

MPH Core Curriculum

Public Health Biology Core Requirement

Competencies and Course Options
2008



Public Health Biology Competencies

1. Describe the biological bases, e.g. molecular, cellular, and physiological, for the major determinants of human disease including infectious disease, nutritional deficiencies, and exposure to toxic environmental agents.
2. Describe the ecological principles that determine the distribution of infectious disease in human populations.
3. Apply principles of human immune system function to explain the rationale and mode of action of existing and potential methods of immunization.
4. Explain the role of genetic determinants in human disease and disease susceptibility caused by infectious agents, nutrition deficiencies and exposure to toxic agents, and in microbial virulence.
5. Apply biological principles to development of disease prevention, control, or management programs.
6. Apply biological principles to assessment of risk from potentially hazardous agents and behaviors.

PUBLIC HEALTH BIOLOGY - 19 COURSE OPTIONS

Appropriate for all students

- 550.630.01/.81*** **Public health biology (3 units)**
260.636.01 **Evolution of infectious disease (3 units)**

Appropriate for students who have background in biological sciences

- 120.620.01** **Fundamentals of reproductive biology (3 units)**
182.640.01 **Food & water borne diseases (3 units)**
183.631.01/81 **Fundamentals of human physiology (4 units)**
187.610.01/81 **Public health toxicology (4 units)**
222.641.01/.81 **Principles of human nutrition (4 units)**
223.689.01 **Biologic basis of vaccine development (3 units)**
260.606.13 **Major global infectious diseases: prospects for control (2 units)**
260.631.01 **Immunology, infection, and disease (3 units)**
260.635.01 **Biology of parasitism (6 units)**
260.650.01 **Vector biology and vector-borne diseases (3 units)**

* .01 On campus regular term; .81 Internet; .13 Winter Intersession

PUBLIC HEALTH BIOLOGY - 19 COURSE OPTIONS (cont'd)

Appropriate for students who have background in biological sciences

260.652.01	Principles of public health ecology(4 units)
260.656.01	Malariology (2 units)
340.612.01/.81	Epidemiologic basis for tuberculosis control (2 units)
340.646.01/.81	Epidemiology & public health impact of HIV & AIDS (4 units)
340.654.01/.81	Epidemiology & natural history of human viral infections (6 units)
340.744.01/81	Advanced topics on control & prevention of HIV/AIDS (4 units)
380.761.01/.81	STI prevention: using epidemiology to inform policy & program (4 units)

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

550.630.01/.81

PUBLIC HEALTH BIOLOGY

Biochemistry & Molecular Biology - 1st term (Internet version 4th term)

3 units

Levin, David; Glass, Gregory; Ketner, Gary; Yager, James; Zirkin, Barry

Offers an integrative **molecular and biological perspective on public health problems**. Explores **population biology and ecological principles** underlying public health and **reviews molecular biology in relation to public health biology**. Modules focus on specific diseases of **viral, bacterial, and environmental origin**. Specific examples of each type are used to develop the general principles that govern interactions among susceptible organisms and etiologic agents.

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

260.636.01 EVOLUTION OF INFECTIOUS DISEASE

Molecular Microbiology & Immunology - 1st Term

3 units

Richard Markham

Introduces students to the **concept of how certain bacterial, parasitic, and Viral pathogens have evolved and are still evolving** to persist in both the developed and developing world. Enables public health workers to **develop new strategies and approaches that can be used to aid in the control** of the major infectious disease epidemics that continue to threaten both the developed and developing world.

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

120.620.01

FUNDAMENTALS OF REPRODUCTIVE BIOLOGY

Biochemistry & Molecular Biology - 1st term

3 units

Evans, Janice

Addresses the **basic biological mechanisms that underlie male and female reproduction** and that pertain to **reproductive health issues**, such as contraception, infertility, sexually transmitted diseases, and reproductive aging. Suitable for students with limited backgrounds in the biological sciences.



PUBLIC HEALTH BIOLOGY COURSE OPTIONS

182.640.01

FOOD- AND WATER- BORNE DISEASES

Environmental Health Sciences - 3rd term

3 units

[Schwab, Kellogg](#)

Discusses **food- and water-borne intoxicants and infections, diseases linked to eating and drinking, and prevention of food and water-borne diseases**. Topics include transmission of disease via food and water, disease processes in food- and water-related illness, microbial toxins, mycotoxins, chemical toxins, bacterial infections (salmonellosis, shigellosis, vibrio, listeria, etc.) virus and parasitic infections, organizing safe food and water supplies, and issues in food and water safety.



