancy and childhood: Patient's selection, nutritional requirement of patient. **Practical** Nutritional assessment of patients: Selection, nutritional requirements; Tube feeding: types, feeding equipment, preparation and application of enteral/nasogastric diets, Monitoring the tube fed patients; Pre-operative and post-operative diets; Parenteral nutrition: Basic rules for TPN use, TPN techniques, TPN prescription, preparation of TPN solution; Case studies and logbooks; Hospital visits. **Suggested Readings** 1. Cresci, G.A. 2015. Nutrition Support for the Critically Ill Patient: A Guide to Practice. 2nd Ed. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 2. Katz, D., Y. Ming-Chin, J. Levitt, K.D. Essel, S. Joshi and R.S.C. Friedman. 2021. Nutrition in Clinical Practice. Lippincott Williams and Wilkins. Philadelphia, PA. 3. Mahan, L.K., S. Escott-Stump and J.L. Raymond. 2021. Krause's Food, Nutrition & Diet Therapy. 15th Ed. Elsevier Saunders, St. Louis, MO, USA. 4. Rolfes, S.R. and E. Whitney. 2020. Understanding Normal and Clinical Nutrition. 12th Ed. Cengage Learning Custom Publication, Boston, USA. 1. Sobotka, L. 2019. Basics in Clinical Nutrition. 5th Ed . Galen. Belmont, USA.	prevention and management. 4. Familiarize with the scientific knowledge and principles of nutrition into practical information. **Theory** Importance of clinical nutrition; Nutritional screening and assessment: database and analysis, anthropometric test, biochemical test, clinical observation, dietary histories, analysis planning problem list and medical record, food planes management; Therapy in patient care: Therapeutic process, stress of therapeutic encounter, focus of care, faces of care processes; Modified diets for various physiological need; Basic concepts and mode of feeding: Enteral nutrition: Nutritional prescription, types of tubes, strategies to optimize delivery and minimize risks, pediatric enteral feeding; Total parenteral nutrition: Intravenous nutritional prescription for specific conditions; Complications in enteral and parenteral nutrition; Evaluation quality of patient care and role of nutritionist and nurse; Drug nutrient interactions: drug effects on food and nutrients, distribution metabolism and vitamin effects on drug; Dietary supplements; Nutrition therapy in disease of infancy and childhood: Patient's selection, nutritional requirement of patient. **Practical** Nutritional assessment of patients: Selection, nutritional requirements; Tube feeding: types, feeding equipment, preparation and application of enteral/nasogastric diets, Monitoring the tube fed patients; Pre-operative and post-operative diets; Parenteral nutrition: Basic rules for TPN use, TPN techniques, TPN prescription, preparation of TPN solution; Case studies and logbooks; Hospital visits. **Suggested Readings** 1. Cresci, G.A. 2015. Nutrition Support for the Critically Ill Patient: A Guide to Practice. 2nd Ed. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 2. Katz, D., Y. Ming-Chin, J. Levitt, K.D. Essel, S. Joshi and R.S.C. Friedman. 2021. Nutrition in Clinical Practice. Lippincott Williams and Wilkins. Philadelphia, PA. 3. Mahan, L.K., S. Escott-Stump and J.L. Raymond. 2021. Krause's Food, Nutrition & Diet Therapy. 15th Ed. Elsevier Saunders, St. Louis, MO, USA. **4.** Rolfes, S.R. and E. Whitney. 2020. Understanding Normal and Clinical Nutrition. 12th Ed. Cengage Learning Custom Publication, Boston, USA. **5.** Sobotka, L. 2019. Basics in Clinical Nutrition. 5th Ed . Galen. Belmont, USA.

HND-510 NUTRITIONAL IMMUNOLOGY 2(2-0)	HND-510 NUTRITIONAL IMMUNOLOGY 2(2-0)
Course Learning Outcomes By the end of this course, students will be able to: 1. Explain the relationship between nutrition and the immunity. 2. Describe the factors impacting nutritional and immunological status. 3. Analyze how diet-induced changes can contribute to the occurrence or prevention of selected diseases. 4. Demonstrate an understanding about the interactions among the nutrients and immune responses.	**Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the relationship between nutrition and the immunity. 2. Describe the factors impacting nutritional and immunological status. 3. Analyze how diet-induced changes can contribute to the occurrence or prevention of selected diseases. 4. Demonstrate an understanding about the interactions among the nutrients and immune responses.
Theory Nutritional immunology: overview, principles; Immune system; Psychoneuroimmunology; Diet and immunity: malnutrition and obesity; under-nutrition and immunity; Role of macro- and micro-nutrients in immunity, Nutritional directions for the pregnant and lactating woman to boost immunity; Microbial modulators and immune system; Immunoenhancing formulas for hospitalized patients; Nutrition and the aging immune system; Nutrition interaction with environmental stress and immunity; Effective detoxification protocols: anti-inflammatory, immune boosting, alkalinizing, detoxification; Mechanisms of immune dysfunction in autoimmune conditions and cancer; Gerson therapy; Harmful effects of vaccinations and antibiotics and nutritional support; Supplementation requirements to treat immune dysfunctions: colds, flus, pandemics; Opportunistic infections; Genetic and immunity; Functional foods and Immunology; Immune boosters; Food Allergies; Cognitive function of nutrients; Immunization and its impacts.	**Theory** Nutritional immunology: overview, principles; Immune system; Psychoneuroimmunology; Diet and immunity: malnutrition and obesity; under-nutrition and immunity; Role of macro- and micro-nutrients in immunity, Nutritional directions for the pregnant and lactating woman to boost immunity; Microbial modulators and immune system; Immunoenhancing formulas for hospitalized patients; Nutrition and the aging immune system; Nutrition interaction with environmental stress and immunity; Effective detoxification protocols: anti-inflammatory, immune boosting, alkalinizing, detoxification; Mechanisms of immune dysfunction in autoimmune conditions and cancer; Gerson therapy; Harmful effects of vaccinations and antibiotics and nutritional support; Supplementation requirements to treat immune dysfunctions: colds, flus, pandemics; Opportunistic infections; Genetic and immunity; Functional foods and Immunology; Immune boosters; Food Allergies; Cognitive function of nutrients; Immunization and its impacts.
Suggested Readings 1. Calder, C.P. and D.A. Kulkarni. 2018. Nutrition, Immunity, and Infection,1st Ed. CPRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 2. Calder, P.C., C.J. Field and H.S. Gill. 2002. Nutrition and Immune Function. CABI Publishing, New York, USA. 3. Gershwin. ME., P. Nestel and C.L. Keen.2004. Handbook of Nutrition and Immunology. Humana Press, New York, USA. 4. Kaspers, B., K.A. Schat, T. Gobel and L. Vervelde. 2021. Avian Immunology, 3rd Ed. Academic Press, San Diego, CA, USA. 1. Mahmoudi, M. and N. Rezaei. 2019. Nutrition and Immunity. Springer Press, Switzerland.	**Suggested Readings** 1. Calder, C.P. and D.A. Kulkarni. 2018. Nutrition, Immunity, and Infection,1st Ed. CPRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 2. Calder, P.C., C.J. Field and H.S. Gill. 2002. Nutrition and Immune Function. CABI Publishing, New York, USA. 3. Gershwin. ME., P. Nestel and C.L. Keen.2004. Handbook of Nutrition and Immunology. Humana Press, New York, USA. **4.** Kaspers, B., K.A. Schat, T. Gobel and L. Vervelde. 2021. Avian Immunology, 3rd Ed. Academic Press, San Diego, CA, USA. **5.** Mahmoudi, M. and N. Rezaei. 2019. Nutrition and Immunity. Springer Press, Switzerland.

