Course Details for Part-III BPH (Hons); Semester-I Examination

PHI 3101: Public Health Nutrition	Credit Hour: 03	Marks: 100

Rationale: This course describes a range of public health involvement to improve healthy eating and lifestyle among general population. It also expands skills of the individual to address community nutritional issues, including assessment of needs of population and program development to solve health problems. Moreover, it will develop skills on accumulating, analyzing data and interpreting the findings using scientific approaches to solve public health issues.

Course Objectives: This course will help the students to –

1. understand principles of public health and nutrition;
2. know the basic concept about different types of nutrients and their role on health;
3. inform about nutrition deficiency disorders in public health;
4. knowledgeable about health measurement techniques to assess public health condition;
5. learn about nutritional requirement among particular population, infants, children, adolescent, pregnant, lactating and elderly;
6. develop skills of research in the field of public health nutrition.

Course Content	Intended Learning Outcomes (ILOs)
	By the end of this course students will be able to –
A. Introduction: Introduction to nutrition; Food; nutrition and public health; Functional foods (FF); Benefits and problems associated with functional foods; Basal Metabolic Rate and body mass ratio (BMR); general guideline of food intake.	1. Basic information about food, health and nutrition.
B. Role of nutrients on health: Nutrient composition of foods- macro and micronutrients; Role of nutrients on health; nutrients deficiency disorders- Vitamin A, B, C, D, E, K, iodine, iron, calcium and zinc; food sources; Recommended dietary intake of essential nutrients.	2. Recognize the necessity of nutrients on health.
C. Diets and health: Diabetics; blood pressure; cardiovascular disease; obesity; Renal disease: Classification, Diagnosis, Risk factors, Dietary sources of salt.	3. Familiar with disease specific diet modifications during various diseased conditions.
D. Nutritional support in different diseases: Dietary management for diabetics; blood pressure; cardiovascular disease; obesity and renal disease.	4. Learn to prevent disease by dietary management.

E. Infant, child and adolescent nutrition: Protein Energy Malnutrition (PEM) in infant and children; Iron and iodine deficiency disorder among adolescent; Nutritional requirement for children and adolescent.	5. Nutritional disorders and nutrients requirement of infant children and adolescent.
F. Nutrition during pregnancy and lactation: Nutritional requirement for pregnant and lactating mother; recommended dietary intake.	6. Diet management during pregnancy and lactation.
G. Geriatric nutrition: Factors affecting nutritional status; Nutritional requirement for elderly; Diet for geriatric population.	7. Proper diet administration among elderly population.
H. Current issues in nutrition: Parenteral nutrition support; Enteral nutrition support; Sports nutrition.	8. Recognize about other nutritional issues in the field of public health.
Recommended Readings:	

1. Norman J. Temple, Ted Wilson, David R. Jacobs, Jr, 2006. Nutritional Health, 2nd edition, Humana Press, Totowa, New Jersey.
2. Mary E. Barasi 2003. Human Nutrition: A Health Perspective, 2nd edition, Hoddert Arnold, London.
3. Gershwin, M.E., Nestel, P., Keen, C.L. 2004. Handbook of Nutrition and Immunity, Humana press, Totowa, New Jersey.
4. Douglas C. Heimburger, Jamy D. Ard, 2006. Handbook of Clinical Nutrition, 4th edition, 1600 John F. Kennedy Boulevard, Suite 1800, Philadelphia, PA 19103-2899.

PHI 3102: Environmental Health	**Credit Hour: 03**	**Marks: 100**

Rationale: As different emerging environmental issues are continuously creating challenges in the field of public health, understanding the interrelation between different environmental condition and human health has become a basic need for dealing with emerging health related problems. This course is aimed to create a strong public health related knowledge in relation to different environmental aspects, different environmental compartments.

Course Objectives: This course will help the students to –

1. Introduce the fundamentals and subclasses of environmental health.
2. Define the major sources of biological, chemical and physical agents found in water, air, soil and food.
3. Describe a range of environmental health problems associated with the agents mentioned above.
4. Identify vulnerable groups exposed to hazardous agents and potential impacts on health.

5. Explain current environmental health risk assessment methods, environmental health indicators, laws regulation related to environmental health, health initiatives and health risk reduction.	
Course Content	**Intended Learning Outcomes (ILOs)**
	By the end of this course students will be able to –
A. Basics of environmental health: Concept of environmental health; Evolution of environment; Environmental compartments; Significance of environment to human health, ecosystem and biodiversity; Key Themes; Human Population Problem; An Urban World; People and Nature; A Global Perspective; Environmental pollution and occupational health; Interaction among environmental spheres in connection with health; Causes of environmental problems; Sustainability and sustainable solutions; Carrying Capacity; GAIA hypothesis; Human-environment interaction; Human impact on the environment; Environmental impact on human health, environmental disease.	1. Demonstrate the complexity of the interaction of environment with human health.
B. Environmental processes and health: Role of nutrient biogeochemical cycles maintaining ecological health and human health; Ecosystem and health; Ecological communities and food chains trophic levels and components of food web; Damage of ecosystem-effects on health; Main types of life; Biological evaluation; Basics of biological diversity (genetic-, habitat- and species diversity); Biological evolution; Four key processes of biological evolution (mutation, natural selection, migration and genetic drift); Biodiversity, sustainability and health; Reason to protect Biodiversity.	2. Understand various environmental health indicators, nutrients with environmental health, environmental processes etc.
C. Water pollution and health: Water Pollution Facts, Figures and Statistics, Types of water pollutants; Oxygen, oxidants, reductants; Dissolve oxygen and oxygen sag curve; Water quality parameters; Harms of water pollution; Prevention; Effects and Sources of Water Pollution; Techniques to measure water quality; Water pollution: sources, harms of water pollution and prevention; Acidity, alkalinity and salinity; Inorganic and organic water pollutants; Heavy metals; Water conservation and its importance;	3. Learn the importance of safe water, its parameters, quality, quantity, and conservation, water pollution, water borne diseases in connection with both communicable and non-communicable diseases.

