

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

PHI 2101: Mental Health	Credit Hour: 03	Marks: 100
<p>Rationale: Mental health is an area for study, research and practice that places a priority on improving and achieving equity in mental health for all people around the world. Mental illness is a global health problem that affects one out of four people at some point in their lives. Given the scale of the problem, studying and working in mental health is a great study and career choice. In this course, a closer look at the field of mental health, why it matters, and what study are out there waiting to be discovered under the umbrella of public health. Furthermore, student will have the chance to explore different aspects of mental health, to learn more about how the mental health issues affect ours health and everyday life and how to diagnose people with mental disorders.</p>		
<p>Course Objectives: This course will help the students to –</p> <ol style="list-style-type: none"> 1. learn about mental health continuum (from general mental wellness to mental illness/disorders); 2. understand the biologic, psychosocial and genetic risk factors of mental health illness and disorders and how to diagnose and treat those problems; 3. develop self-awareness, design plans for maintaining healthy behaviours and facilitate referral to counselling and treatment resources; 4. conceptualize self-directed research in mental health; 5. be an advocate for fighting the stigma surrounding mental health issues; 6. be the community voice influencing government decision-making in regard to mental health and wellbeing issues. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
A. Introduction: Mental health and wellbeing; Incidence, prevalence, burden and aetiologies of mental illness in Bangladesh and global context; Vision of a transformed mental health system.	1. Understand the basic concept of mental health and wellbeing, illness, disorders, and burden.	
B. Mental Health Theories and Key Concepts: Freud’s life and the origins of psychodynamic theory; Ego psychology; Object relations theory; Child analysis and developmental theory; Current trends in psychodynamic theory; The evolution of cognitive and behaviour therapies; Behaviourism.	2. Know the basic theories of mental health.	
C. Mental Health and the Neurosciences: Brain development; Mind and brain in psychiatric illness; Other issues in neuroscience.	3. Characterize and evaluate the paradigms concerned with brain functions and neuro-psychiatric disorders.	

<p>D. Clinical Mental Health Disorders: Epidemiology, risk factors, types, sign & symptoms, general medical treatment, prevention and promotion strategies of the following mental health disorders – Paediatric Disorders; Sleep Disorders; Bipolar Mood Disorders; Depression; Anxiety Disorders; Eating Disorders; Cognitive Disorders; Substance Use, Abuse, and Dependence; Adjustment Disorder; Schizophrenia and Psychoses; Sexual Disorders.</p>	<p>4. Acquired, integrate and utilize knowledge about the epidemiology, risk factors, common clinical features, prevention and promotion of common mental health disorders.</p>
<p>E. The Context of Mental Health Care: Mental health care settings and continuum in cultural contexts; Ethical and legal context of mental health care and practice.</p>	<p>5. Understand different context of mental health care, its practice, ethical and legal principles and issues.</p>
<p>F. Assessment and Therapeutics: Mental health assessment, treatment planning, and the medical record; Psychological testing and rating scales; Psychotherapeutic approaches.</p>	<p>6. Integrate knowledge about the approaches of psychiatric assessment through interview, physical examination, and laboratory testing.</p>
<p>G. Mental Health Emergencies & Violence: Delirium; Suicidality; Aggressive and violent behaviour; Intimate partner violence; Child maltreatment; Rape and sexual assault; Elder abuse.</p>	<p>7. Acquire knowledge about three commonly encountered psychiatric emergencies and issues related to violence.</p>
<p>H. Understanding Mental Health First Aid: Short and long term support for mentally ill person; Importance and characteristic of positive relationships; Person-centred approaches to mental health; Early intervention; Recovery; Impact of individual attitudes and perceptions; Wellness action plans.</p>	<p>8. Learn about the first aid approaches towards mental illness and practice in real life world</p>
<p>I. Mental Health Advocacy: Mental health legislation; Drivers of mental health provision; How policy supports mental health; Strategies to promote well-being; Reducing barriers to accessing mental health support.</p>	<p>9. Understand the legislative framework relating to mental health, integrate policy for individual support and explore ideas for sustainable mental wellness.</p>
<p>Recommended Readings:</p>	
<p>1. Allan Tasman and Wanda K. Mohr, 2011. Fundamentals of Psychiatry. John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK. 2. Andrew Koffmann and M. Grace Walters, 2014. Introduction to Psychological Theories and Psychotherapy. Oxford University Press. 3. Jeffrey J. Magnavita (Edited), 2016. Clinical Decision Making in Mental Health Practice. American Psychological Association, 750 First Street, NE, Washington, DC 20002.</p>	

4. CACHE Level 2: Certificate in Understanding Mental Health First Aid and Mental Health Advocacy in the Workplace. Learning Curve Group, LCG-MHFA March 2020, Version 1 (603/5148/2).
5. Paul Harrison, Philip Cowen, Tom Burns, and Mina Fazel, 2018. Shorter Oxford Textbook of Psychiatry (7 edn). Oxford University Press.

PHI 2102: Pathology	Credit Hour: 03	Marks: 100
<p>Rationale: The goal of teaching pathology to the undergraduate students is to provide comprehensive knowledge of the cause and mechanism of disease, in order to enable them to achieve complete understanding of the clinical manifestation and natural history of the disease, so that a Public Health specialist can plan prevention strategies.</p>		
<p>Course Objectives: This course will help the students to –</p> <ol style="list-style-type: none"> 1. understand the concepts of cell injury and changes produced thereby in different tissues and organs and the body’s capacity for healing; 2. understand the normal homeostatic mechanisms, the derangements of these mechanism and the effects on human systems; 3. understand the etiopathogenesis, the pathological effects and the clinico-pathological correlation of common infectious and non-infectious diseases; 4. understand the concept of neoplasia with reference to the etiology, gross and microscopic features, diagnosis and prognosis in different tissues and organs of the body; 5. correlate normal and altered morphology (gross and microscopic) of different organ systems in different diseases to the extent needed for understanding of disease processes and their clinical significance; 6. have a knowledge of common genetic disorders and their resultant effects on the human body; 7. have an understanding of the common diseases in infancy and childhood, for the investigations necessary to diagnose them and determine their prognosis. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
<p>A. Introduction to pathology and cellular adaptation cell injury and cell death: Define pathology and its different branches, define aetiology and pathogenesis, mechanism, morphology and examples of cell injury, necrosis and apoptosis. Subcellular and cellular responses and adaptation to injury Intracellular accumulations, pathological calcification and cell aging.</p>	<ol style="list-style-type: none"> 1. Understand the concepts of pathology, cell injury and changes produced thereby in different tissues and organs and the body’s capacity for healing. 	