HND-512/ FST-502/ FN-510 FOOD ANALYSIS AND SENSORY EVALUATION 3(2-1)

Course Learning Outcomes

By the end of this course, students will be able:

1. Have concepts of food composition, sampling and importance of analysis.
2. Explain the analytical procedures for various parameters along with SOPs for working in labs.
3. Acquire knowledge regarding the concepts of instruments used in food analysis.
4. Describe the importance of sensory evaluation of food products.

Theory

Food analysis: Significance; Sampling: Techniques, plans, preparation and preservation; Physical properties and analysis of foods and food products: Appearance, texture, specific gravity, refractive index, rheology; Compositional and nutritional analysis; Moisture, ash, proteins, lipids, carbohydrates, fiber, nitrogen-free extract (NFE), acidity, pH, sugars, mineral elements, and vitamins; Instruments used in food analysis; Spectroscopy; Chromatography: Introduction, principles, types and applications; Sensory evaluation of foods: Attributes, difference and preference tests, consumer acceptance; Overview of the commonly employed statistical methods.

Practical

Laboratory safety requirements; Preparation and standardization of laboratory solutions; Sampling; Determination of specific gravity, refractive index, moisture, ash, crude protein, crude fat, crude fiber, nitrogen-free extract (NFE), pH and acidity; Estimation of vitamin C; Determination of carbohydrates in foods; Determination of mineral elements through flame photometer and atomic absorption spectrophotometer; Determination of calorific value of foods by using bomb calorimeter; Paper and thin layer chromatography (TLC); Identification of toxins by TLC; Sensory evaluation of foods; Determination of phenolic compounds and their antioxidant activity in fruits and cereals.

Suggested Readings

1. AOAC. 2019. Official Methods of Analysis of AOAC International. 21st Ed. Association of Official Analytical Chemists, Arlington, USA.
2. Awan, J.A. and S.U. Rehman. 2020. Food Analysis Manual. Unitech Communications, Faisalabad, Pakistan.
3. Cruz, R.M.S., I. Khmelinskii and M. Vieira. 2014. Methods in Food Analysis. CRC Press. Taylor & Francis Group, Boca Raton, F.L, USA.
4. Galanakis, C.M. 2021. Innovative Food Analysis.

HND-512/ FST-502/ FN-510 FOOD ANALYSIS AND SENSORY EVALUATION 3(2-1)

Course Learning Outcomes

By the end of this course, students will be able:

1. Have concepts of food composition, sampling and importance of analysis.
2. Explain the analytical procedures for various parameters along with SOPs for working in labs.
3. Acquire knowledge regarding the concepts of instruments used in food analysis.
4. Describe the importance of sensory evaluation of food products.

Theory

Food analysis: Significance; Sampling: Techniques, plans, preparation and preservation; Physical properties and analysis of foods and food products: Appearance, texture, specific gravity, refractive index, rheology; Compositional and nutritional analysis; Moisture, ash, proteins, lipids, carbohydrates, fiber, nitrogen-free extract (NFE), acidity, pH, sugars, mineral elements, and vitamins; Instruments used in food analysis; Spectroscopy; Chromatography: Introduction, principles, types and applications; Sensory evaluation of foods: Attributes, difference and preference tests, consumer acceptance; Overview of the commonly employed statistical methods.

Practical

Laboratory safety requirements; Preparation and standardization of laboratory solutions; Sampling; Determination of specific gravity, refractive index, moisture, ash, crude protein, crude fat, crude fiber, nitrogen-free extract (NFE), pH and acidity; Estimation of vitamin C; Determination of carbohydrates in foods; Determination of mineral elements through flame photometer and atomic absorption spectrophotometer; Determination of calorific value of foods by using bomb calorimeter; Paper and thin layer chromatography (TLC); Identification of toxins by TLC; Sensory evaluation of foods; Determination of phenolic compounds and their antioxidant activity in fruits and cereals.

Suggested Readings

1. AOAC. 2019. Official Methods of Analysis of AOAC International. 21st Ed. Association of Official Analytical Chemists, Arlington, USA.
2. Awan, J.A. and S.U. Rehman. 2020. Food Analysis Manual. Unitech Communications, Faisalabad, Pakistan.
3. Cruz, R.M.S., I. Khmelinskii and M. Vieira. 2014. Methods in Food Analysis. CRC Press.

Elsevier Inc. Food Waste Recovery Group, Vienna, Austria. 5. Pasha, I. and F. Ahmad. 2020. Comprehensive Methods for Food Analysis, A Practical Guide. Pak TM Printers, Faisalabad, Pakistan.	Taylor & Francis Group, Boca Raton, F.L, USA. 4. Galanakis, C.M. 2021. Innovative Food Analysis. Elsevier Inc. Food Waste Recovery Group, Vienna, Austria. 5. Pasha, I. and F. Ahmad. 2020. Comprehensive Methods for Food Analysis, A Practical Guide. Pak TM Printers, Faisalabad, Pakistan.
TGM-502 TUTORIAL GROUP MEETING FOR SOFT SKILLS	**TGM-502 TUTORIAL GROUP MEETING FOR SOFT SKILLS**
Seventh Semester	
HND-601 HOSPITAL DIETETICS-II 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the role of dietary management in various health disorders related to lower gastrointestinal tract and non-communicable diseases. 2. Demonstrate ability for the dietary modification of normal diets aligned with various health disorders. 3. Devise policy principles and strategic actions for the promotion of healthy diets. 4. Identify nutrition education programs for health promotion and disease prevention. **Theory** Diet based regimen to improve the public health; Diet supplementation for diseased patients; Malabsorption and mineral deficiency; Health diets and lifestyles; Preventing diet related diseases; Nutritional implications of various diets; Managing disease and avoiding complications through diet diversification; Dietary management in various health disorders (objective, physiology, food choices, diet plans): Obesity, leanness and underweight; Coronary heart disease: Dyslipidemia, hypertension, ischemic heart disease, heart failure; Fevers and infections; Diabetes mellitus; Diseases of respiratory system: Cystic fibrosis, asthma; Rheumatic diseases: Rheumatoid arthritis, osteoarthritis & gout; Inborn errors of metabolism: Phenylketonuria, maple syrup urine disease, galactosemia, glycogen storage disease; Renal diseases; Burn; Surgical conditions; Bacterial overgrowth; Infections; AIDS; Food allergy; Protein energy malnutrition; Micronutrient deficiencies; Policy principles for promotion of healthy diets; Incorporating nutrition objectives into development policies; Strategic actions and for promoting healthy diets; Drawing up of nutrition education programs; Role of specialist in dietetics and diseases. **Practical**	**HND-601 HOSPITAL DIETETICS-II 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able to: 2. Explain the role of dietary management in various health disorders related to lower gastrointestinal tract and non-communicable diseases. 3. Demonstrate ability for the dietary modification of normal diets aligned with various health disorders. 4. Devise policy principles and strategic actions for the promotion of healthy diets. 5. Identify nutrition education programs for health promotion and disease prevention. **Theory** Diet based regimen to improve the public health; Diet supplementation for diseased patients; Malabsorption and mineral deficiency; Health diets and lifestyles; Preventing diet related diseases; Nutritional implications of various diets; Managing disease and avoiding complications through diet diversification; Dietary management in various health disorders (objective, physiology, food choices, diet plans): Obesity, leanness and underweight; Coronary heart disease: Dyslipidemia, hypertension, ischemic heart disease, heart failure; Fevers and infections; Diabetes mellitus; Diseases of respiratory system: Cystic fibrosis, asthma; Rheumatic diseases: Rheumatoid arthritis, osteoarthritis & gout; Inborn errors of metabolism: Phenylketonuria, maple syrup urine disease, galactosemia, glycogen storage disease; Renal diseases; Burn; Surgical conditions; Bacterial overgrowth; Infections; AIDS; Food allergy; Protein energy malnutrition; Micronutrient deficiencies; Policy principles for promotion of healthy diets; Incorporating nutrition objectives into development policies; Strategic actions and for promoting healthy diets; Drawing up of nutrition education programs; Role of specialist in dietetics and diseases.