Ways to stop water pollution;, Virtual water; effects and diseases.	
D. Air pollution and health: Physical characteristics of atmosphere; Spheres of atmosphere; Air pollution, Major primary pollutant produced by anthropogenic activities; Types of air pollutants; Primary and secondary air pollutants; Aerosol or Particulate matters (PM); Smog; Stratospheric Ozone; Air pollution and Bangladesh scenario: urban and rural areas, Effects of air pollution and possible solution; Indoor and outdoor air pollution; Ozone depletion; Acid base reactions in the atmosphere; Criteria air pollutants; Acid rain; Effects and diseases.	4. Learn the atmosphere and its degradation, qualities and health effects.
E. Agriculture and its effects on environment and health: Expansion of monoculture; 1st and 2nd wave of environment problems related to agriculture; Genetically modified (GM) crops and its environmental effects; Global trend in agriculture, Bangladesh agriculture and its characteristics; agriculture challenges and its prospects; climate changes and agriculture; Integrated pest management (IPM) techniques and environmental benefits; Sustainable agriculture-objectives, goals, benefits and techniques; Pesticides, insecticides, herbicides and their impact on environment and health.	5. Demonstrate the health consequences of agricultural practices, safety and security of food in connection with sustainable agricultural practices.
F. Climate change and global warming: Climate change; Global Warming; Causes of Global Warming and climate change; Greenhouse gases; The facts of climate change; Effects of global warming; Drastic Changes in Climate Pattern; Widespread Extinction of Flora and Fauna; Changes in the Global Sea Level; Possible Impacts of climate change in Bangladesh; The impact on women, Remedial measures; Health impacts of climate change and global warming; Climate change health outcomes; Health system strengthening.	6. Understand the key environmental health issues in emergencies and disasters.
G. Solid waste management and health implication: Waste; Types of waste; Solid waste-sources, composition; Municipal solid waste; Characterization of municipal solid waste; Hazardous waste; Hospital waste and biomedical waste; Effects of solid waste; Waste management	7. Learn varieties, composition and risks of solid waste on human health, management approaches and strategies.

concept-reduce, reuse and recycle; Solid waste management; Zero waste system; Health impacts of municipal waste, hospital waste and biomedical waste.	
H. Environmental hazard and toxicology: Environmental Hazards and Risks; Major types of Hazards; Definition of poison, toxin and pollutants Classification of hazardous substances and wastes; Environmental chemistry of hazardous wastes; Physical and chemical properties of hazardous wastes; Transport, effects and fates of hazardous wastes; Dose-response relationship; Relative toxicities; Reversibility and sensitivity; Xenobiotics and endogenous substances; Toxicological chemistry; Kinetic phase and dynamic phase; Teratogenesis, mutagenesis, carcinogenesis and effects of immune and reproductive systems; Health hazards; AMES test.	8. Demonstrate the main categories of environmental health hazards, their principles and management.
I. Contemporary pollution issues in Bangladesh: Arsenic pollution in Bangladesh; Chromium pollution in Bangladesh; Food adulteration in Bangladesh; Ground water contamination; Urban air pollution; Sewage pollution in Bangladesh; Pollution in Bangladesh caused by neighbor countries; Coastal pollution in Bangladesh; Development versus environment.	9. Learn about the current environmental health issues in Bangladesh.

Recommended Readings:

1. S.E. Manahan, 2016. Fundamentals of environmental chemistry. Lewis Publishers.
2. Sinha R. K. and Heart, S. n.d. Industrial and hazardous Wastes, Pointer publishers, Jaipur, India.
3. Jain R.K.and Rao, S. S. 2000. Industrial Safety, Health and environmental Management system, Khanna Publishers.
4. H. Koren, M Bisest, 2017. Handbook of Environmental Health, Lews publishers, CRC Company, Florida, USA.
5. Brother, J., and Muthu V.K. 2017. A short book of Public Health, New Delhi.
6. 1999. Occupational health and safety management systems specification", Occupational health and safety assessment series (OHSAS) 18001.

PHI 3103: Communicable and Non-communicable Diseases	Credit Hour: 03	Marks: 100

Rationale: The communicable and non communicable diseases continue to present a challenge to the professionals who track and contain them. These diseases are a leading cause of morbidity and mortality around the world and remain an enigma to many. The new threat of bioterrorism has become a significant security concern of all nations. This course will focus on the considerable and increasing burden of disease due to communicable and non communicable diseases. It will present methods for measuring the burden of communicable and non-communicable disease, review approaches to program and service development; to modify risk factors; present lessons learned from successful developing country programs; and discuss implications for health services development and international development policies.

Course Objectives: This course will help the students to –

1. To understand and describe the importance of the most burdensome communicable diseases in a global health perspective
2. To have knowledge on global epidemiology of the most important infectious diseases and the capacity to view and discuss prevention aspects from a social, medical and ethical perspective.
3. To describe major noncommunicable diseases which significantly contribute to the global burden of disease?
4. To describe and analyze different factors influencing NCD and injuries and corresponding preventive actions.

Course Content	Intended Learning Outcomes (ILOs)
	By the end of this course students will be able to –
Introduction: Definition; causation; pathogenesis; transmission; management and control of Communicable diseases; infectious diseases Epidemiology; Prevention of Communicable diseases; Design and analysis of epidemiological studies.	1. Demonstrate the definition, disease causation, mood of transmission. Prevention and control of communicable diseases.
Gastrointestinal and communicable Infections: Hepatitis; Cholera; Enteric fever; Typhoid; Amoebiasis; Helminthiasis; Tuberculosis; SARS Virus; Influenza; COVID-19; HIV; Syphilis; Gonorrhea; Zoonotic diseases; Obesity	2. Know about Gastrointestinal, Respiratory infections and Sexually Transmitted Infections.
National applied communicable disease control and prevention program:	3. Know about national communicable disease programs.