<p>B. Acute and chronic inflammation: Vascular and cellular events in acute inflammation, chemical mediators, outcome and morphological patterns of acute inflammation. Chronic inflammation with special reference to granulomatous inflammation. Systemic effects and effects of deranged inflammation.</p>	<p>2. Recognize the types of inflammation and the effects on human systems.</p>
<p>C. Tissue healing and repair: Regeneration healing and fibrosis. Control of normal cell proliferation and tissue growth, mechanism of tissue regeneration, repair by healing and fibrosis. Extracellular matrix and cell matrix interactions.</p>	<p>3. Know the relation between tissue regeneration and repair.</p>
<p>D. Hemodynamic disorders, thromboembolic disease and shock: Edema, hyperemia, congestion and haemorrhage, normal Hemostasis, thrombosis, DIC, embolism, infarction and shock.</p>	<p>4. Learn to prevent disease by hemodynamic disorders.</p>
<p>E. Genetic Disorders: Principles of genetics, normal karyotyping. Mutations, Mendelian disorders, disorders with multifactoral inheritance cytogenetic disorders involving autosomes and sex chromosomes. Single gene disorders with nonclassic inheritance of Public Health interest. Diagnosis of genetic disorders involving molecular and genetic techniques.</p>	<p>5. Know the common genetic disorders and their resultant effects on the human body.</p>
<p>F. Neoplasia: Definition, nomenclature and biology of tumor growth. Molecular basis of cancer with special reference to carcinogenic agents and molecular basis of multistep carcinogenesis Epidemiology and clinical features of tumors. Grading, staging and laboratory diagnosis of cancer.</p>	<p>6. Understand the concept of neoplasia with reference to the etiology, gross microscopic features, diagnosis and prevention.</p>
<p>G. Infectious Diseases: General principles of microbial pathogenesis, bacterial, fungal, parasitic and viral infections.</p>	<p>7. Learn about etiopathogenesis, the pathological effects and the clinico-pathological correlation of common infectious diseases.</p>
<p>H. Environmental and Nutritional pathology: Common environmental and occupational exposures leading on to diseases; Effects of Tobacco, Effects of Alcohol, Adverse Drug Reactions, Drug Abuse, Poisoning, Radiation Injury Nutritional deficiencies and obesity related disorders.</p>	<p>8. Learn environmental and nutritional pathology and their effects on health.</p>

I. Disease of Infancy and Childhood: Congenital anomalies, birth injuries, diseases of neonates, inborn errors of metabolism, tumor and tumor like lesions of infancy and childhood.	9. Understand the common diseases in infancy and childhood.
Recommended Readings:	
<ol style="list-style-type: none"> 1. Kumar, V., Abbas, A. K. and Aster, J. C. 2015. Robbins and Cotran Pathologic Basis of Diseases (10th edition). Elsevier. 2. Dey, N. C. Dey, T. K. <i>Dey</i>, Debasish Sinha 2009. A Textbook of Pathology (15th revised edition) 3. Levison, D., Reid, R., Burt, A. D., Harrison, D. J., Fleming S. S. 2008. Muir's Textbook of Pathology (14th edition). CRS Press. 	

PHI 2103: Reproductive and Child Health	Credit Hour: 03	Marks: 100
<p>Rationale: International Law stated reproductive health is a human right. It plays an important role in morbidity, mortality and life expectancy. Reproductive health problems are the leading cause of women's ill health and mortality worldwide, and impacts on child health. This course is designed to address the problems and challenges associated with reproductive health and child health. Besides, getting knowledge about effective preventive measures, will improve the reproductive health resulting successful maternal and infant survival and outcomes.</p>		
<p>Course Objectives: This course will help the students to –</p> <ol style="list-style-type: none"> 1. identify the leading indicators and program components of reproductive health; 2. describe disparities in reproductive health outcomes between countries and regions of the world; 3. learn about the effective interventions to improve reproductive health and child health; 4. identify the leading maternal and child health problems in developed and developing countries; 5. describe effective preventive measures to improve maternal health and child health. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
A. Reproductive health (RH) concepts: Concept and definition of RH; Moving from MCH to RCH- historical perspective; Reproductive health situation; Reproductive health situation in Bangladesh; maternal	<ol style="list-style-type: none"> 1. Understand the basics of reproductive and child health. 	

and child health (MCH); Objectives of MCH, MCH problems.	
B. Women's health and development: Size; age distribution; Social and economic status of women in developed and developing countries; Fertility and its relation with women's health and quality of Life; Consequences of urbanization/migration on women's health; Women's right in RH.	2. Describe fertility and its relation with women health.
C. Gender issues: Concept of gender and sex; Gender equity and equality; Gender based-violence (GBV); prevention measures of GBV.	3. Describe gender equity and gender equality.
D. Safe motherhood: Introduction to safe motherhood; Components of safe motherhood; Maternal mortality and morbidity; Common problems and complications of pregnancy and its management; midwives.	4. Describe the components of safe motherhood and causes of maternal morbidity and mortality.
E. Sexually transmitted diseases: Common STDs, RTIs and its determinants; Syndromic management and prevention of RTIs and STDs; High risk group and vulnerability of HIV and AIDS; HIV and AIDS situation in Bangladesh; Prevention and management of HIV and AIDS.	5. Describe the concepts of RTIs and STIs, HIV, and AIDS and their preventive measures.
F. Child health: Introduction to child health; Childhood morbidities and mortalities; Mentally and physically challenged child; Child health programs; Integrated management of childhood illness (IMCI) & National new-born health programmes (NNHP); Breastfeeding; concepts of "High Risk" child and "Child Survival"; Local customs and tradition and its effects on child health.	6. Understand the child health programs in Bangladesh.
G. Adolescent health: Adolescent health; physical and mental changes in adolescence period; menarche, menstruation; teenage pregnancy and its consequences; intervention programmes for adolescents; rights and empowerment of adolescents.	7. Identify the causes of adolescent pregnancy and its consequences.
H. Family planning and fertility control: Definition; birth control methods; fertility control in a global perspectives; legal and illegal induced abortion.	8. Understand different family planning methods.
I. Reproductive health policy, programmes and contemporary issues.	9. Learn about the different contemporary issues in reproductive and child health.
Recommended Readings:	
1. Park, K. 2011. Park's Textbook of Preventive and Social Medicine. Banarsidas Bhanot Publishers.	
2. Rahman, M., Alamgir AKM, Hafez M. A. 2012. Rashid, Khabir, Hayder's, Textbook of Community Medicine and Public Health, 4th ed. RHM Publisher, Dhaka, Bangladesh.	

3. Wallace, H. M., Kantigiri and Serrano, C. V. 1987. Health care of Women and Children in Developing Countries, 2nd ed., Third party publishing company, Oakland, California.