Planning of modified diet: consistent carbohydrate diet, moderate carbohydrate diet; Modified proteins diet: High protein diet, restricted protein diet; Modified fats diet: Restricted fats diet; Modified micronutrients diet; Controlled sodium, potassium and phosphorus diet; Dietary management in various health disorders; Hospital visits and nutrition camps. **Suggested Readings** 1. Mahan, L.K., S. Escott-Stump and J.L. Raymond. 2012. Krause's Food, Nutrition & Diet Therapy. 13th Ed. Elsevier Saunders, St. Louis, MO, USA. 2. Mudambi, S.R. and M.V. Rajagopal. 2007. Fundamentals of Foods, Nutrition & Diet Therapy. 5th Ed. New Age International Pvt. Ltd. Publishers, New Delhi, India. 3. Punekar, M. and J. D'Souza. 2010. Handbook of Applied Nutrition, Dietotherapy and Diet Management. SBS Publishers & Distributors Pvt. Ltd., New Delhi, India. 4. Rawat, S. 2015. Applied Nutrition. Random Publication, New Delhi, India. 1. Schlenker, E. and J.A. Gilbert. 2015. Williams' Essentials of Nutrition and Diet Therapy. 11th Ed. Elsevier/Mosby Inc., Louis, MO, USA.	**Practical** Planning of modified diet: consistent carbohydrate diet, moderate carbohydrate diet; Modified proteins diet: High protein diet, restricted protein diet; Modified fats diet: Restricted fats diet; Modified micronutrients diet; Controlled sodium, potassium and phosphorus diet; Dietary management in various health disorders; Hospital visits and nutrition camps. **Suggested Readings** 1. Mahan, L.K., S. Escott-Stump and J.L. Raymond. 2012. Krause's Food, Nutrition & Diet Therapy. 13th Ed. Elsevier Saunders, St. Louis, MO, USA. 2. Mudambi, S.R. and M.V. Rajagopal. 2007. Fundamentals of Foods, Nutrition & Diet Therapy. 5th Ed. New Age International Pvt. Ltd. Publishers, New Delhi, India. 3. Punekar, M. and J. D'Souza. 2010. Handbook of Applied Nutrition, Dietotherapy and Diet Management. SBS Publishers & Distributors Pvt. Ltd., New Delhi, India. 4. Rawat, S. 2015. Applied Nutrition. Random Publication, New Delhi, India. 5. Schlenker, E. and J.A. Gilbert. 2015. Williams' Essentials of Nutrition and Diet Therapy. 11th Ed. Elsevier/Mosby Inc., Louis, MO, USA.
FST-511/HND-603/FN-507 FOOD SERVICE MANAGEMENT 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the key milestones of food service industry. 2. Relate the current trends in food service operations and evolution through the business life cycle. 3. Explain the art underlying menu development and method for recipe standardization. 4. Demonstrate an understanding about 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, techniques, and essential approaches; Theories of management and approaches: Developing objectives and goals, definition, importance, types of goals, policies, procedures and rules; Principles and procedures of management organization and interaction at work: Principles of management,	**FST-511/HND-603/FN-507 FOOD SERVICE MANAGEMENT 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Describe the key milestones of food service industry. 2. Relate the current trends in food service operations and evolution through the business life cycle. 3. Explain the art underlying menu development and method for recipe standardization. 4. Demonstrate an understanding about 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, techniques, and essential approaches; Theories of management and approaches: Developing objectives and goals, definition, importance, types of goals, policies, procedures and rules; Principles and procedures of management organization and interaction at work:

functions of management, tools of management, organization chart, function and work improvement techniques; Principles of quantity food purchase selection: Buying and accounting of different foods; Factors in menu planning for large groups, systems for maintaining quality in food preparation and service; 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 and marketing; Food safety: Good manufacturing practice (GMP), Hazard analysis and critical control point (HACCP); Hygiene and sanitation in preparation and serving area; Safety and sanitation; Menu planning; Large quantity cooking; Menu design and application. **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. Davis, B., A. Lockwood, P. Alcott and I.S. Pantelidis. 2018. Food and Beverage Management. Routledge & CRC Press, Boca Raton, FL, USA. 3. Payne-Palacio, J. and M. Theis. 2015. Foodservice Management: Principles and Practices. 13th ed. Pearson Education, USA. 4. Reynolds, D.R. 2014. Foodservice Management Fundamentals. John Wiley Sons Inc., Hoboken, NJ, USA. Reynolds, D.R., I. Rahman, and CW. Barrows. 2020. Introduction to Hospitality Management. 11th Ed. John Wiley & Sons, Inc., NY, USA.	Principles of management, functions of management, tools of management, organization chart, function and work improvement techniques; Principles of quantity food purchase selection: Buying and accounting of different foods; Factors in menu planning for large groups, systems for maintaining quality in food preparation and service; 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 and marketing; Food safety: Good manufacturing practice (GMP), Hazard analysis and critical control point (HACCP); Hygiene and sanitation in preparation and serving area; Safety and sanitation; Menu planning; Large quantity cooking; Menu design and application. **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. Davis, B., A. Lockwood, P. Alcott and I.S. Pantelidis. 2018. Food and Beverage Management. Routledge & CRC Press, Boca Raton, FL, USA. 3. Payne-Palacio, J. and M. Theis. 2015. Foodservice Management: Principles and Practices. 13th ed. Pearson Education, USA. **4.** Reynolds, D.R. 2014. Foodservice Management Fundamentals. John Wiley Sons Inc., Hoboken, NJ, USA. **5.** Reynolds, D.R., I. Rahman, and CW. Barrows. 2020. Introduction to Hospitality Management. 11th Ed. John Wiley & Sons, Inc., NY, USA.
HND-605 NUTRITION POLICIES AND PROGRAMS 2(2-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the basic issues of malnutrition in Pakistan. 2. Devise appropriate intervention strategies to overcome malnutrition. 3. Discuss different stakeholders of nutrition interventions. 4. Provide perspective about food security challenges of Pakistan. **Theory**	**HND-605 NUTRITION POLICIES AND PROGRAMS 2(2-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Explain the basic issues of malnutrition in Pakistan. 2. Devise appropriate intervention strategies to overcome malnutrition. 3. Discuss different stakeholders of nutrition interventions. 4. Provide perspective about food security challenges of Pakistan. **Theory**