Successful case story from national and international level.	
Epidemiology of chronic non-communicable diseases and conditions: Cardinal characteristics of Non-Communicable disease risk factors; prevention. NCD and developing countries; Gaps of natural history of NCDs.	4. Know the basics of non- communicable diseases.
Cardiovascular diseases: Definition; Problem statement- world; Bangladesh; measuring the burden of diseases; risk factors; prevention; Hypertension**;** Coronary heart Disease (CHD); Transient-ischemic attacks (TIA); Stroke, stroke control programme in Bangladesh; Congenital heart disease; Rheumatic heart disease.	5. Understand the Cardiovascular Diseases.
Diabetes mellitus: Definition; classification; Problem statement-world; Bangladesh; epidemiological determinants of diabetes mellitus; screening for diabetes; prevention and care.	6. Understand about Diabetes Mellitus.
Mental health, stress and substance abuse: Definition and concept; Criteria of mentally healthy person; epidemiology of mental health; prevention; Mental public health in Bangladesh	7. Demonstrate the concept of mental health and stress.
Cancer: Definition; causes, common cancer in Bangladesh and world; Prevention and control of cancer**.**	8. Know about types, mechanism and prevention of cancer.
Pulmonary diseases: Physiology of asthma; Clinical approach to asthma; Asthma in the world; Risk factors of asthma; COPD; Smoking.	9. Demonstrate about Pulmonary diseases.
Non-communicable diseases control (NCDC): Global Action Plan for the Prevention and Control of NCDs; Policy on prevention and control of non-communicable diseases in Bangladesh; Interventions and implementation; policy; science in NCD's.	10. Know about Global action plan for the prevention and control of NCDs.

Recommended Readings:
1. Park, K. 2011. Textbook of preventive and social medicine. Banarsidas Bhanot Publishers. 2. Bonita R., Beaglehole, R. And Kjellström, T. 2006, Basic Epidemiology, 2nd Edition, World Health Organization, WHO Library Cataloguing-in-Publication Data. 3. Rashid, Khabir, Hayder's, Textbook of Community l Medicine and Public Health, 4th ed. RHM Publisher, Dhaka, Bangladesh. 4. Ahmed, S. M. M., ABC's of the Community Medicine, 2nd ed. Daaniiya Publications. Dhaka, Bangladesh.

PHI 3104: Research Methodology	**Credit Hour: 03**	**Marks: 100**
Rationale: The main purpose of the course is to provide an introduction to the basic principle of research methodology. The course also gives the student basic information and understanding of data collection and basic art of scientific research writing. It prepares students to plan and carry out research projects during their studies and in their future career.		
Course Objectives: This course will help the students to – 1. To develop understanding of the basic framework of research process. 2. To develop an understanding of various research designs and techniques. 3. To identify various sources of information for literature review and data collection. 4. To learn the components of academic writing.		
Course Content		**Intended Learning Outcomes (ILOs)**
		By the end of this course students will be able to –
Introduction: Concept and classification of research; Research problem; Importance a literature review in research work; Formulation of research question and hypothesis; Statement of objectives; Importance of writing objectives.		1. Understand some basic concepts of research and its methodologies.
Research design: Types of research design; Experimental and Non-experimental research design; Field research and Survey research.		2. Demonstrate how to conduct different types of research.
Data collection and analysis: Sampling Techniques and sample size; Data collection Methods and instruments; Developing a Data collection Instrument; Pre-testing of a data		3. Describe the various components of research.

collection Instrument; Importance of pre-testing; Data processing- Analysis of data by using SPSS and other software program; Editing; Compiling and tabulation of data.	
Scientific writing; Writing the Scientific Proposal; Report and Thesis; The Author's procedure; Writing a research paper; Writing a review paper; a conference report; a book review; Present a paper orally; Preparation of a poster.	4. Generate report and art of scientific writing.
Quality assurance and quality control: Define, procedure, calibration, verification, validation of data; Reliability and accuracy of data.	5. Learn about the process of data quality assurance and quality control.
Research ethics: Ethical/ moral consideration in sampling, survey and dealing with samples; data analysis and interpretation; scientific writing; ethical codes of conduct.	6. Learn about ethics in research and its different attributes.
The review process: Deal with editors and the publishing process (deal with Proofs).	7. Know about review strategies of publication process.

Recommended Readings:

1. Dawson, C. 2002. Practical Research Methods, New Delhi, USB Publishers' distributors.
2. Kothari, C.R. 1985. Research Methodology- Methods and Techniques, New Delhi, Wiley Eastern Limited.
3. Cochran, W. G. and Cox, G. M. (1957): Experimental Designs; John Wiley and Sons nc, London.
4. Cochran, W. G. (1963). Sampling Techniques (second edition), John Wiley and Sons, NY.
5. Islam, M. Nurul. (2009). An Introduction to Research Methods. Mullick and Brothers. New Market, Dhaka.

PHI 3105: Zoonosis and Ethology	Credit Hour: 02	Marks: 100

Rationale: The emerging zoonoses are a growing public health threat around the world. It is estimated that, globally, about one billion cases of illness and millions of death occur every year from zoonoses. Some 60% of emerging infectious diseases that are reported globally are zoonoses. Over 30 new human pathogens have been detected in the last three decades, 75% of which have originated in animals. The current global emergence of the novel virus, SARS-CoV-2 exemplifies that the occurrence of these infections are unpredictable as they originate from animals, often these infections are caused by novel viruses and are only detected when outbreaks occur. The ongoing COVID-19 pandemic shows that zoonotic infections are also a concern to global health security owing to its ability to rapidly spread internationally due to global connectivity and proliferation of trade, including trans-boundary movement of humans and animals. Given the scale and burden of emerging zoonotic infections, knowing and understanding the growing public health threats of emerging zoonotic infections; identifying challenges in controlling these infections; and underpin a strategic approach for predicting, detecting and controlling these infections through an integrated and interdisciplinary approach between the animal and human health sectors is crucial.