PHI 2104: GIS and Remote sensing in Public Health	Credit Hour: 03	Marks: 100
<p>Rationale: Changes in the natural environment and climate can compromise human and animal health. Emerging and re-emerging infectious diseases can spread whenever ecosystems change. Spatial information derived from remotely sensed data or models using Geographic information systems (GIS) that is playing an increasingly important role in understanding the relationship between health and environmental factors for locating and forecasting disease outbreaks. Spatial modelling techniques from GIS hold particular potential for efficient monitoring and forecasting of human and animal diseases; developing policies and implementing interventions aimed at better controlling these diseases.</p>		
<p>Course Objectives: This course will help the students to –</p> <ol style="list-style-type: none"> 1. use geo-information to improve the quality and accessibility of health care; 2. explore the relationship between spatial data and geographic variation in health status; 3. monitor health trends, to early-detect infectious diseases and improve prevention. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
<p>A. Elements of Geographic Information System: GIS Components and Structure, The Organizational Context, Spatial Data Models, Integration of Vector and Raster Data, Spatial Data Infrastructure, GIS Data Acquisition, Applications of GIS, Health aspects of GIS and remote sensing.</p>	<ol style="list-style-type: none"> 1. Develop basic knowledge on Geographic Information Systems and its applications on Geo-health. 	
<p>B. Coordinate Systems: Geographic Coordinate System, Map Projections, Commonly Used Map Projections, Projected Coordinate Systems, Options for Coordinate Systems in GIS.</p>	<ol style="list-style-type: none"> 2. Learn the basic properties and uses of coordinate systems; Understand the difference between geographic and projected coordinate systems and managing them. 	

<p>C. Spatial Data Accuracy and Quality: location errors, spatial data, accuracy standards, topological errors, topological editing, non-topological editing.</p>	<p>3. Develop knowledge on data type with quality to perform different spatial analysis related to epidemiology.</p>
<p>D. Methods of Spatial Data Analysis: Spatial Data Analysis, Attributes Analysis, Integrated Analysis of Spatial Data and Attributes, GIS Models. Web mapping of disease outbreak and epidemics.</p>	<p>4. Understand and be able to apply fundamental spatial concepts through GIS analysis such as arrangement, orientation, diffusion, dispersion, and pattern of diseases.</p>
<p>E. Principles of Remote Sensing: Electromagnetic Spectrum, Spectral Signatures in the Solar Spectrum, Thermal Infrared Domain, Atmospheric Interactions, Sensors- Passive Sensors and Active, Satellite Remote Sensing Missions, Interpretation- Visual and Digital.</p>	<p>5. Develop basic knowledge on Remote sensing data and its applications on Geo-health. In addition, how remote sensing data are captured and type of platforms.</p>
<p>F. Digital Image Processing: Digital Image Classification, Techniques of Multitemporal Analysis, Analysis of Spatial Properties, Applications on Geo-health.</p>	<p>6. Process the data collected from Earth observation, where physically data collection is costly and time concern.</p>
<p>G. Geostatistical Mapping for Geo-health: Basic concepts, Mechanical spatial prediction models, Statistical spatial prediction models, Validation of spatial prediction models, Regression-kriging.</p>	<p>7. Examine environmental and occupational health; Identify the Effects of climate change on exposure to pathogenic viruses, parasites and bacteria.</p>
<p>Recommended Readings:</p>	
<ol style="list-style-type: none"> 1. Briney, Amanda. (n.d.). "Medical Geography – A History and Overview of Medical Geography." <i>Geography at About.com</i>. Retrieved from: http://geography.about.com/od/culturalgeography/a/medicalgeograph.htm (27 March 2014). 2. Cromley, Ellen K. and Sara L. McLafferty. (2012). <i>GIS and Public Health</i>. The Guilford Press: New York, New York. 2nd edition. 3. Department of Health and Human Services. (14 November 2006). "Geographic Information Systems (GIS) at CDC." United States Centers for Disease Control and Prevention. Retrieved from: http://www.cdc.gov/gis/ (27 March 2014). 4. ESRI. (n.d.). "Disease Surveillance Tracking – Environmental Health Mapping & Vector Control." <i>ESRI Public Health</i>. Retrieved from: http://www.esri.com/industries/health/public-health (27 March 2014). 5. Harvard School of Public Health. (2 January 2013). "Geographic Information Systems (GIS) in Public Health Research." Harvard University. Retrieved from: http://www.hsph.harvard.edu/gis/ (27 March 2014). 	

6. Office of Health Assessment and Epidemiology. (n.d.). “Top Reports from the Epidemiology Unit.” Department of Public Health County of Los Angeles. Retrieved from: <https://publichealth.lacounty.gov/epi/reports.htm> (27 March 2014).
7. Rushton, Gerard. (10 October 2007). “Privacy and Confidentiality in Health GIS.” ESRI Health GIS Conference. Retrieved from: http://www.vdh.virginia.gov/OFHS/policy/documents/2012/irb/pdf/GIS_Confidentiality.pdf (27 March 2014).

PHI 2105: Public Health Genetics	Credit Hour: 03	Marks: 100
<p>Rationale: The rationale behind this course is to educate the student about the basic principles of public health genetics and their application to health practices and research. In this course, the application of advances in genetics, molecular biotechnology and population genetics to improve public health and prevent disease. This course will provide the knowledge necessary to apply genetic concepts to public health practice.</p>		
<p>Course Objectives: This course will make the student to –</p> <ol style="list-style-type: none"> 1. understand the basic principle of public health genetic; 2. apply knowledge of inheritance and risk factors for disease to understand a variety of rare and common health conditions; 3. understand the molecular approach of genetic disease screening and diagnosis; 4. interpret pedigree information; 5. understand the basic principle of population genetics; 6. assess the ethics of the application of genetic technologies to public health. 		
Course Content	Intended Learning Outcomes (ILOs)	
	After successful completion of this course the students will be able to-	
<p>A. Introduction to Public Health Genetics: Historical perspectives and current challenges and opportunities; The human genome project; Models of public health genetic; Policy development; The multidisciplinary nature of public health genetics in research and education.</p>	1. Know the frameworks for understanding genetic principles, concepts and their application in public health genetics.	
<p>B. DNA as genetic material: Griffith’s experiment to prove the presence of a transforming principle, Avery, MacLeod and McCarty’s experiment to determine that DNA and not RNA or protein was the transforming principle, further validation by Hershey and Chase, Chemistry of nucleic acids, DNA structure.</p>	2. Learn about the basic of DNA	