Scenario of malnutrition in Pakistan; Economic cost of malnutrition; World declarations on nutrition; Pakistan's nutrition policy/strategy; Community nutrition programs: National and international i.e., Tawana Pakistan, Ehsaas etc; Conceptual framework of malnutrition Multisectoral approaches to address malnutrition; Evidence based interventions for maternal and child nutrition: Food fortification, supplementation, diet diversification; Biofortification; School nutrition programs: Interventions and impacts; Food security issues of Pakistan; Global hunger index; Breast feeding and complementary feeding; Caring for socio-economically deprived and vulnerable; Preventing and controlling specific micronutrient deficiencies; Preventing and managing infectious diseases; Sustainable development goals; Counseling for change; Nutrition development partners; SUN movement; One health concept; Developing effective food and nutrition policies and programs. **Suggested Readings** 1. Babu, S., S. Gajanan and J.A. Hallam, 2017. Nutrition Economics: Principles and Policy Applications. Academic Press, Elsevier Inc., Burlington, MA, USA 2. IFPRI. 2016. Taking Actions: Progress and Challenges in Implementing Nutrition Policies and Programs. International Food Policy Research Institute, Washington, DC, USA. 3. Merson, M.H., R.E Black, and A.J. Mills. 2020. Global Health: Diseases, Programs, Systems, and Policies. Jones and Bartlett Learning International, London, UK. 4. Nnakwe, N.E. 2017. Community Nutrition: Planning Health Promotion and Disease Prevention. 3rd Ed. Jones and Bartlett Learning International, London, UK. 5. Votruba-Drzal, E. and Dearing, E. 2017. The Wiley Handbook of Early Childhood Development Programs, Practices, and Policies. John Wiley & Sons, Inc., NY, USA.	Scenario of malnutrition in Pakistan; Economic cost of malnutrition; World declarations on nutrition; Pakistan's nutrition policy/strategy; Community nutrition programs: National and international i.e., Tawana Pakistan, Ehsaas etc; Conceptual framework of malnutrition Multisectoral approaches to address malnutrition; Evidence based interventions for maternal and child nutrition: Food fortification, supplementation, diet diversification; Biofortification; School nutrition programs: Interventions and impacts; Food security issues of Pakistan; Global hunger index; Breast feeding and complementary feeding; Caring for socio-economically deprived and vulnerable; Preventing and controlling specific micronutrient deficiencies; Preventing and managing infectious diseases; Sustainable development goals; Counseling for change; Nutrition development partners; SUN movement; One health concept; Developing effective food and nutrition policies and programs. **Suggested Readings** 1. Babu, S., S. Gajanan and J.A. Hallam, 2017. Nutrition Economics: Principles and Policy Applications. Academic Press, Elsevier Inc., Burlington, MA, USA 2. IFPRI. 2016. Taking Actions: Progress and Challenges in Implementing Nutrition Policies and Programs. International Food Policy Research Institute, Washington, DC, USA. 3. Merson, M.H., R.E Black, and A.J. Mills. 2020. Global Health: Diseases, Programs, Systems, and Policies. Jones and Bartlett Learning International, London, UK. **4.** Nnakwe, N.E. 2017. Community Nutrition: Planning Health Promotion and Disease Prevention. 3rd Ed. Jones and Bartlett Learning International, London, UK. **5.** Votruba-Drzal, E. and Dearing, E. 2017. The Wiley Handbook of Early Childhood Development Programs, Practices, and Policies. John Wiley & Sons, Inc., NY, USA.
FST-601/HND-607 INSTRUMENTAL TECHNIQUES IN FOOD AND NUTRITION 3(2-1) **Course Learning Outcomes** By the end of this course students will be able to: 1. Explain modern extraction and food analyzing techniques 2. Acquire knowledge about sampling and sampling procedure, with special reference to intended instruments 3. Demonstrate the basic principles behind analytical techniques 4. Learn different working principles, parts and applications of different instruments used in food	**FST-601/HND-607 INSTRUMENTAL TECHNIQUES IN FOOD AND NUTRITION 3(2-1)** **Course Learning Outcomes** By the end of this course students will be able to: 1. Explain modern extraction and food analyzing techniques 2. Acquire knowledge about sampling and sampling procedure, with special reference to intended instruments 3. Demonstrate the basic principles behind analytical techniques 4. Learn different working principles, parts and applications of different instruments used in food