Course Objectives: This course will help the students to –

1. describe the importance of zoonotic diseases in public health;
2. recognize and understand the zoonotic potential of presented diseases;
3. understand the epidemiology of zoonotic diseases that are of great public health concern;
4. describe the route(s) of transmission of major zoonotic diseases;
5. cite individual and collective measures for prevention and control of major zoonotic diseases;
6. understand the factors influencing the spread and transmission of zoonotic diseases in different geospatial partitioning;
7. know the sustainable global surveillance and response to emerging zoonotic diseases.

Course Content	Intended Learning Outcomes (ILOs)
	By the end of this course students will be able to –
A. **Recognize and understand Zoonosis, ethology, and the zoonotic potential of presented diseases:** Understand animal behaviour and the epidemiology of zoonotic diseases; Importance of zoonotic diseases in public health; Routes of transmission of major zoonotic diseases; Populations that are particularly vulnerable to specific zoonotic diseases.	1. Integrate knowledge and to recognize and understand animal behaviour and the route of zoonotic diseases transmission.
B. **Early Philosophers and their Attitudes toward animals:** Peter Singer and the Welfare Perspective; Tom Regan and Animal Rights.	**2.** Explore the ancient knowledge about animals and zoonoses.
C. **Zoonoses in animals:** Zoonoses in exotic pets and rodents, farm animals and wildlife,	**3.** Familiarize the students with animal specific diseases.

D. **Individual and collective prevention and control methods for major zoonotic diseases:** Significant public health successes regarding zoonotic diseases and why they were successful.	4. Identify and understand the prevention and control strategies for zoonotic diseases.
E**. Differences, in prevalence risk, regarding zoonotic diseases in developed vs. Developing countries and reasons for these differences**.	5. Develop the ability to understand and explain the risk factors of zoonotic diseases, and summarize the differences of the diseases between developed and developing countries with all possible reasons.
F. **Current issues and controversies:** Welfare and Wildlife; Welfare and social controversies; Emerging zoonoses in Israel; Biology and ethics in biomedical research; biology and philosophy of eating meal.	6. Analyze and evaluate contemporary and controversy issues on the field of novel zoonotic emergencies and disaster.
G. **Sustaining Global Surveillance and Response to Emerging Zoonotic Diseases:** International Context for Zoonotic Disease Surveillance and Response; Disease Surveillance to Mitigate Emergency Response Measures and Costs; Elements of an Effective Zoonotic Disease Surveillance System; Executing an Effective Zoonotic Disease Surveillance System; Review of Existing Disease Surveillance Systems for Zoonotic Diseases; Capacity-Building Programs to Create a Multidisciplinary, Integrated Workforce; Gaps and Challenges	7. **A**nalyze burden, transmission and interventions of zoonotic diseases by utilizing the surveillance data.

Recommended Readings:

1. Joann L. Colville and David L. Berryhill. 2007. Handbook of Zoonoses: Identification and Prevention. Mosby, Inc., an affiliate of Elsevier Inc. ISBN: 978-0-323-04478-3.
2. Jacob Lorenzo-Morales (Edited). 2012. Zoonosis. InTech, Janeza Trdine 9, 51000 Rijeka, Croatia. ISBN 978-953-51-0479-7.
3. Gerald T. Keusch, Marguerite Pappaioanou, Mila C. González, Kimberly A. Scott, and Peggy Tsai, Editors. 2009. Sustaining Global Surveillance and Response to Emerging Zoonotic Diseases. The National Academies Press, 500 Fifth Street, NW, Washington, DC 20001. ISBN 978-0-309-13734-8 (pbk.)
4. Peter M. Rabinowitz and Lisa A. Conti. 2009. Human-Animal Medicine: Clinical Approaches to Zoonoses, Toxicants and other Shared Health Risks. ISBN: 10-1416068376.

PHI 3106: Practical: Environmental Health	Credit Hour: 02	Marks: 100

Rationale: The environmental compartments e.g. air, water, food and organisms are important elements for health promotion and goodness. The deterioration of these compartments should be assessed to understand the knowhow for securing well environmental health and public health. This course aims to analyze environmental samples to measure the degradation level.

Course Objectives: This course will help the students to –

1. Learn analysis of environmental samples.
2. Determine the factors necessary for improved environmental health.
3. Learn about the troubleshoot of environmental problems.

Course Content	Intended Learning Outcomes (ILOs)
	By the end of this course students will be able to –
Investigation of water quality parameters in potable and waste water.	1. Learn of instrumental analysis to measure water quality.
Heavy metal determination (Arsenic, chromium, cadmium) in drinking water and all types of food.	2. Learn the instrumental analysis to measure heavy metal pollution using AAS, spectrophotometry and other methods.
Pesticide determination in food.	3. Learn the identification of pesticides.
Characterize of air pollutants.	4. Understand the composition and the types of air pollution.
Pathogenic bacteria in drinking water and foods.	5. Assess food safety and security measuring pathogenic bacteria.
Identification of potential hazards and regulatory requirements in workplace, educational institutes and recreational places.	6. Know the different types of health hazards in the environment.
Measurement of noise pollution in residence, workplaces, educational institutes, and transportation.	7. Assess the noise pollution and its impact.