<p>C. Gene expression: Replication as continuity of transfer of genetic information; Transcription, types of RNAs, their characteristics and function; Translation leading to functional protein synthesis, collinearity of genes and proteins.</p>	<p>3. Know the principles of gene expression</p>
<p>D. Ethical, legal and social issues regarding public health genetics: Genetics, public health, and the law; Genetics and public health beyond the clinical encounter; Public health surveillance of genetic information; Ethical and legal response to social risk.</p>	<p>4. Understand the basic approach that allows for detailed examination and discussion of social and ethical issues in genetics arising in research, practice and policy affecting both individuals and populations.</p>
<p>E. Population Genetics: Concept of gene pool; The theory of allele frequency; natural selection; Random genetic drift; Population in genetic equilibrium; The Hardy-Weinberg law; Genetics of ABO blood group.</p>	<p>5. Know the principles behind population genetics and allelic distribution.</p>
<p>F. Linkage: Types of linkage; Morgan's view on linkage; Coupling and repulsion hypothesis, sex-linked inheritance.</p>	<p>6. Understand the linkage of gene and its inheritance.</p>
<p>G. Crossing Over: Types of crossing over; Mechanism of crossing over; Detection and significance of crossing over.</p>	<p>7. Know the mechanism, detection and significance of crossing over.</p>
<p>H. Evaluation of Genetic Testing: Genetic screening; The direct detection of genotype distinguishes individual genomes; Newborn screening; Prenatal diagnosis, antenatal screening and reproductive aspects of medical genetics; Carrier testing.</p>	<p>8. Understand the molecular approach behind genetic diseases diagnosis.</p>
<p>I. Genetic Counselling: Introduction to genetic counseling; pedigree analysis, the dangers of genetic exceptionalism; genetic counseling in mendelian and non-mendelian disorders, Counseling in relation to prenatal screening and testing; Impact of genetic information and genetic counselling on public health.</p>	<p>9. Know the role of genetic counseling in understanding public health genetics.</p>
<p>J. Communication, Education, and Information dissemination: Principles and practices of communication processes for genetics in public health; Training in public health genetics; Genetic information in surveillance system.</p>	<p>10. Understand the role of genetics in risk communication and information dissemination</p>

Recommended Readings:

1. D. Peter Snustad and Michael J. Simmons 2012. Principle of Genetics, 6th edition. Wiley.
2. Hartwell et al 2011. From Genes to Genomes, 4th edition. McGraw-Hill Education Press.
3. Angus Clarke 2019. Harper's Practical Genetic Counselling, 8th edition. CRC Press.
4. Watson et al 2013. Molecular Biology of the Gene. 7th edition. Pearson.

PHI 2106: Practical Reproductive and Child Health	Credit Hour: 02	Marks: 100
<p>Rationale: Mother and child constitute a majority of population in our country. Accessing the appropriate health care facilities is needed to ensure their good health. So the appropriate information regarding the service availability and the challenges they faced should be explored. Thus, this course is designed to understand practical scenario of maternal and child health services, family planning services and others.</p>		
<p>Course Objectives: This course will make the student to –</p> <ol style="list-style-type: none"> 1. understand maternal and child health care (MCH); 2. understand family planning services; 3. know about the healthcare services for garment workers; 4. learn of adolescent health programs. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
A. Evaluation of service provision and delivery of a Family planning and fertility Clinic	1. Understand available family planning services in our health care facilities and assess the needs of new services.	
B. Observation of antenatal services (ANC), delivery, and postnatal services (PNC) etc. in a safe motherhood clinic.	2. Differentiate between ANC and PNC services.	
C. Evaluation of service provision and delivery of NGO and GoB MCH care delivery centre.	3.1 Understand the maternal and child health care (MCH) provided by the NGO and GoB. 3.2 Identify MCH service gaps of NGO and GoB, if any.	

D. Observation of health care delivery system of garment factory to their women workers	4. Learn about the services availability for garment workers
E. Evaluation of adolescent health programs of NGO and GoB.	5. Identify the of adolescent health programs of NGO and GoB.
Recommended Readings:	
<ol style="list-style-type: none"> 1. Park, K. 2011. Park's Textbook of Preventive and Social Medicine. Banarsidas Bhanot Publishers. 2. Rahman, M., Alamgir AKM, Hafez M. A. 2012. Rashid, Khabir, Hayder's, Textbook of Community Medicine and Public Health, 4th ed. RHM Publisher, Dhaka, Bangladesh. 3. WHO guideline for ANC and PNC 	

PHI 2107: Practical: GIS and Remote Sensing in Public Health	Credit Hour: 02	Marks: 100
<p>Rationale: After an initial overview of the topic from the course PHI 206, students will begin by learning about geospatial technologies and the role of mapping in public health. They will learn basic GIS-RS operations and techniques so that they can make custom maps for the class, through a series of weekly GIS lab exercises.</p>		
<p>Course Objectives: This course will make the student to –</p> <p>Students will look at how communities are shaped and how they shape our health. They will be asked questions about planning and design changes that can be made to improve health in communities. The class will work to identify changes that could be made to address specific health concerns or issues.</p>		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
<p>A. Basic Concepts of GIS: Digitizing Geographical features like points, lines, and polygons; Conversion of Vector data into Raster data and vice versa; Making window to have a particular area as study of interest; Mask preparation to separate a particular area for intensive study; Preparation of continuous surface map from tabular data (preparation of water quality, pollution, temperature, rain fall map etc.); Application of Buffer, Distance, Reclass, weighting procedure and Overlay</p>	<ol style="list-style-type: none"> 1. Demonstrate a practical understanding of how spatial information could inform the development and implementation of community health policies. 	

technique in GIS environment to safeguard the environmentally sensitive areas.	
B. Cartography and Visualization: Definition of map and map features, Characteristics of Map, Scale of map and its importance, Concept of layer, topographical maps, thematic maps, attribute information and display information.	2. Explain and apply exemplary cartographic principles; Anticipate the evolution and learn basic principles of maps and its designing
C. Spatial Referencing System: Map projections- types and uses, Geographic coordinate systems, Projected coordinate systems, projection transformations, Bangladesh Practise.	3. Explain the role and importance of geodetic datums, geoids, coordinate systems, and map projections for identifying position and the location of places, people, and features on the Earth's surface.
D. Image Analysis: Preparing false color composite image for better visual discrimination; Unsupervised and Supervised Image Classification technique to classify various land use pattern (water body, mangrove, other forested land and agricultural crop separation technique); Land use change detection over time (Time series analysis).	4. Extract information from EO data for time series analysis to understand the trend of disease spread.
E. Geostatistical Analysis: Interpolation- Point/area, exact/approximate, global/local; Regression- Ordinary least square regression, Geographically weighted regression; Kriging – Simple, Universal, ordinary; Validation.	5. Understand and be able to apply fundamental spatial concepts such as arrangement, orientation, diffusion, dispersion, and pattern of diseases.
Recommended Readings:	
<ol style="list-style-type: none"> 1. Price, Maribeth Hughett, 2019. Mastering ArcGIS. Dubuque, Iowa :McGraw-Hill. 2. Hengl, T. (2009). <i>A Practical Guide to Geostatistical Mapping</i> . Office for Official Publications of the European Communities . 3. John A. Richards. 2012. Remote Sensing Digital Image Analysis: An Introduction (5th. ed.). Springer Publishing Company, Incorporated. 	