analysis **Theory** Introduction and significance; Instrumental techniques: Principles, instrumentation and applications; Sample preparation; Micro extraction and supercritical fluid extraction techniques; Microwave and ultrasonic assisted processes for different animal and plant-based foods; Chromatography: Basic principles, thin layer chromatography (TLC), column chromatography, gas chromatography (GC), high-performance liquid chromatography (HPLC) and liquid-chromatography mass-spectrometry (LCMS); Spectroscopy: Ultra violet-visible spectroscopy (UV-VIS,) atomic emission and absorption spectroscopy, infrared spectroscopy, nuclear magnetic resonance (NMR), magnetic resonance imaging (MRI) and computerized tomography (CT) applications as new tools; Mass Spectrometry: Principles and applications; Electrophoresis: Types, principles and applications; Instruments used in the analysis of food colour and flavour; Recent updates in instrumental techniques. **Practical** Sample extraction techniques (microwave assisted, supercritical and ultrasonic); Estimation of food components using UV-VIS spectrophotometer; Mineral analysis by flame photometer and atomic absorption spectrophotometer; Determination of organic acids by high-performance liquid chromatography; Determination of volatile compounds by gas chromatography; Identification of food components by Fourier transform infrared spectroscopy (FTIR); Protein characterization by electrophoresis; Application of novel instrumental techniques. **Suggested Readings** 1. Nielsen, S. 2017. Food Analysis Laboratory Manual. Springer Nature Switzerland AG. 2. Otles, S. 2009. Handbook of Food Analysis Instruments. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 3. Pasha, I. and F. Ahmad. Comprehensive Methods for Food Analysis A Practical Guide. 2020. Pak TM Printers, Faisalabad, Pakistan. 4. Qian, M.C. and O.A. Pike. 2010. Food Analysis Laboratory Manual. 2nd Ed. Springer, NY, USA. 1. Skoog D.A., H.F. James and S.R. Crouch. 2006. Principles of Instrumental Analysis. Cengage Learning, India.	analysis **Theory** Introduction and significance; Instrumental techniques: Principles, instrumentation and applications; Sample preparation; Micro extraction and supercritical fluid extraction techniques; Microwave and ultrasonic assisted processes for different animal and plant-based foods; Chromatography: Basic principles, thin layer chromatography (TLC), column chromatography, gas chromatography (GC), high-performance liquid chromatography (HPLC) and liquid-chromatography mass-spectrometry (LCMS); Spectroscopy: Ultra violet-visible spectroscopy (UV-VIS,) atomic emission and absorption spectroscopy, infrared spectroscopy, nuclear magnetic resonance (NMR), magnetic resonance imaging (MRI) and computerized tomography (CT) applications as new tools; Mass Spectrometry: Principles and applications; Electrophoresis: Types, principles and applications; Instruments used in the analysis of food colour and flavour; Recent updates in instrumental techniques. **Practical** Sample extraction techniques (microwave assisted, supercritical and ultrasonic); Estimation of food components using UV-VIS spectrophotometer; Mineral analysis by flame photometer and atomic absorption spectrophotometer; Determination of organic acids by high-performance liquid chromatography; Determination of volatile compounds by gas chromatography; Identification of food components by Fourier transform infrared spectroscopy (FTIR); Protein characterization by electrophoresis; Application of novel instrumental techniques. **Suggested Readings** 1. Nielsen, S. 2017. Food Analysis Laboratory Manual. Springer Nature Switzerland AG. 2. Otles, S. 2009. Handbook of Food Analysis Instruments. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 3. Pasha, I. and F. Ahmad. Comprehensive Methods for Food Analysis A Practical Guide. 2020. Pak TM Printers, Faisalabad, Pakistan. 4. Qian, M.C. and O.A. Pike. 2010. Food Analysis Laboratory Manual. 2nd Ed. Springer, NY, USA. 5. Skoog D.A., H.F. James and S.R. Crouch. 2006. Principles of Instrumental Analysis. Cengage Learning, India.
HND-609 FOOD SUPPLEMENTS 2(2-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate the concept, field and applications of	**HND-609 FOOD SUPPLEMENTS 2(2-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Demonstrate the concept, field and applications

food supplements 2. Discuss different types and forms of supplements derived from natural and artificial sources 3. Examine the size and scope of supplement industry 4. Explain the regulatory mechanisms and rules regarding development, commercialization and marketing of food supplements **Theory** An overview of dietary supplements and their market; Forms of food supplements; Vitamins and mineral supplements; Essential fatty acids; Amino acids and Enzymes as supplements; Natural products and extracts; Herbs as Food Supplements; 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; natural vs artificial supplements; Marketing and regulatory issues; size and scope of supplement industry in Pakistan in comparison to those of the world; 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. 1. Webb, G.P. 2011. Dietary Supplements and Functional Foods. 2nd Ed. Blackwell Publishing Ltd., Oxford, UK	of food supplements 2. Discuss different types and forms of supplements derived from natural and artificial sources 3. Examine the size and scope of supplement industry 4. Explain the regulatory mechanisms and rules regarding development, commercialization and marketing of food supplements **Theory** An overview of dietary supplements and their market; Forms of food supplements; Vitamins and mineral supplements; Essential fatty acids; Amino acids and Enzymes as supplements; Natural products and extracts; Herbs as Food Supplements; 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; natural vs artificial supplements; Marketing and regulatory issues; size and scope of supplement industry in Pakistan in comparison to those of the world; 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
HND-613/ FST-501 FOOD MICROBIOLOGY AND BIOTECHNOLOGY 3(2-1) **Course Learning Outcomes** By the end of this course, students will be able: 1. Describe the basic knowledge of food microbiology and Biotechnology 2. Interpret the use of the essential tools of food	**HND-613/ FST-501 FOOD MICROBIOLOGY AND BIOTECHNOLOGY 3(2-1)** **Course Learning Outcomes** By the end of this course, students will be able: 1. Describe the basic knowledge of food microbiology and Biotechnology 2. Interpret the use of the essential tools of food

microbiology 3. Learn, how to illustrate the concepts and techniques of food microbiology in their respective disciplines 4. Comply with the pathogenic microorganisms and foodborne illnesses. **Theory** Introduction and scope; Microbial growth, survival, and death in foods: molds, yeasts and yeast like fungi, bacteria; Factors affecting the growth and survival of microorganisms in food: Intrinsic, extrinsic and implicit; Contamination and spoilage of perishable, semi perishable and stable foods; Metabolic and biochemical engineering: Bacteria based products and processes, Yeast based products and processes, Metabolites, range of fermentation processes, components of fermentation processes; process variables in fermentation, recovery, purification of fermentation products; Production of organic acids, enzymes, amino acids, single cell proteins, carotenoids and fermented food products; Microbial genetics: Conjugation, transduction, transformation; Genetic engineering, GMO in food biotechnology; Legal and social aspects of food biotechnology. **Practical** Isolation, identification and characterization of microorganisms: Morphology, biochemical; Enumeration of microorganisms in food and water samples (total count, viable count, MPN); Examination of foods for pathogenic organisms, production of fermented food products. **Suggested Readings** 1. Doyle, M.P., F. Diez-Gonzalez and C. Hill. 2019. Food Microbiology: Fundamentals and Frontiers. 5th Ed. ASM Press, Washington D.C., USA. 2. Lee, B.H. 2014. Fundamentals of Food Biotechnology. Second Edition, John Wiley and Sons, Ltd. West Sussex, UK. 3. Matthews, K.R., K.E. Kniel and T.J. Montville. 2017. Food Microbiology: An Introduction. 4th Ed. ASM Press, Washington, USA. 4. Montet, D. and R.C. Ray. 2015. Fermented Foods, Part 1: Biochemistry and Biotechnology, 1st Ed. CRC Press, NY, USA. 1. Ray, B. and A. Bhunia. 2018. Fundamental Food Microbiology. 5th Ed. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.	microbiology 3. Learn, how to illustrate the concepts and techniques of food microbiology in their respective disciplines 4. Comply with the pathogenic microorganisms and foodborne illnesses. **Theory** Introduction and scope; Microbial growth, survival, and death in foods: molds, yeasts and yeast like fungi, bacteria; Factors affecting the growth and survival of microorganisms in food: Intrinsic, extrinsic and implicit; Contamination and spoilage of perishable, semi perishable and stable foods; Metabolic and biochemical engineering: Bacteria based products and processes, Yeast based products and processes, Metabolites, range of fermentation processes, components of fermentation processes; process variables in fermentation, recovery, purification of fermentation products; Production of organic acids, enzymes, amino acids, single cell proteins, carotenoids and fermented food products; Microbial genetics: Conjugation, transduction, transformation; Genetic engineering, GMO in food biotechnology; Legal and social aspects of food biotechnology. **Practical** Isolation, identification and characterization of microorganisms: Morphology, biochemical; Enumeration of microorganisms in food and water samples (total count, viable count, MPN); Examination of foods for pathogenic organisms, production of fermented food products. **Suggested Readings** 1. Doyle, M.P., F. Diez-Gonzalez and C. Hill. 2019. Food Microbiology: Fundamentals and Frontiers. 5th Ed. ASM Press, Washington D.C., USA. 2. Lee, B.H. 2014. Fundamentals of Food Biotechnology. Second Edition, John Wiley and Sons, Ltd. West Sussex, UK. 3. Matthews, K.R., K.E. Kniel and T.J. Montville. 2017. Food Microbiology: An Introduction. 4th Ed. ASM Press, Washington, USA. 4. Montet, D. and R.C. Ray. 2015. Fermented Foods, Part 1: Biochemistry and Biotechnology, 1st Ed. CRC Press, NY, USA. 5. Ray, B. and A. Bhunia. 2018. Fundamental Food Microbiology. 5th Ed. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA.
TGM-601 TUTORIAL GROUP MEETING FOR SOFT SKILLS	**TGM-601 TUTORIAL GROUP MEETING FOR SOFT SKILLS**
Eighth Semester	