Recommended Readings:

1. S.E. Manahan, 2016. Fundamentals of environmental chemistry, Lewis Publishers.

<table>
<tr><td>PHI 3107: Practical: Research Methodology- Capstone Project</td><td>Credit Hour: 02</td><td>Marks: 100</td></tr>
<tr><td colspan="3">Rationale: The theoretical knowledge of research methodology should be implanted to the students with the help of practical application of the concepts, theories and practices of a specific research. This practical experience will surely enhance their capabilities for independent research conduction in their terminal degree, thesis work and future research career.</td></tr>
<tr><td colspan="3">Course Objectives: This course will help the students to –

1. Learn how to design a research.
2. Know the different factors of research.</td></tr>
<tr><td colspan="2">Course Content</td><td>Intended Learning Outcomes (ILOs)</td></tr>
<tr><td colspan="2"></td><td>By the end of this course students will be able to –</td></tr>
<tr><td colspan="2">Qualitative research: Design a research to investigate the perception and disparities of health among the people of different age group in university; local community and/or working place.</td><td rowspan="5">Learn the concept of research, its variation and objectives, execution ways, analysis and interpretation in a practical way.</td></tr>
<tr><td colspan="2">Quantitative research: Investigate the concentration of pollutants in food, air, water and soil and measure their health impacts.</td></tr>
<tr><td colspan="2">Cross-sectional research: Design a small scale research to understand both qualitative and quantitative components of research</td></tr>
<tr><td colspan="2">Case Study: Analyze a particular/given case to understand its components, variables, methods, outputs, outcomes etc.</td></tr>
<tr><td colspan="2">Development of a demo research to understand data collection, sampling, data processing, scientific writing and review processes.</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Recommended Readings:</td></tr>
<tr><td colspan="3">1. Jan Jonker, Bartjan Pennink, 2010, The Essence of Research Methodology, Springer publication, ISBN: 978-3-540-71658-7.</td></tr>
</table>

PHI 3108: Viva Voce	Credit Hour: 02	Marks: 100

Course Details for Part-III BPH (Hons); Semester-II Examination

PHI 3201: Immunology	Credit Hour: 03	Marks: 100
Rationale: The aim of this course is to enable participants to understand both the basic and clinical aspects of Immunology.		
Course Objectives: This course will help the students to – 1. Understand the general basis of Immunology. 2. Understand structure and functions of different organs and cells involved in immune response. 3. Critically understand Immunology in relation to disease.		

Course Content	Intended Learning Outcomes (ILOs)
	By the end of this course students will be able to –
Introduction: Basic concept of innate and adaptive immunity; mechanism of innate immunity; cellular and humeral immunity; herd immunity.	1. Know the cellular structure of immune system.
Organs and cells involved in immune response: General features and functions of lymphoid organs and cells; mononuclear phagocytes; antigen presenting cells; polymorphs; mast cells and platelets.	2. Understand the immune response cell.
Antigens: Definition and function; general properties of antigen; haptens; Epitopes; antigenic determinants; antigen-antibody binding; antibody affinity and avidity.	3. Understand the different immune response against tissues.
Immunoglobulin: Basic structure and function of immunoglobulin; classes and subclasses and other properties; memory B cells; Membrane receptor of antigens: B cell surface receptors for antigens; T-cell receptors (TCR), major histocompatibility complex (MHC).	4. Understand Immunoglobulin and the structure and functions of different membrane receptor of antigens.
Immune response against tissues: Autoimmunity and autoimmune disease immunological tolerance; transplantation and rejection.	5. Know about Immune response with tissues.
Hypersensitivity reactions: Definition; Types; Mechanisms.	6. Understand the mechanisms of hypersensitivity reactions.
Immunodeficiency: Immunodeficiency disease; **Prophylaxis**: Effectiveness and safety of vaccine; Current vaccine and modern approaches; adjuvants.	7. Understand the different types of immunodeficiency disease and also know the current vaccine and modern approaches.

Recommended Readings:
1. Warren Levinson, Review of Medical Microbiology and Immunology, 16th Edition, 2020. 2. David Male, Immunology, 9th Edition, Elsevier; 2020. 3. Abul K. Abbas, Cellular and Molecular Immunology, 9th Edition, 2017. 4. Peter J. Delves, Seamus J. Martin, Dennis R. Burton, Ivan M. Roitt, Roitt's Essential Immunology, 13th Edition, 2017 ,Wiley-Blackwell.

PHI 3202: Health Economics	**Credit Hour: 03**	**Marks: 100**
Rationale: The goal of this course is to give a brief introduction to key concepts of health economics the demand for and supply of health services, fundamentals of markets and the price mechanism with a focus on the healthcare market. It will make the students to gain knowledge on healthcare system and health. In particular, the course provides student with ability to understand the implications of market and government failures in the context of health care. Furthermore, the course will enhance settings of health economics skills and encourage networking among fellow students in public health.		
Course Objectives: This course will help the students to – 1. To understand basic concepts of health economics. 2. To understand on the health care system. 3. To interpret the factors that influence consumer demand and supply for health services. 4. To use economic theory to understand and evaluate in health policy system. 5. To develop skills and abilities to integrate knowledge of health economic theory and methods for independent analysis of different problems of how health care is financing and organized.		

Course Content	**Intended Learning Outcomes (ILOs)**
	By the end of this course students will be able to –
Introduction to health economics: Definition of Economics; importance for health and health services; Range of issues addressed by Health Economics; Scopes; Economics of Health in developing countries.	1. Basic information about health economics.
Demand and elasticity of demand for health: Definition of demand: Law of	2. Recognize concept of demand in

demand, Function and schedule, Demand curve and shift; Factors affecting demand for health; Elasticity of demand: Definition, types, Measurement, Factors; Response of demand to price/income; Cross elasticity; Normal and inferior goods; Elasticity and demand for Healthcare.	economics.
Supply of healthcare: Definition, law, Function, Schedule, Curve, Shift of supply curve; Production function, Isoquants; Substitution goods, Complementary goods; Budget Line.	3. Familiarize with conception of supply in economics.
Demand and supply: Healthcare providers and health services utilization; Agency relationship in healthcare; Supplier induced demand; Factors affecting provider behaviour; Implications for reimbursement of provider policy.	4. Know the demand supply policy in the context of health economics.
Theory of costs: Concept of costs; fixed cost; variable cost; derivation of short and long run cost curves (TC, MC, AC, AVC, TVC, TFC); Relation between different types of cost curves.	5. Understand the theory of costs.
Efficiency and market structure and market failure: Perfect Competition; Characteristics of market and firm; Efficiency in healthcare market: Allocative and Technical; Types of market failure and occurrence in healthcare market; State intervention in healthcare market; Role of government in healthcare market.	6. Identify market structure and market failure.
Health financing overview: Determinants of healthcare financing; Types of Health expenditure, financial flows; National health accounts; Resource allocation in health sector; Tax, deficit, demand side financing; micro health insurance; User fees; Equity and efficiency of different methods of health financing.	7. Discover overview of financing process in health.