PHI 2108: Viva Voce	Credit Hour: 02	Marks: 100
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Course Details for Part-II BPH (Hons); Semester-II Examination

PHI 2201: Public Health Microbiology	Credit Hour: 03	Marks: 100
<p>Rationale: Public Health Microbiology course will introduce students to the microbial species that cause human disease. This course will cover bacteria, fungi, viruses, and protozoa, and discuss current topics including antibiotic resistance, public health threats, and global health. Students will be able to explain the microbiological tests to identify and characterize organisms to address Public Health issues. Moreover, it will develop skills on accumulating, analyzing data and interpreting the findings using scientific approaches to solve public health issues.</p>		
<p>Course Objectives: This course will make the student able to –</p> <ol style="list-style-type: none"> 1. understand ideology of microbiology in public health; 2. understand the emerging and re-emerging microbial diseases in home and abroad and their diagnosis, control and prevention; 3. describe and understand the pathogenesis of microbial agents such as bacteria, virus, parasite and fungi commonly prevalent in Bangladesh; 4. realise the prudent use of antibiotics and its rationale; 5. appraise the need for research on common microbial diseases encountered in health sector. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
<p>A. History of Development of Microbiology: Development of microbiology as a discipline, abiogenesis vs. biogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming; Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology.</p>	1. Understand the concept of microbiology in public health.	
<p>B. Diversity of Microorganisms Systems of classification: Binomial nomenclature, Whittaker's five kingdom and Carl Woese's three kingdom classification systems and their utility, General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Prokarya: Archaea and Bacteria, Eukarya : Algae, Fungi and Protozoa) giving definitions and citing examples Protozoa: Methods of nutrition, locomotion & reproduction-Amoeba, Paramecium and Plasmodium.</p>	2. Illustrate the diversity of microorganism and classification	
<p>C. Microbial growth and control: Principles of microbial control; The action of microbial control agents;</p>	3. Learn about microbial growth and control.	

Influencing conditions of microbial control; Physical and chemical methods of microbial control	
D. Techniques studying microbes: Sample collection, processing, sample transport, detection of microbial populations; Gram Staining; Determination of microbial numbers and biomass.	4. Describe the techniques for laboratory diagnosis of common microbes.
E. Normal microflora of the human body and host pathogen interaction: Normal microflora of the human body; Importance of normal microflora; normal microflora of skin, throat, gastrointestinal tract, urogenital tract. Host pathogen interaction: Definitions - Infection, Invasion, Pathogen, Pathogenicity, Virulence, Toxigenicity, Carriers and their types, Opportunistic infections, Nosocomial infections. Transmission of infection, Pathophysiologic effects of LPS	5. Explain the host-parasite relationship, normal flora of the body, pathogens and opportunistic pathogens understand hospital acquired infection and its prevention.
F. Bacterial diseases: List of diseases of various organ systems, their causative agents and transmission chain. The following diseases in detail with symptoms, mode of transmission, prophylaxis and control- Respiratory Diseases: Streptococcus pyogenes, Mycobacterium tuberculosis; Gastrointestinal Diseases: Escherichia coli, Salmonella typhi, Vibrio cholerae, Helicobacter pylori; Others: Staphylococcus aureus, Bacillus anthracis, Clostridium tetani	6. Understand the mode of transmission, symptoms, and their sources for transmission of bacterial infection
G. Viral diseases: The following diseases in detail with symptoms, mode of transmission, prophylaxis and control Polio, Herpes, Hepatitis, Rabies, Dengue, Coronavirus disease, AIDS, Influenza with brief description of swine flu, Ebola, Chikungunya, Japanese Encephalitis	7. Explain viral diseases in detail with Symptoms, mode of transmission
H. Introduction to medical parasitology: Common parasitic diseases in Bangladesh; General morphological characteristics of protozoa, nemathelminths, platyhelminths	8. Describe the important characteristics and epidemiology of common parasitic diseases
I. General characteristics and mode of action antibacterial agents: Five modes of action, Inhibitor of nucleic acid synthesis, cell wall synthesis, cell membrane functions and protein synthesis, metabolism antifungal agents, antibiotic resistance, MDR, XDR, MRSA, NDM-1.	9. Understand antimicrobial agent, antibiotic resistant pattern and selection of appropriate antibiotics.
Recommended Readings:	
<ol style="list-style-type: none"> 1. Pelczar, M. J., Chan, E.C.S. and Krieg, N.R. 2014 (5th Edition). Microbiology, Tata McGraw-Hill Education. 2. Tortora, G. J, Funke, B. R. and Case, C. L. 2011. Microbiology- An Introduction, 10th Edition, Pearson Education Limited. 3. Jawetz, Melnick, and Adelberg 2007 (24th ed). Medical Microbiology. McGraw-Hill. 	

PHI 2202: Occupational Health	Credit Hour: 03	Marks: 100
<p>Rationale: Work has an impact on physical and psychological health. In this course, students will explore the health and safety issues of various types of work. The student will learn safe work practices in offices, industry and construction as well as how to identify and prevent or correct problems associated with occupational safety and health in these locations as well as in the home. Students will gain an understanding of the current state of occupational safety and health in the Bangladesh and globally including the enforcement of laws regulating occupational safety and health and the roles of workers, unions, and employers.</p>		
<p>Course Objectives: This course will help the students to –</p> <ol style="list-style-type: none"> 1. able to recognize and evaluate occupational safety and health hazards in the workplace; 2. effectively communicate and collaborate inside a diverse work environment; 3. Students will furthermore be able to analyze the effects of workplace exposures, injuries and illnesses, fatalities and the methods to prevent incidents using the hierarchy of controls, effective safety and health management systems; 4. identify the potential relationships between various exposures and symptoms in workers, working populations, and communities; 5. identify, explain and examine the legal regulation of workplace safety; 6. identify corrective solutions to address ergonomic risk factors. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
<p>A. Occupational Health: Introduction, Integration of Safety, Health and Environment, Occupational Health risks; Way to reduce occupational Risks, Measures for Occupational Health and Safety, Tips to improve occupational health.</p>	<p>1. Recognize the interrelatedness of health, Safety and environment, can identify, reduce and improve the occupational health risk.</p>	
<p>B. Work environment: Introduction and basic concept, recognition of health hazards, evaluation of health hazards-physical hazards, chemical hazards, biological hazards, mechanical and ergonomics hazards, Psychosocial hazards, controlling hazards, tasks for trainees.</p>	<p>2. Identify potential workplace safety and health hazards and determine how to mitigate the hazards through engineering controls, administrative controls and personal protective equipment</p>	
<p>C. Environmental toxicity due to Hazardous substances: Hazardous substances in the human environment, pathway to human exposure to hazardous chemicals in the environment, people exposure to toxic chemicals in everyday life, chemical residues in food, soil, water and the human body, health impact of hazardous chemicals and substances in the environment, super toxic man-made chemicals and substances in the environment and potential threat to human health.</p>	<p>3. Demonstrate a basic understanding of toxicology and the relationship of chemical exposure on human health.</p>	