PUBLIC HEALTH BIOLOGY COURSE OPTIONS

183.631.01/.81

FUNDAMENTALS OF HUMAN PHYSIOLOGY

Environmental Health Sciences - 2nd term (Internet version 4th term)

4 units

Tankersley, Clarke

Introduces the **central and peripheral nervous systems and neuromuscular, respiratory, circulatory, endocrine, gastrointestinal, reproductive, and renal systems**. Intended for students in the allied health fields whose careers will be involved with human health problems.



PUBLIC HEALTH BIOLOGY COURSE OPTIONS

187.610.01/.81

PUBLIC HEALTH TOXICOLOGY

Environmental Health Sciences - 1st term (Internet version 2nd term)

4 units

Trush, Michael; Yager, James

Examines **basic concepts of toxicology** as they apply to environmental toxicology. Discusses **distribution, cellular penetration, metabolic conversion, and elimination of toxic agents**, as well as the fundamental laws governing the **interaction of foreign chemicals with biological systems**.

Focuses on the **application** of these concepts to the understanding and prevention of mortality and morbidity resulting from environmental exposure to toxic substances through a case study format.

Prerequisites: Background in chemistry (particularly organic chemistry) and biology useful

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

222.641.01/.81

PRINCIPLES OF HUMAN NUTRITION

International Health - 1st term (Internet version during summer term)

4 units

Caballero, Benjamin; Cheskin, Lawrence; Cooper, David S.; O'Brien, Kimberly; Paige, David; West, Keith

Provides an integrated overview of the physiological requirements and functions of **protein, energy, and the major vitamins and minerals that are determinants of health and disease**. Topics include dietary sources, intake levels, and **biological determinants of nutrient requirements; assessment of nutrient status in individuals and populations**; the role of nutrition in growth and health through the life cycle; the rationale for the development of dietary guidelines and of nutrition policies in different countries; and the role of diet on the development of chronic diseases, such as cardiovascular disease, cancer, diabetes, etc.

Prerequisites: Basic background in biology/medical sciences

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

223.689.01

BIOLOGIC BASIS OF VACCINE DEVELOPMENT

Molecular Microbiology & Immunology - 4th term

3 units

Durbin, Anna; Bourgeois, August; Bream, Jay

Provides an overview of the **biologic basis** for **development and evaluation** of new viral, bacteriologic, parasitic, and cancer **vaccines**. Lectures address the fundamental immunologic concepts of correlates of protective immunity underlying current and new strategies for immunization.

Emphasizes the use of new technologies for expression of vaccine antigens, including recombinant DNA techniques and use of novel adjuvants and antigen-carrier systems to enhance the delivery/presentation of specific immunogens to effector sites.

Prerequisites: 260.611-612, or equivalent knowledge of **principles of modern immunology**

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

260.845.13

MAJOR GLOBAL INFECTIOUS DISEASES: PROSPECTS FOR CONTROL

Molecular Microbiology & Immunology - Winter Institute
2 units

[Joseph Margolick](#)

Provides in-depth information on the **basic pathogenic mechanisms of selected infectious diseases that continue to be of major public health importance worldwide**, with an emphasis on underlying problems for development of effective public health interventions. Topics include HIV/AIDS, malaria, tuberculosis, measles, and infectious disease hazards that may become important in the future. Students taking this course will obtain a working knowledge of the biology of these diseases, including prospects for their effective management and control at both the individual and public health level, and of basic human immunology and vaccinology.

Instructor Consent Required



PUBLIC HEALTH BIOLOGY COURSE OPTIONS

260.631.01

IMMUNOLOGY, INFECTION AND DISEASE

Molecular Microbiology and Immunology - 2nd term
(3 units)

Scott, Alan

Margolick, Joseph

Presents the fundamental cellular, molecular and genetic mechanisms that initiate and control immune responses elicited during pathogen challenge and vaccination.

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

260.635.01 BIOLOGY OF PARASITISM

Molecular Microbiology and Immunology - 3rd term
6 units

Kumar, Nirbhay, Graczyk, Thaddeus, Scott, Alan, Shiff, Clive, Sullivan, David

Presents a **biological basis of parasitic lifestyles including host responses and parasite evasion of host defense mechanisms, transmission, epidemiology, diagnosis, clinical manifestations, pathology, treatment, and control** of the **major helminthic and protozoan infections of man**. Class discussions based on research papers and topics of fundamental importance to parasitology will involve student participation in a seminar format. Laboratory sessions examine living and preserved parasites, gross pathology, histopathology, and vectors.



PUBLIC HEALTH BIOLOGY COURSE OPTIONS

260.650.01

VECTOR BIOLOGY AND VECTOR-BORNE DISEASES

Molecular Microbiology and Immunology - 3rd term

(3 units)

Norris, Douglas

Rasgon, Jason

Trpis, Milan

Presents **principles of transmission of human and animal pathogens** by insects, mites and ticks. Discusses basic **arthropod biology** with special attention to biological properties of vectors and their interactions with pathogens. Discusses basic components of **arbopathogen disease cycles** and **principles of pathogen transmission dynamics**. Discusses major groups of arthropod-borne pathogens and vectors. **Special topics** will include emergent pathogens, vector genetics, traditional and modern disease control strategies and venomous arthropods.