Recommended Readings:

1. Donaldson C. and Gerard K. 1993. Economics of Health Care Financing. Macmillan.
2. Lee, K. and Mills, A. 1983. The Economics of Health in Developing Countries. Oxford, Oxford University Press.
3. McGuire, A., Henderson, J. And Mooney, G. 1998. The Economics of Health Care: An introductory text. London, Routledge and Kegan Paul.
4. Mills, A. and Gilson, L. 1988. Health Economics for Developing Countries: A Survival Kit. EPC Publication NO. 17, Summer, Health Policy Unit, LSHTM.
5. Koutsoyiannis, A. 1979. Modern Microeconomics, Macmillan.
6. Drummond, M. F. and Stoddart, G. L. 1996. Methods for the Economic Evaluation of Health Care Programmes. Oxford, Oxford University Press.

PHI 3203: Software Application in Public Health	**Credit Hour: 02**	**Marks: 100**

Rationale: Software systems are the cornerstones of all modern aspects. Such systems are often complex and long lived, and must be robust and adaptable. By studying software application and management course will equip students with the skills needed to follow a career specifying and developing these systems, and other computer-based solutions for health information system. Students will gain knowledge and experience of the latest technologies of health technologies, but also grounding in the underlying principles of the subject. This course also provides an in depth knowledge of project management principles and modern software project management practices in health informatics.

Course Objectives: This course will help the students to –

1. To explain overview of software life cycle with software management and project management.
2. To enrich knowledge about the requirement analysis, software design and implementation of software with efficient algorithm on public health related issues.
3. To capable the understanding of software testing techniques in organization level.
4. To understanding Software application in electronic health record system.
5. To understand about telecommunication, social media and internet resources uses in public health.

Course Content	**Intended Learning Outcomes (ILOs)**
	By the end of this course students will be able to –
Software engineering paradigms: Definition of S/W Eng.; system; Characteristics of a system; Types of	1. Explain overview of software life cycle with software

system; System development life cycle; Generic software process models; prototyping fourth generation technique.	management.
Project management: Management Activities; Project Planning; Project Scheduling; Risk Management; Software Cost Estimation.	2. Know about project management.
Requirements analysis fundamentals: Analysis principle; Software Prototyping Specification; feasibility study; Requirement Analysis Methodologies;	3. Enrich knowledge about the requirement analysis of software.
Health informatics software design fundamentals: Design process; Design fundamentals: Software architecture, program structure, data structure, software procedure, Software design principles; Software Reuse; Configuration Management; Code documentation, Input/output; Algorithm Development: Mathematical problems; sorting and searching algorithm; image segmentation, feature extraction and classification algorithm; biological computations.	4. Know about design and implementation of software with efficient algorithm.
Software Testing Techniques and Strategies: Testing fundamentals; Component or Unit testing; Acceptance Testing; Beta Testing; White box testing; Loop testing; Black Box testing; Verification and validation; Integration testing; Validation testing; System testing; The art of debugging.	5. Capable about software testing techniques in organization level.
Software application in electronic health record system: Definition of EHR; Purposes of patient record; Difference between EHR and paper based record; functional component of an EHR system; EMR; clinical decision support, data capture, data display, query and surveillance system. Information technology and surveillance systems in public health; Databases and technologies to improve public health surveillance.	6. Understand Software application in electronic health record system.
Social media and internet resources in public health: An overview of Blogging/ audio/ video/ online communities and social networks; Citizen Journalism; Use of Facebook/Twitter/other social media to enhance health in public settings; IoT; Big data; Cloud computing; shared and distributed database; data warehouse; data mining.	7. Know about social media and internet resources which are used in public health.
Telecommunication system in health informatics: Telecommunication; GSM and CDMA; Cell phone	8. Understand telecommunication system which is used in health

technology- cell sectoring, cell pattern, frequency reuse, tower and traffic; path-loss and fading; multipath propagation; Satellite communication; Use of cell phone technology to improve delivery public health program; Changes in technology affect in the practice of public health practitioners.	informatics.

Recommended Readings:

1. Rod Stephens, 2015(1st ed.), Beginning Software Engineering, Wrox Publisher, ISBN: 9781118969175.
2. Ian Sommerville, 2016 (10th ed.) Software Engineering, ISBN: 978-0133943030.
3. Roger S. Pressman, 2014(8th ed.), Software Engineering: A Practitioner's Approach, McGraw-Hill Higher Education, ISBN: 978–0–07–802212–8.
4. Yufeng Wang, Jianhua Ma, 2015(1st ed.), Mobile Social Networking and Computing: A Multidisciplinary Integrated Perspective, CRC Press, ISBN: 9781466552753.
5. Ramon Mata-Toledo, Pauline Cushman, 2001(Illustrated ed.), Schaum's Outline Handbook of Computer Algorithms, McGraw-Hill Companies, ISBN: 978-0071361996.
6. Robert E. Hoyt, William R. Hersh, 2018(7th ed.), Health Informatics: Practical Guide, Lulu.com, ISBN: 978-1-387-64241-0.

PHI 3204: Climate Change and Health	**Credit Hour: 03**	**Marks: 100**

Rationale: Climate change is one of the greatest threats to human health in the 21st century. By studying this course, the students will have the opportunity to learn the solid overview behind the climate change and how climate change affects human health. It takes a deep dive into climate change's adverse health effects, including those related to extreme heat, waterborne infections, insect-borne diseases, and exposure to storms and floods.

Course Objectives: This course will help the students to –

1. At an introductory level, describe how the climate has changed, explain the role of greenhouse gases in climate change, and describe how the climate is predicted to change in the future.
2. To understand and discuss climate change impact on health in the context of public health.