<p>D. Occupational and other work-related diseases: Objectives, introduction and basic concepts, occupational diseases- Diseases caused due to contacting with metal, Diseases caused by air pollution, Diseases caused by water pollution, Diseases caused by improper disposal of solid waste, Deficiency diseases, Work related diseases.</p>	<p>4. Identify the potential relationships between various exposures and symptoms in workers, working populations, and communities.</p>
<p>E. Occupational health law: Employment law, legislation related to occupational health records, environmental legislation, Bangladesh health and safety legislation.</p>	<p>5. Identify, explain and examine the legal regulation of workplace safety and critically evaluate the limitations of the health laws and Safety laws.</p>
<p>F. Occupational hygiene: occupational hygiene overview, monitoring exposure, biological monitoring exposure, biological monitoring, prevention and control of exposure.</p>	<p>6. Apply the basic concepts of industrial hygiene.</p>
<p>G. Risk Assessment: The range of health and safety hazards and the harm they can do, Risk and its reduction/prevention, The terms hazard and risk, Why risk assessments are carried out, The importance of reporting potential health and safety hazards.</p>	<p>7. Identify and analyze various risk analysis methods, Describe the process of handling risk, including the assumption of risk and transfer of risk.</p>
<p>H. Occupational health and safety management systems: OHSAS-18001:2007 objectives and benefits, basic elements of OHSAS, Responsibilities of employers, basic elements of ISO 14001, Standards of ISO 14000 series.</p>	<p>8. Explain the purpose and scope of the OHSAS regulation, Apply skills obtained in OHSAS and ISO course work to real workplace settings and environments</p>
<p>I. Ergonomics: Introduction, Objectives, Problem due to poor ergonomics, Solution to the due ergonomic problem, Applications of ergonomics, Ergonomics risk and hazard, Ergonomics and health.</p>	<p>9. Understand and apply basic ergonomic terminology, Recognize and analyze ergonomic risk factors, identify corrective solutions to address ergonomic risk factors.</p>
<p>J. Personal Protective Equipment: Need of PPE, Standards, factors of selection of PPE, non-respiratory equipment, respiratory equipment.</p>	<p>10. Determine the appropriate level and type of Personal Protective Equipment (PPE) required.</p>
<p>Recommended Readings:</p>	
<p>1. Manahan S. E. 2000. Fundamentals of environmental chemistry Industrial and hazardous Wastes, Rajiv K, Sinha and Sunil Heart, Pointer publishers, Jaipur, India.</p> <p>2. Jain R. K. and Rao, S. S. 2002. Industrial Safety, Health and Environmental Management system. Khanna Publishers Hand Book of Environmental Health, H. Koren, M Bisest, Lews publishers, CRC Company, Florida, USA.</p>	

3. Brother, J. and Muthu V. K. 2005. Occupational health and safety management systems specification. Occupational health and safety assessment series (OHSAS) 18001, New Delhi.
4. S.C. Sharma and Vineet Kumar 2014. Safety Occupational Health and Environmental Management In Construction. Khanna Publishers.

PHI 2203: Ecology and Public Health	Credit Hour: 03	Marks: 100
<p>Rationale: This course demonstrates an understanding of basic ecology and public health, ecological factors; ecosystem concept, function and energy-flow; biogeochemical cycles; pollution; biodiversity degradation and climate change effects on human health. Ecology and public health address the complex inter-relationships between health and ecosystems.</p>		
<p>Course Objectives: This course will make the student to –</p> <ol style="list-style-type: none"> 1. understand basic concept of ecology, ecological factors and natural ecosystems; 2. gain knowledge on ecosystem structure, design and function in concept of public health; 3. basic understanding about biogeochemical cycles; 4. obtain knowledge on the ecological and environmental effects on human health; 5. gather knowledge on environmental pollution and health hazard; 6. able to prevent ecological disasters; and human adaptation to climate change; 7. facilitate to conduct research of ecological effects on human health and human society. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
<p>A. Introduction: Concepts of ecology; principles of ecology and human health; ties between ecology and other discipline; scopes and applications of ecological knowledge in the perspectives of public health.</p>	<p>1. Know the basic information about ecology and public health.</p>	
<p>B. Ecological factors: Definition; effects of climatic factors, edaphic factors, physiographic factors and biotic factors; types and interactions between different biotic factors and relationship of different ecological factors with human health.</p>	<p>2. Learn about the ecological factors associated with human health</p>	
<p>C. Ecosystem: Ecosystem concept; components of ecosystem; ecosystem classification; ecosystem adaptation and</p>	<p>3. Understand the concept, structure and design of ecosystem in the context of public health.</p>	

human co-adaptation; ecosystem design and ecosystem model for better public health.	
D. Biogeochemical cycle in ecosystem: Concept of Biogeochemical cycle; types of Biogeochemical cycle; Hydrological cycle; Gaseous cycle (Carbon, Oxygen and Nitrogen cycle); Sedimentary cycle; and nutrient cycle.	4. Understand the biogeochemical cycles of ecosystem.
E. Ecosystem function and energy flow: Concept of ecosystem function; trophic levels; food-chain; food-web; ecological pyramid; process of energy flow; Resilience and socio-ecological adaptation.	5. Identify levels of energy flow in food chain.
F. Ecosystem and biodiversity degradation; and effects on human health: Causes and consequences of ecosystem and habitat degradation; causes and consequences of biodiversity degradation; effects of ecosystem and biodiversity degradation on human health and society; Sustainable development, bio-diversity and health (SDG-11 to 15).	6. Identify causes for the disruption of ecosystem and know about impact of public health with ecosystem changes.
G. Pollution and public health: Definition; pollutant and types of pollutants; pollution categories; causes and consequences of water, air, soil, agricultural, sound and nuclear pollution and their specific effects on human health.	7. Learn about different pollutants and its impacts on human health.
H. Health hazard, climate change effects and environmental health diseases: Concept of health hazard; health hazardous wastes; effects on human health due to heat stroke, cold stress, solar radiation and arsenic contamination; climate change effects on human health; environment induced human diseases- Malaria, Dengue, Diarrhoea, and Arsenocosis.	8. Understand the climate change, diseases and human health.
Recommended Readings:	
<ol style="list-style-type: none"> 1. Eugene, P. Odum, Gray W. Barrett. 2004. Fundamentals of Ecology. 5th edition. Cengage learning. 2. Gerald G. Marten, Human Ecology, 2008. Earthscan, 8–12 Camden High Street, London, NW1 0JH, UK. 3. McElroy, A. and Townsend, P.K. 2015. Medical Anthropology in Ecological perspective, 6th edition 4. Subrahmanyam N.S. and Sambamurty A.V.S.S. 2000. Ecology. Narosa Pub. House. Mumbai, London. 	