PUBLIC HEALTH BIOLOGY COURSE OPTIONS

260.652.01

PRINCIPLES OF PUBLIC HEALTH ECOLOGY

Molecular Microbiology & Immunology - 2nd term

4 units

Glass, Gregory; Norris, Douglas

Applies **basic principles of ecology** (relationships between organisms & their environment) to **public health**, focusing on factors related to **population growth and regulation and the impacts of behavior, genetics, and evolution on disease patterns**. Examines the effects of population processes on **disease control by vaccination, chemotherapies, and vector control**.

Instructor Consent Required

Prerequisites: A course in **advanced biology**



PUBLIC HEALTH BIOLOGY COURSE OPTIONS

260.656.01 MALARIOLOGY

Molecular Microbiology and Immunology - 4th term
4 units

Shiff, Clive; Kumar, Nirbhay; Sullivan, David

Presents issues related to **malaria as a major public health problem.** Emphasizes the **biology of malaria parasites and factors affecting their transmission to humans** by anopheline vectors. Topics include host-parasite-vector relationships; diagnostics; parasite biology; vector biology; epidemiology; host immunity; risk factors associated with infection, human behavior, chemotherapy, and drug resistances; anti-vector measures; vaccine development; and management and policy issues.

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

340.612.01/.81

EPIDEMIOLOGIC BASIS FOR TUBERCULOSIS CONTROL

Epidemiology - 3rd term (Internet version 1st term)

2 units

[Golub, Jon](#); [Chaisson, Richard](#); [Coberly, Jacqueline](#)

Considers subjects and **epidemiologic principles relevant to control measures against tuberculosis**. Topics include source and interpretation of tuberculin sensitivity; risk factors; **prevention** by case-finding and treatment, vaccination, and chemoprophylaxis; and elements of control programs in developed and undeveloped areas.

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

340.646.01/.81

EPIDEMIOLOGY AND PUBLIC HEALTH IMPACT OF HIV AND AIDS

Epidemiology - 1st term (Internet version 2nd term)

4 units

[Farzadegan, Homayoon](#)

Provides an overview of the **historical and public health aspects of the HIV/AIDS epidemic**, with review and analysis of virology; immunology; clinical and laboratory manifestations; legal and ethical issues; economic impact; and needs for future research and intervention for global control of the HIV epidemic.

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

340.654.01/.81

EPIDEMIOLOGY AND NATURAL HISTORY OF HUMAN VIRAL INFECTIONS

Epidemiology - 3rd term (Internet version 1st term)

4 units

[Farzadegan, Homayoon](#); [Shah, Keerti](#)

Emphasizes **biology, epidemiology, and pathogenesis of diseases caused by human viruses**. Discusses virus interaction with host, diagnostic methodologies, immunization, and treatment of viral infections. Examines relationships between viral infections and oncogenesis such as hepatitis/liver cancer, HPV/cervical cancer, EBV/lymphoma, and HTLV/leukemia. Also covers biology and natural history of major viral families such as retroviruses, rabies, and others.

Special Comments: Content similar to 260.623-624

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

340.744.01/.81

ADVANCED TOPICS ON CONTROL AND PREVENTION OF HIV/AIDS

Epidemiology - 2nd term (Internet version 3rd term)

4 units

Farzadegan, Homayoon

Focuses on directed readings and discussion on the **science and pathogenesis of HIV/AIDS**. Covers **dynamics of the HIV epidemic** in the populated world, **difficulties and contrasts between clinical management of HIV/AIDS in developed and developing countries**, **prevention and control** modalities against HIV/AIDS, and **predicting patterns of future growth of the HIV/AIDS epidemic** with special reference to global economic impact of HIV vaccine and eradication issues of HIV/AIDS.

PUBLIC HEALTH BIOLOGY COURSE OPTIONS

380.761.01/.81

STI PREVENTION: USING EPIDEMIOLOGY TO INFORM POLICY AND PROGRAM

Population, Family & Reproductive Health - 3rd term (Internet version 4rd term)
4 units

Hogan, Terry; Zenilman, Jonathan

Considers **features of sexually transmitted diseases relevant to their control**, reviewing the natural history of the infections and laboratory diagnosis. Emphasizes public health practice control measures, including policy, behavior intervention, and medical screening/treatment intervention of sexually transmitted diseases.

Prerequisites: Prerequisites: Principles of Epidemiology, 340.601 or equivalent
Public Health Biology, 550.630 or equivalent