Course Content	**Intended Learning Outcomes (ILOs)**
	By the end of this course students will be able to –
Introduction to Climate system: Weather; Climate; relationship between weather and climate; The climate system; Natural climate	1. Understand the basics of climate change science.

variations; Human- induced climate variations.	
Observed climate variability and change: Land-surface; sea surface temperature, sea air temperature, Temperature of the upper air; changes in the cryosphere; Temperature of the past 1000 years; volcanic and solar effects; changes in precipitation and related variable; water vapour; evaporation; clouds the atmospheric or oceanic circulation change;extreme weather and climate events.	2. Understand the evidences of climate change.
Greenhouse gases and their Impact: Trace gases; Current observation; Trends; Projection of future emissions; overall impact of global atmospheric chemistry change.	3. Understand the role of greenhouse gases in climate change.
Radioactive Forcing of climate change: Radioactive forcing; forcing-response relationship; well-mixed greenhouse gases; stratospheric ozone; land-use change; solar forcing of climate; global warming potentials; Global mean radioactive forcing; Time evolution of radioactive forcing.	4. Know about climate change due to radioactive force.
Climate Change and Bangladesh: Scenarios; Adaptation and mitigation measures; Impact of climate change on woman.	5. Know the reason of vulnerability of climate change in Bangladesh.
Climate Change and health: Relationship between climate change and disease; how does extreme events negatively impact human health; climate change and the spread; distribution; and incidence of certain water-borne diseases and vector-borne diseases; Impacts of climate change on air pollution and its effect on human health; Impacts of Climate Change on Population Migration and Security	6. Know the relationship between climate change and climate sensitive diseases.
Case studies: Climate change; sea level rise and development in Bangladesh.	7. Assess climate vulnerabilities.

Recommended Readings:
1. Climate change 2007 by, J.T. Houghton, Y. Ding, D.J. Griggs, Cambridge University press 2007. 2. Climate Process and Change by Edward Bryant, Cambridge University Press, 1997. 3. Bangladesh: Climate Change Impacts and Vulnerability: A Synthesis by Ahsan Uddin Amhed, 2006, Climate Change Cell, Department of Environment, Bangladesh. 4. Documents published by Climate Change Cell, Department of Environment, Bangladesh (2009). 5. Climate Change Science and Policy (2009). Schneider, S. H., Rosencranz, A., Mastrandrea, M. D. and KuntzDuriseti K., Island Press. ISBN-10: 1597265675, ISBN-13: 978-1597265676 6. Climate Change, Sea Level Rise and Development in Bangladesh (2014). Brammer, H., the University Press Limited.

PHI 3205: Community Health	**Credit Hour: 02**	**Marks: 100**
Rationale: This course is designed to understand community actions to explore community health problems, and develop solutions, ultimately improve people's health.		
Course Objectives: This course will help the students to – 1. Understand the history and relevance of community, community health, and public health. 2. Understand the effect of community health practices on individual health. 3. Apply demographic and epidemiological skills in the investigation, prevention and control of community health problems. 4. List various environmental issues and their impact on individual and community health. 5. Demonstrate the public health and healthcare systems operation in community.		
Course Content	**Intended Learning Outcomes (ILOs)**	
	By the end of this course students will be able to –	
Introduction: community health: definition; Key elements; Factors; Features; A history of community and public health; Social and preventive health; Role of community physicians in society; Health system and health development; Community organizing/building and health promoting	1. Understand the concept of community health, personal health, community health, population health, public health and the factors affecting community health.	

programme.	
Community Diagnosis and Treatment: The process of community diagnosis; Types of community diagnosis; Problem oriented community diagnosis; community diagnosis versus clinical diagnosis; Community treatment.	2. Discuss the process of community diagnosis.
Approaches to community health: History of primary health care (PHC); Health for all, Alam-Ata Declaration; Components, Principles and strategies of PHC; Essential Service Package (ESP); Revitalizing PHC; Inquiry in PHC; Implementation of health care strategies in community.	3. List the components, principles and strategies of primary health care.
Communicable and non-communicable diseases: Classification of diseases and health problems; communicable diseases; Non-communicable diseases; Prioritizing prevention and control efforts; Prevention; intervention, control, and eradication of diseases; Levels of Prevention.	4. Define and differentiate communicable and non-communicable diseases and explore prevention and control measures.
Community health and environment: Home and workplace environment; Water and sanitation; Worksite safety and health and wellness promotion programs.	5. Learn how to develop a healthy home and workplace development.
Community Organization and public health: Governmental Health Agencies; Quasi-Governmental Health Organizations; roles of Governmental Health Agencies in community development process; The role the World Health Organization (WHO) plays in community and public health.	6. Understand the roles of governmental and quasi-governmental organizations in community development process.
Community health action in Bangladesh: Scenario; community health programs for women; infants and children; adolescents; adults and older people; Community mental health; Maternal and child health.	7. Understand present situation of maternal and child health in a community.
MDG, SDG, and UHC: Definitions; Objectives; Approaches of community health in Millennium Development Goal (MDG), Sustainable development goal (SDG), and	8. Understand the approaches of community health in MDG, SDG, and UHC.

Universal health coverage (UHC).	

Recommended Readings:

1. An Introduction to Community Health *by* McKenzie, James, Robert R. Pinger, and Jerome Kotecki.7th edition. Jones and Bartlett Publishing. ISBN 9780763790110.
2. Thapa J, Tandan M, Subedi RK - A textbook of community health diagnosis (2012).
3. Rashid, Khabir, Hayder's Textbook of Community Medicine and Public Health, 4th edition, RHM Publishers, Dhaka, Bangladesh.

PHI 3206: Pharmaco-epidemiology	**Credit Hour: 03**	**Marks: 100**

Rationale: The goal of this course is to introduce students to the most important issues of pharmacoepidemiology. To this end, students will emphasize the ways in which the observational study of drugs can draw on standard epidemiologic technique, and explore the ways in which drugs present unique research problems and opportunities.