PHI 2204: Medical Entomology	Credit Hour: 02	Marks: 100
<p>Rationale: In the last decade, the Chikungunya and Zika virus outbreaks have turned public attention to the possibility of the expansion of vector-borne infectious diseases worldwide. Medical entomology is focused on the study of arthropods involved in human health. The discipline is focused upon the insects, and more globally, arthropods that impact human health. It includes many links with veterinary entomology and environmental sciences, in a “one-health” concept. Knowledge of vector biology, arthropods monitoring, and control of vector populations remains essential to preventing and surveying vector-borne infectious diseases. So educating and awareness building in medical entomology are therefore essential in fighting arthropod-borne diseases.</p>		
<p>Course Objectives: This course will make the student to -</p> <ol style="list-style-type: none"> 1. be able to recognize arthropods that affect human health; 2. introduce the aspects (taxonomy, physiology, ecology, and behavior) of medically important arthropods; 3. recognize and understand the epidemiology of the arthropods/vector-borne diseases; 4. understand the mechanisms of arthropods/vector-borne diseases transmission to humans; 5. understand the dynamics of arthropods/vector-borne diseases; 6. understand vector/arthropod management and different control strategies. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
<p>A. Introduction and history of medical entomology: Concept, history and objectives of medical entomology</p>	1. Explore the antique knowledge and important of medical entomology.	
<p>B. Morphological adaptation of parasitic arthropods: Taxonomy, physiology, ecology, and behavior of medically important arthropods</p>	2. Develop the ability to understand the biology, ecology and behavior of flies, lice ticks, mosquitoes and mites those have public health importance.	
<p>C. Public Health Importance of arthropods: Problem caused by arthropods and their direct effects on human health</p>	3. Identify and understand the zoonotic diseases transmitted by arthropods and their burden on public health.	
<p>D. Epidemiology and dynamism of arthropod-borne diseases: Principal of arthropod-borne disease epidemiology and factors contributing to the dynamics of arthropod-borne diseases</p>	4. Know about the trends and influencing factors of different arthropod-borne diseases	

E. Identification of Public Health Importance Vectors: modern techniques to identify medically important mosquitoes; sand flies; house flies; black flies; tsetse flies; lice; bed bugs; cockroaches; Fleas; ticks; mites etc.	5. Able to identify medically important arthropods and capacity to use modern techniques that are helpful in diagnosing
F. Management and control of Vectors and vector-borne diseases: General tactics and strategies to control vectors and vector-borne diseases.	6. Recognize how to plan and develop guidelines to prevent and control arthropods and arthropod-borne diseases.
Recommended Readings:	
<ol style="list-style-type: none"> 1. Muller, G. and Durden, L. 2009. Medical and Veterinary Entomology, Academic Press, London. 2. Service, M. W. 1995. Medical Entomology for students, Chapman and Hall, London. 3. Lane, R.P and Crosskey, R.W. 1993. Medical Insects and Arachnids, Chapman and Hall, London. 	

PHI 2205: Biostatistics and Bioinformatics	Credit Hour: 03	Marks: 100
<p>Rationale: Bio-statistical analysis provides the methods to identify the patterns in the data and interpret the findings in a public health context. The goal of biostatistics is to disentangle the data received and make valid inferences that can be used to solve problems in public health. In this course, students will learn the statistical methods that can be used in analyzing health data and help in making inference. Also students will enrich their knowledge in protein sequencing and protein structure on aspect of Bioinformatics. Genomics concept is also explained in this context.</p>		
<p>Course Objectives: This course will make the student to –</p> <ol style="list-style-type: none"> 1. compute probabilities for various discrete and continuous probability distributions; 2. demonstrate the sampling distribution of different statistics; 3. estimate population parameters (means and proportions) with high reliability based on the information contained in the sample; 4. reach decisions about large body of data by examining only a small part of the data; 5. develop knowledge about Bioinformatics concept; 6. realize Protein sequencing and genome mapping; and 7. know Protein structure and gene finding. 		
Course Content	Intended Learning Outcomes (ILOs)	

	By the end of this course students will be able to –
A. Probability distributions: Discrete distributions: Binomial, Poisson; Continuous distributions: Normal, Standard normal distribution, their application.	1. Explain the similarities and differences between discrete and continuous distributions and when the use of each is appropriate.
B. Sampling distributions: Central limit theorem, Distribution of the sample mean, Distribution of the difference between two sample means, Distribution of sample proportion; Distribution of the difference between two sample proportions.	2. Understand how to use a sampling distribution to calculate basic probabilities.
C. Estimation: Confidence Interval (CI) for a population mean and a population proportion, CI for the difference between two population means and two population proportions, Determination of sample size for estimating means and proportions.	3. Interpret a confidence interval from both a practical and a probabilistic viewpoint.
D. Hypothesis Testing: Null and alternative hypothesis, Level of significance, Power of a test, Type I and type II error, P-value, Hypothesis testing: A single population mean and proportion, Difference between two population means and proportions, A single population variance, Chi-square test, Correlation, Tests of independence, Contingency table, The fisher exact test, Paired t-test, McNemar's test	4. Calculate and interpret z, t, F, and chi-square test statistics for making statistical inferences.
E. Introduction to Bioinformatics: Importance; Background of Bioinformatics Central Dogma of Life: According to Biology; According to Bioinformatics; Online resources of Bioinformatics, Algorithm basics; Introduction to programming; Introduction to statistics using R; Applications of Bioinformatics.	5. Enrich knowledge about Bioinformatics concept.
F. Protein Sequence: Overview of Genbank; Sequence comparison; Sequence comparison; DNA Sequencing: DNA sequencing methods; Genome mapping; Sequence Alignment: Definition and Types, Importance.	6. Understand Protein sequencing.

<p>G. Protein Structure: Phylogeny; Sequencing techniques and genome assembly; Gene finding; Protein bioinformatics and structural bioinformatics; Mass spectrometry in proteomics; Methods for Studying Proteins: Overview of Protein Structure, Amino Acid, Alpha Helix, Beta Strand, Reasons for Secondary Structure Prediction.</p>	<p>7. Understand Protein structure</p>
<p>Recommended Readings:</p>	
<ol style="list-style-type: none"> 1. Daniel, W. W., Cross C.L. (2013). Biostatistics: A Foundation for Analysis in the Health Sciences, 10th edition, John Wiley & Sons, Inc. 2. Gerstman B. B. (2014). Basic Biostatistics: Statistics for Public Health Practice, Jones and Bartlett Publishers. 3. Chap T. L., Eberly, L.E. (2016). Introductory Biostatistics, Jones and Bartlett Publishers, Inc., Hoboken, New Jersey. 4. Rosner B. (2015). Fundamentals of Biostatistics, 8th edition, Cengage learning. 5. Arthur M. Lesk (2019) Introduction to Bioinformatics, 5th edition. 6. Teresa K. Attwood and David J. Parry-Smith (2002). Introduction to Bio Informatics. 7. Andrzej Polanski and Marek Kimmel (2007). Bioinformatics, 2007th edition. 	