HND-602/ PHARM-601 DRUG-NUTRIENT INTERACTIONS 3(2-1)

Course Learning Outcomes

- To raise the awareness of potential drug-nutrient interactions and influence on clinical outcomes
- To understand the complex underlying mechanisms responsible for drug-nutrient interactions
- To identify the factors that can promote drug-nutrient interactions and contribute towards failure of nutrition or therapeutic
- To integrate knowledge of pharmacology, nutrient-nutrient and drug-nutrient interactions

Theory

Basic definitions and concepts: Pharmacodynamics; Pharmacokinetics; absorption, distribution, metabolism, elimination; Routes and techniques of drug administration; Mechanisms of food-drug interactions; Interpret a drug package leaflet; Differences and similarities between drugs, dietary supplements and functional foods in terms of their legal status and use; Types of drug-drug interactions and drug-food interactions; Effects of food on drug therapy; drug absorption, drug distribution, drug metabolism and drug excretion; Effects of drugs on the nutritional status of patients e.g. taste, smell and type of intake; Drug–nutrient interactions in infancy and childhood; Drug–nutrient interactions in the elderly; Drug–nutrient interaction considerations in pregnancy and lactation; Drug–nutrient interactions in patients with chronic infections; Common interactions of drugs with foods, nutrients, supplements, or other drugs; Strategies to lower the risk of drug nutrient interactions, Dietary counselling for the prevention of food drug interactions.

Practical

Weights and measures, Pharmaceutical calculations, Formulations; external and internal dosage forms, Techniques and routes of drug administration, Identification of various drugs, Interpretation of drug package and labels, preparation of ointments, solutions and tinctures, case studies.

Suggested Readings:

1. R.A Meckling. 2019. Nutrient-Drug Interactions (Nutrition and Disease Prevention) 1st ed. Routledge, Oxfordshire, England, UK
2. Barett, G.E. and A. Sahebkar. 2021. Pharmacological Properties of Plant-Derived Natural Products and Implications for Human Health. 1st Ed. Springer Nature Switzerland AG, Cham, Switzerland.

HND-602/ PHARM-601 DRUG-NUTRIENT INTERACTIONS 3(2-1)

Course Learning Outcomes

- To raise the awareness of potential drug-nutrient interactions and influence on clinical outcomes
- To understand the complex underlying mechanisms responsible for drug-nutrient interactions
- To identify the factors that can promote drug-nutrient interactions and contribute towards failure of nutrition or therapeutic
- To integrate knowledge of pharmacology, nutrient-nutrient and drug-nutrient interactions

Theory

Basic definitions and concepts: Pharmacodynamics; Pharmacokinetics; absorption, distribution, metabolism, elimination; Routes and techniques of drug administration; Mechanisms of food-drug interactions; Interpret a drug package leaflet; Differences and similarities between drugs, dietary supplements and functional foods in terms of their legal status and use; Types of drug-drug interactions and drug-food interactions; Effects of food on drug therapy; drug absorption, drug distribution, drug metabolism and drug excretion; Effects of drugs on the nutritional status of patients e.g. taste, smell and type of intake; Drug–nutrient interactions in infancy and childhood; Drug–nutrient interactions in the elderly; Drug–nutrient interaction considerations in pregnancy and lactation; Drug–nutrient interactions in patients with chronic infections; Common interactions of drugs with foods, nutrients, supplements, or other drugs; Strategies to lower the risk of drug nutrient interactions, Dietary counselling for the prevention of food drug interactions.

Practical

Weights and measures, Pharmaceutical calculations, Formulations; external and internal dosage forms, Techniques and routes of drug administration, Identification of various drugs, Interpretation of drug package and labels, preparation of ointments, solutions and tinctures, case studies.

Suggested Readings:

1. R.A Meckling. 2019. Nutrient-Drug Interactions (Nutrition and Disease Prevention) 1st ed. Routledge, Oxfordshire, England, UK
2. Barett, G.E. and A. Sahebkar. 2021. Pharmacological Properties of Plant-Derived Natural Products and Implications for Human Health. 1st Ed. Springer Nature Switzerland

	AG, Cham, Switzerland.
HND-604 NUTRITION THROUGH SOCIAL PROTECTION 2(2-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Establish linkages between social protection and nutrition. 2. Describe the importance of social protection instruments for the improvement of people's health. 3. Explain about social protection interventions for improved maternal and child care practices. 4. Discuss the roles of development partners in the nutritional health status of vulnerables. **Theory** Social Protection; Food insecurity and vulnerability; Food and social class differences; Food society and environment; Introduction to sociology of nutrition; Food and nutrition in culturally diverse societies; How can social protection enhance food security and nutrition? Social change and rural development; Women empowerment and nutrition; Food choices and their determinants; Behavior change; Social construction and eating disorders; Challenges to combat malnutrition; Nutrition-sensitive and nutrition-specific interventions; Economic opportunities among the poor; Nutrition and gender sensitive policies and strategies of social protection sector; Social assistance, income generation, risk reduction and risk management; Current social protection programs in the public and private sector; Pathways for impact of social protection on nutrition; Community development projects; Medical social services projects; Role of social welfare/ protection sector to scale-up nutrition; Impact of individual financial assistance programs; Backyard poultry farming and backyard kitchen gardening; Social protection strategies in Pakistan and South Asia; Social safety nets for vulnerable group; Nutritional sensitive social programs; Role of various development partners (such as NGOs, INGOs, Asian Development bank, World Bank, USAID, and DFID) in social protection and scaling up nutritional status: **Suggested Readings** 1. Esther, S. and L. Markus. 2021. Handbook on Social Protection Systems. Edward Elgar Publishing Inc., Northampton, MA, USA. 2. FAO. 2015. Improving Nutrition Through Multisectoral Approaches. Food and Agriculture Organization of the United Nations, Rome, Italy. 3. FAO. 2017. FAO Social Protection Framework: Promoting rural development for all. Food and	**HND-604 NUTRITION THROUGH SOCIAL PROTECTION 2(2-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Establish linkages between social protection and nutrition. 2. Describe the importance of social protection instruments for the improvement of people's health. 3. Explain about social protection interventions for improved maternal and child care practices. 4. Discuss the roles of development partners in the nutritional health status of vulnerables. **Theory** Social Protection; Food insecurity and vulnerability; Food and social class differences; Food society and environment; Introduction to sociology of nutrition; Food and nutrition in culturally diverse societies; How can social protection enhance food security and nutrition? Social change and rural development; Women empowerment and nutrition; Food choices and their determinants; Behavior change; Social construction and eating disorders; Challenges to combat malnutrition; Nutrition-sensitive and nutrition-specific interventions; Economic opportunities among the poor; Nutrition and gender sensitive policies and strategies of social protection sector; Social assistance, income generation, risk reduction and risk management; Current social protection programs in the public and private sector; Pathways for impact of social protection on nutrition; Community development projects; Medical social services projects; Role of social welfare/ protection sector to scale-up nutrition; Impact of individual financial assistance programs; Backyard poultry farming and backyard kitchen gardening; Social protection strategies in Pakistan and South Asia; Social safety nets for vulnerable group; Nutritional sensitive social programs; Role of various development partners (such as NGOs, INGOs, Asian Development bank, World Bank, USAID, and DFID) in social protection and scaling up nutritional status: **Suggested Readings** 1. Esther, S. and L. Markus. 2021. Handbook on Social Protection Systems. Edward Elgar Publishing Inc., Northampton, MA, USA. 2. FAO. 2015. Improving Nutrition Through Multisectoral Approaches. Food and Agriculture Organization of the United Nations, Rome, Italy. 3. FAO. 2017. FAO Social Protection Framework:

Agriculture Organization of the United Nations, Rome, Italy. 4. FAO. 2017. Nutrition and Social Protection. Food and Agriculture Organization of the United Nations, Rome, Italy. IFPRI. 2018; Global Nutrition Report 2018: From Promise to Impact: Ending Malnutrition by 2030. International Food Policy Research Institute, Washington D.C., USA.	Promoting rural development for all. Food and Agriculture Organization of the United Nations, Rome, Italy. **4.** FAO. 2017. Nutrition and Social Protection. Food and Agriculture Organization of the United Nations, Rome, Italy. **5.** IFPRI. 2018; Global Nutrition Report 2018: From Promise to Impact: Ending Malnutrition by 2030. International Food Policy Research Institute, Washington D.C., USA.
HND-606 RESEARCH METHODS IN NUTRITION 3(3-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Analyze and discuss the prevailing situation for development of research questions. 2. Review of the published scientific literature and formulate the objectives and/or hypothesis. 3. Select appropriate research design, sampling method and statistical tool for data analysis. 4. Draft a research proposal, synopsis, and scientific documents. **Theory** Research methods in nutrition: Introduction, objectives, types of research, basic and applied, quantitative and qualitative, clinical and diagnostic; Types of sampling: Probability and non-probability; Methods of data collection, surveys, interviews, secondary data analysis, food frequency questionnaire, 24 hour recall, dietary diary/journal; Development of questionnaire; Survey designs; Literature analysis;, publication ethics; Research designs: Observational studies, cross-sectional, case-control, cohort (prospective, retrospective, time-series), longitudinal studies, naturalistic studies; Experimental studies; Clinical/interventional trials: Randomized controlled trials, non-randomized control trials, pre-post studies, cluster randomized trials, crossover study design; Experimental data analysis: Incidence/ prevalence rate; Research ethics. **Suggested Readings** 1. Awan, J.A. and Awan, K.A. 2020. Scientific Presentations. Unitech Communications, Faisalabad, Pakistan. 2. Drummond, K.E. and A. Murphy-Reyes. 2018. Nutrition Research: Concepts and Applications. Jones & Bartlett Learning, Boston, MA, USA. 3. Lovegrove, J.A., L. Hodson, S. Sharma and S.A. Lanham-New. 2015. Nutrition Research Methodologies. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK. 4. Pounis, G. 2018. Analysis in Nutrition Research: Principles of Statistical Methodology	**HND-606 RESEARCH METHODS IN NUTRITION 3(3-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Analyze and discuss the prevailing situation for development of research questions. 2. Review of the published scientific literature and formulate the objectives and/or hypothesis. 3. Select appropriate research design, sampling method and statistical tool for data analysis. 4. Draft a research proposal, synopsis, and scientific documents. **Theory** Research methods in nutrition: Introduction, objectives, types of research, basic and applied, quantitative and qualitative, clinical and diagnostic; Types of sampling: Probability and non-probability; Methods of data collection, surveys, interviews, secondary data analysis, food frequency questionnaire, 24 hour recall, dietary diary/journal; Development of questionnaire; Survey designs; Literature analysis;, publication ethics; Research designs: Observational studies, cross-sectional, case-control, cohort (prospective, retrospective, time-series), longitudinal studies, naturalistic studies; Experimental studies; Clinical/interventional trials: Randomized controlled trials, non-randomized control trials, pre-post studies, cluster randomized trials, crossover study design; Experimental data analysis: Incidence/ prevalence rate; Research ethics. Use of Nvivo for qualitative research in nutrition, RewMan for systematic reviews and meta analysis, End notes for reference management. **Suggested Readings** 1. Awan, J.A. and Awan, K.A. 2020. Scientific Presentations. Unitech Communications, Faisalabad, Pakistan. 2. Drummond, K.E. and A. Murphy-Reyes. 2018. Nutrition Research: Concepts and Applications. Jones & Bartlett Learning, Boston, MA, USA. 3. Lovegrove, J.A., L. Hodson, S. Sharma and S.A. Lanham-New. 2015. Nutrition Research