Course Objectives: This course will help the students to –

1. Understand the basic concept of pharmacoepidemiology.
2. Plan and implement pharmacoepidemiology studies.

Course Content	**Intended Learning Outcomes (ILOs)**
	By the end of this course students will be able to –
Introduction Distinction between pharmaco epidemiology, epidemiology, and clinical pharmacology; Historical Background.	1. Understand the basic concept of pharmaco-epidemiology.
Adverse drug effects (ADEs): risks and benefits of drug use in humans including the cause, manifestations and consequences historic and legal frameworks; addressing ADE issues at individual and population levels	2. Learn about adverse drug effects.
Drug Safety Surveillance and Risk Management: Drug Safety ; Drug-drug interactions; Classification criteria ; Errors of omission ; Errors of commission ;Signal sources and generation ;Signal identification; Signal detection algorithms ; Disproportionality Analysis.	3. Learn about drug safety.

Measurement of treatments and outcomes: Baseline disease status; Drug effectiveness versus efficacy; Treatment effect heterogeneity; Drug exposure ; Intent-to-treat versus as-treated ;Clinical outcomes ; Economic outcomes.	4. Know the measurement of treatments and outcomes.
Drug approval process: Overview of the Drug Approval Process; Branded versus generics; biological; Guidance on premarket Risk assessment.	5. Understand drug aproval process.
Pharmacovigilance and pharmacoepidemiology: Historical and legal background**;** Vaccine risk management; Medications in pregnancy; Drug safety decision-making using a range of evidence; Post-marketing benefit-risk assessment.	6. Learn about Pharmacovigilance.
Research Designs in Pharmaco epidemiology: Basic features, strengths and weaknesses of pharmacoepidemiology study designs; Case reports and case series; Ecological studies; Cross-sectional studies; Case-control studies; Nested-case control studies; Cohort studies.	7. Learn about typical pharmaco epidemiology study designs and explain their strengths and weaknesses.
Bioethical Issues in Pharmacoepidemiology Research.	8. Know bioethical issues.

Recommended Readings:

1. Textbook of Pharmacoepidemiology, 2nd Edition 2013. Editors: Strom BL, Kimmel SE, Hennessy S. ISBN: 978-1-118-34486-6 (Available from Biomed Library) •
2. Essentials of Clinical Research. 2014, Editor: Stephen Glasser. ISBN: 978-3-319-05470-4 (Available online from Biomed Library). http://primo.lib.umn.edu/TWINCITIES:mncat_discovery:TN_scopus2-s2.0-84961373238
3. Causal Inference. Hernán MA, Robins JM (2017). Boca Raton: Chapman & Hall/CRC, forthcoming. Available online at: http://www.hsph.harvard.edu/miguel-hernan/causal-inference-book/
4. Jick H, García Rodríguez LA, Pérez-Gutthann S. Principles of epidemiological research on adverse and beneficial drug effects. Lancet 1998;352:1767-70

PHI 3207: Practical: Database Management System in Public Health	Credit Hour: 02	Marks: 100

Rationale: The course, Database Management Systems, provides an introduction to the management of database systems upon public health related topics. The course emphasizes the understanding of the fundamentals of relational systems including data models, database architectures, and database manipulations of health information system (HIS). The course also provides an understanding of new developments and trends such as internet database environment and data warehousing concern to public health. The course uses a health problem-based approach to learning.

Course Objectives: This course will help the students to –

1. To understand the objectives of data and information management of an IT based health system.
2. To understand the relational model and relational database management system concern to public health and also mathematical and biological computational algorithm.
3. To **i**mplement relational databases upon public health use a RDBMS and retrieve data using SQL.
4. To develop SQL query for observing health information system output.
5. To implement web-based application of public health oriented issues using PHP.

Course Content	Intended Learning Outcomes (ILOs)
	By the end of this course students will be able to –
Introduction: Database system concept, Purpose of Database system; View of data; Data models; Database languages; Transaction management; Storage management; Database Administrator; Database users; Overall system structure.	1. Understand the objectives of data and health information management.
Database model of public health issues: Entity, attribute, cardinal relations; Entity-Relationship model; Relational model and its language (SQL, Relational algebra); table, field and records; primary key and secondary key.	2. Understand the relational model and relational database management system of public health problems.
Algorithm development of health information System: Mathematical problems; sorting and searching algorithm; string and array operations; and biological computations.	3. Develop mathematical and biological computational algorithm.
Database design and implementations of HIS in SQL: Using MYSQL/Oracle software with SQL query design database	4. Implement relational databases of public health issues using a RDBMS and retrieve data using SQL.

and database system of health issues, tables; insert values in table; delete and updates of tables.	
SQL query management of health informatics: create SQL query to generate output in database system; query optimization.	5. Develop SQL query for observing system output.
Web programming of health based topics: PHP and its basic syntax; functions and methods; Apache and its application with PHP.	6. Implement web-based application using PHP.

Recommended Readings:

1. Avi Silberschatz, Henry F. Korth and S. Sudarshan, 2020 (7th ed.), Database System Concepts, McGraw-Hill Education, ISBN: 978-0-07-802215-9.
2. Seymour Lipschutz, 2014 (1st ed. rev.) Data Structure, McGraw-Hill Education, ISBN: 9781259029967.
3. Robin Nixon, 2014 (3rd ed.), Learning PHP, MySQL, JavaScript, CSS and HTML5: A Step-by-Step.
4. Guide to Creating Dynamic Websites, O'Reilly Media, ISBN: 9781491949467.
5. Ramon Mata-Toledo, Pauline Cushman, 2001(Illustrated ed.), Schaum's Outline Handbook of Computer Algorithms, McGraw-Hill Companies, ISBN: 978-0071361996.
6. Peter Adams, 2016 (Kindle ed.), SQL: The Ultimate Guide from Beginner to Expert - Learn And Master SQL In No Time! Create Space Independent Publishing Platform, ISBN: 9781540700520.

PHI 3208: Viva Voce	Credit Hour: 02	Marks: 100