<p>PHI 2206: Practical: Public Health Microbiology</p>	<p>Credit Hour: 02</p>	<p>Marks: 100</p>
<p>Rationale: This Practical course examination include spotting, different bacterial staining procedures, identification of bacterial strains using conventional methods. The aim of teaching microbiology practical is to develop skill of the students in such an extent that he/she can perform the laboratory diagnosis individually. They will also understand the treatment and control procedures of infectious diseases.</p>		
<p>Course Objectives: This course will make the student to –</p> <ol style="list-style-type: none"> 1. substantiate and clarify theoretical concepts with experimental evidence; 2. develop skills of performing basic microbiology tests important in clinical investigations of public health interest; 3. develop familiarity with microbiological laboratory instrumentations techniques. 		
<p>Course Content</p>	<p>Intended Learning Outcomes (ILOs)</p>	

	After successful completion of this course the students will be able to learn
A. Microscopy and micrometry – Introduction to microscopes, focusing slides under low/ high power and oil immersion – Principles and demonstration of various types of microscopes	1. Demonstration of various types to microscopes
B. Gram’s staining; Z-N staining; AFB staining	2. Perform and interpret Gram’s, Z-N stain and AFB staining.
C. Demonstration of culture media namely Nutrient agar, Blood agar, Chocolate agar, MacConkey’s agar, Lowenstein Jensen, Robertson’s cooked meat media, Blood culture media, transport media (Carry-Blair/Stuart/Peptone water) with and without bacterial growth D. Demonstration of colony morphology of common bacteria: Staphylococci, Streptococcus Lactose fermenters, Lactose non fermenters, Proteus, Pseudomonas. E. Demonstration of inoculation, incubation (aerobic, CO ₂ and Anerobic condition) and plate reading	3. Observe the common bacteriological media with growth of Staphylococcus aureus, Streptococcus pyogenes, Escherechia coli, Salmonella, Shigella, Klebsiella, Proteus and Pseudomonas.
F. Demonstration of in vitro antibiotic sensitivity test by disk diffusion method,	4. Observe the drug sensitivity test of bacteria.
G. Demonstration of sterilization by chemical agents autoclaving and hot air oven.	5. Demonstrate autoclave and hot air oven.
Recommended Readings:	
1. Prof. K.A. <i>Khaleque</i> , Prof. K.Z Mamun. <i>Khaleque's Practical Pathology & Microbiology</i> , 2019. Published by: Aleya house, BD2, Dhaka, Bangladesh (Eid 19). 2. Prof. Dr. R. C. Dubey and Dr. D. K. Maheshwari. <i>Practical Microbiology</i> , 2009. S. Chand Publishing, 2002. ISBN 8121921538, 9788121921534.	

PHI 2207: Fieldwork: Occupational Health	Credit Hour: 02	Marks: 100
<p>Rationale: Work has an impact on physical and psychological health. This fieldwork familiarize the student to the about workplace occupational health and safety. The student will learn safe work practices in offices, industry, construction and agriculture field as well as how to identify and prevent or correct problems associated with occupational safety and health in these locations. The course is designed to assist the student with the implementation of safe healthy practices at work and at home.</p>		
<p>Course Objectives: This course will help the students to –</p> <ol style="list-style-type: none"> 1. identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others; 2. control unsafe or unhealthy hazards and propose methods to eliminate the hazard; 3. present a coherent analysis of a potential safety or health hazard both verbally and in writing; 4. discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors; 5. identify the decisions required to maintain protection of the environment, home and workplace as well as personal health and safety. 		
Course Content	Intended Learning Outcomes (ILOs)	
<p>Students have to visit Govt. and Non-govt. organisations especially Industries, Garments, Leather, Steel, Powerplant, agricultural land etc. After completion of the field visit, the students will have to present the findings and then submit a report addressing these criteria given below</p> <ul style="list-style-type: none"> • health and safety program management • emergency management • environmental protection • ergonomics • hazardous waste management • occupational hygiene 	<ol style="list-style-type: none"> 1. Identification, analysis and elimination of workplace hazards. 	

PHI 2208: Practical: Biostatistics and Bioinformatics	Credit Hour: 02	Marks: 100
Rationale: This course is designed to practice the basic statistical concepts with health-related data using computer programming. The MS Excel, SPSS, and R software will be used to perform statistical analysis of data sets and results interpretations.		
Course Objectives: This course will make the student to – <ol style="list-style-type: none"> 1. know how to calculate the frequency distribution to present the data graphically; 2. compute the numerical quantities that measure the central tendency and dispersion; 3. examine the relationship between two variables via correlation and regression analysis; 4. draw a representative and appropriate sample from a certain population using the appropriate sampling technique; 5. make decision for evaluating claims about a population; 6. identify the relationship between two qualitative variables. 		
Course Content	Intended Learning Outcomes (ILOs)	
	By the end of this course students will be able to –	
A. Organizing and graphing data: Construction of frequency distributions tables for qualitative and quantitative data, different types of graphical representation.	1. Construct frequency distribution and presentation of data.	
B. Descriptive statistics: mean, median, mode, variance, standard deviation, range, skewness, kurtosis.	2. Find different measures of central tendency and dispersion of a set of data.	
C. Correlation and regression: Correlation coefficient, Regression coefficient, Fitting of simple regression line.	3. Fitting and interpretation of simple linear regression equation.	
D. Sampling and Probability distribution: Drawing samples by simple random sampling, Drawing sample from Binomial, Poisson and Normal.	4. Select sample from Binomial, Poisson and Normal.	
E. Hypothesis testing: A single population mean and proportion, Difference between two population means and proportions, Paired comparisons.	5. Conclude a decision whether the hypothesis is accepted or rejected.	
F. Measures of Association: Association between two qualitative variables (Chi-square test).	6. Understand whether two qualitative variables dependent or independent.	
Recommended Readings:		

1. Daniel, W. W., Cross C.L. (2013). Biostatistics: A Foundation for Analysis in the Health Sciences, 10th edition, John Wiley & Sons, Inc.
2. Chap T. L., Eberly, L.E. (2016). Introductory Biostatistics, Jones and Bartlett Publishers, Inc., Hoboken, New Jersey.
3. Rosner B., (2015). Fundamentals of Biostatistics, 8th edition, Cengage learning.
4. P.S.S. Sundar Rao & J Richard, (2016). Introduction to Biostatistics and Research Methods, 5th Edition.

PHI 2209: Viva Voce	Credit Hour: 02	Marks- 100
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