and Interpretation of the Results. Academic Press, Elsevier Inc., Burlington, MA, USA. 5. Pounis, G. 2019. Analysis in Nutrition Research; Principles of Statistical Methodology and Interpretation of the Results. Academic Press, Cambridge, UK.	Methodologies. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK. **4.** Pounis, G. 2018. Analysis in Nutrition Research: Principles of Statistical Methodology and Interpretation of the Results. Academic Press, Elsevier Inc., Burlington, MA, USA. **5.** Pounis, G. 2019. Analysis in Nutrition Research; Principles of Statistical Methodology and Interpretation of the Results. Academic Press, Cambridge, UK.
HND-608 FOOD AND DRUG LAWS 2(2-0) **Course Learning Objective** By the end of this course, students will be able to: 1. Explain the national as well as local legal frameworks for regulation of foods and drugs. 2. Explain the role Punjab Pure Food Rules towards food safety and consumer health. 3. Discuss the position of regulatory agencies in enforcement of existing food and drug laws. 4. Elucidate commonly used methods for the detection of adulterants in food and drug products. **Theory** Historical development of food laws; Punjab Pure Food Rules 2018: Legal terms and definitions from the food industry; Rules for food additives, categories, permissible limits; Food packaging: rules, criteria for packaging material, labelling requirements; Duties and responsibilities of public analysts and food safety officer, Licensing of food trades businesses and premises, History of the food and drug administration; The Drug Regulatory Authority of Pakistan Act, 2012; DRAP Alternative medicines and health products enlistment rules 2014; Halal food dietary laws; Methods for detection of common adulterants in food: Milk and milk products, fats and oil, spices; The Punjab Consumer Protection Rules 2009; The Punjab Consumer Protection Act 2005; The Pakistan Hotels and Restaurants Act, 1976; The Pakistan Halal Authority Act 2015; OIC guidelines on halal food 2009; Codex Alimentarius Commission (CAC); Pakistan National Accreditation Council; Punjab Halal Development Agency; Pakistan Standards and Quality Control Authority (PSQCA); Role of electronic and print media in public awareness and empowerment. **Suggested Readings** 1. GOP. 2012. Drug Regulatory Authority of Pakistan Act, 2012. The Drug Regulatory Authority of Pakistan, Government of the Pakistan, Islamabad. 2. GOP. 2015. Pakistan Halal Authority Act, 2015.	**HND-608 FOOD AND DRUG LAWS 2(2-0)** **Course Learning Objective** By the end of this course, students will be able to: 1. Explain the national as well as local legal frameworks for regulation of foods and drugs. 2. Explain the role Punjab Pure Food Rules towards food safety and consumer health. 3. Discuss the position of regulatory agencies in enforcement of existing food and drug laws. 4. Elucidate commonly used methods for the detection of adulterants in food and drug products. **Theory** Historical development of food laws; Punjab Pure Food Rules 2018: Legal terms and definitions from the food industry; Rules for food additives, categories, permissible limits; Food packaging: rules, criteria for packaging material, labelling requirements; Duties and responsibilities of public analysts and food safety officer, Licensing of food trades businesses and premises, History of the food and drug administration; The Drug Regulatory Authority of Pakistan Act, 2012; DRAP Alternative medicines and health products enlistment rules 2014; Halal food dietary laws; Methods for detection of common adulterants in food: Milk and milk products, fats and oil, spices; The Punjab Consumer Protection Rules 2009; The Punjab Consumer Protection Act 2005; The Pakistan Halal Authority Act 2015; OIC guidelines on halal food 2009; Codex Alimentarius Commission (CAC); Pakistan National Accreditation Council; Punjab Halal Development Agency; Pakistan Standards and Quality Control Authority (PSQCA); Role of electronic and print media in public awareness and empowerment. Rules and regulations of PAFDA (Punjab Agriculture Food & Drug Authority) **Suggested Readings** *1.* GOP. 2012. Drug Regulatory Authority of Pakistan Act, 2012. The Drug Regulatory Authority of Pakistan, Government of the

Minister for Science and Technology, Government of the Pakistan, Islamabad, Pakistan. 3. GOP. 2018. The Punjab Pure Food Rules – 2018. The Punjab Weekly Gazette. Government Printing Press, Lahore, Pakistan. 4. GOP. 2009. Punjab Consumer Protection Rules 2009. Government of the Punjab, Lahore, Pakistan. 5. Hutt, P.B. and L.A. Grosman. 2021. Food and Drug Law. The Foundation Press, Inc., Brooklyn, NY, USA. Independent readings for diverse topics.	Pakistan, Islamabad. 2. GOP. 2015. Pakistan Halal Authority Act, 2015. Minister for Science and Technology, Government of the Pakistan, Islamabad, Pakistan. 3. GOP. 2018. The Punjab Pure Food Rules – 2018. The Punjab Weekly Gazette. Government Printing Press, Lahore, Pakistan. 4. GOP. 2009. Punjab Consumer Protection Rules 2009. Government of the Punjab, Lahore, Pakistan. **5.** Hutt, P.B. and L.A. Grosman. 2021. Food and Drug Law. The Foundation Press, Inc., Brooklyn, NY, USA. **6.** Independent readings for diverse topics.
HND-610 CAPSTONE PROJECT 3(0-3)	**HND-610 CAPSTONE PROJECT 3(0-3)**
HND-612 INTERNSHIP/ FIELD EXPERIENCE 3(0-3)	**HND-612 INTERNSHIP/ FIELD EXPERIENCE 3(0-3)**
HND-614/ FST-503 FOOD QUALITY MANAGEMENT 2(2-0) **Course Learning Outcomes** By the end of this course, students will be able to: 1. Learn about different food safety issues of current era. 2. Demonstrate an understanding about the food safety tools. 3. Explain national and international food safety standards. 4. Interpret the role and mandate of food standards enforcing agencies. **Theory** Food safety, security and quality: Definitions and importance; Different terminologies used in food safety & quality; Categories of hazards: Physical, chemical, biological; Good manufacturing practices; Good storage practices; Plant design layout; Global food safety imitative; Global food safety systems: HACCP, BRC, FSSC 22000, ISO 22000; Quality management system (ISO 9001:2008); Food safety laws in Pakistan - West Pakistan Pure Foods Ordinance 1960, Cantonments Pure Food Ordinance Act 1966, West Pakistan Pure Food Rules 1965, The Punjab Pure Food Rules 2011. **Suggested Readings** 1. Alli, I. 2003. Food Quality Assurance: Principles and Practices. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 2. David A.S. and F.S. Norah. 1998. Principles and Practices for the Safe Processing of Foods. Woodhead Publishing Limited, Cambridge, England. 3. Early, R. 1995. Guide to Quality Management	**HND-614/ FST-503 FOOD QUALITY MANAGEMENT 2(2-0)** **Course Learning Outcomes** By the end of this course, students will be able to: 1. Learn about different food safety issues of current era. 2. Demonstrate an understanding about the food safety tools. 3. Explain national and international food safety standards. 4. Interpret the role and mandate of food standards enforcing agencies. **Theory** Food safety, security and quality: Definitions and importance; Different terminologies used in food safety & quality; Categories of hazards: Physical, chemical, biological; Good manufacturing practices; Good storage practices; Plant design layout; Global food safety imitative; Global food safety systems: HACCP, BRC, FSSC 22000, ISO 22000; Quality management system (ISO 9001:2008); Food safety laws in Pakistan - West Pakistan Pure Foods Ordinance 1960, Cantonments Pure Food Ordinance Act 1966, West Pakistan Pure Food Rules 1965, The Punjab Pure Food Rules 2011. **Suggested Readings** 1. Alli, I. 2003. Food Quality Assurance: Principles and Practices. CRC Press, Taylor & Francis Group, Boca Raton, FL, USA. 2. David A.S. and F.S. Norah. 1998. Principles and Practices for the Safe Processing of Foods. Woodhead Publishing Limited, Cambridge, England. 3. Early, R. 1995. Guide to Quality

Systems for the Food Industry. Springer Science + Business Media, LLC., NY, USA. 4. Motarjemi, Y and H. Lelieveld. 2014. Food Safety Management: A Practical Guide for the Food Industry. Academic Press, Elsevier Inc., San Diego, CA, USA. Sun, D. 2012. Handbook of Food Safety Engineering. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK.	Management Systems for the Food Industry. Springer Science + Business Media, LLC., NY, USA. 4. Motarjemi, Y and H. Lelieveld. 2014. Food Safety Management: A Practical Guide for the Food Industry. Academic Press, Elsevier Inc., San Diego, CA, USA. 5. Sun, D. 2012. Handbook of Food Safety Engineering. Wiley-Blackwell, John Wiley & Sons Ltd., Chichester, West Sussex, UK.