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Contract # 5280 EED Epidemiology

Product ID	Description	Quantity	Unit Price	Amount
340.668.89 Topics in Infectious Disease Epidemiology	In fulfilment of the COVID-19 EED Epidemiology grant and per approval from the grant liaison, this online training on Introduces the basic methods for infectious disease epidemiology and case studies of important disease syndromes and entities. Methods include definitions and nomenclature, outbreak investigations, disease surveillance, case-control studies, laboratory diagnosis, molecular epidemiology, and dynamics of transmission. Case-studies focus on acute respiratory infections, diarrheal diseases, hepatitis, tuberculosis, sexually transmitted diseases, malaria, and other emerging infections.	1	$4,122.00	$4,122.00
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Topics in Infectious Disease Epidemiology

340.668.89 | AY 2024-2025

Course Website: https://courseplus.jhu.edu/core/index.cfm/go/course.home/coid/21541/
(https://courseplus.jhu.edu/core/index.cfm/go/ course.home/coid/21541/)

Contact Information Faculty

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Course Description

Introduces the basic methods for infectious disease epidemiology and case studies of important disease syndromes and entities. Methods include definitions and nomenclature, outbreak investigations, disease surveillance, case-control studies, laboratory diagnosis, molecular epidemiology, and dynamics of transmission. Case-studies focus on acute respiratory infections, diarrheal diseases, hepatitis, tuberculosis, sexually transmitted diseases, malaria, and other emerging infections.

Course Learning Objectives

Upon successfully completing this course, students will be able to:

1. Describe and discuss the main epidemiological characteristics of the major infectious diseases of humans, including modes of transmission, natural history, and risk factors for infection
2. Describe how these epidemiological characteristics influence the detection, diagnosis and dynamics of these infections in human populations
3. Discuss how the epidemiologic features of infectious diseases determine programs and policies for their prevention and control

Intended Audience

JHSPH students and Summer Institute Training participants

LiveTalk Requirements

This course includes synchronous, online sessions ("LiveTalks") through CoursePlus using the Zoom platform (https://zoom.us/). In order to participate in a LiveTalk, each student is required to be signed into a Zoom account on their computer or mobile device before the session begins. You can use an existing account or sign up for a new account (https://uis.jhu.edu/zoom/ students/) in advance of our first LiveTalk. (If not using a JHU pro account, make sure the name in your personal Zoom account matches your preferred name in CoursePlus.) A short video tutorial (https://nam02.safelinks.protection.outlook.com/?
url=https%3A%2F%2Fctl.jhsph.edu%2Fhelp%2Findex.cfm%2Fgo%2Ftutorial.liveTalk%2F&data=02%7C01%
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%3D&reserved=0) for participating in a LiveTalk via Zoom is available to students.

The LiveTalks will be recorded. These recordings will be made available to all students registered for this course for educational purposes only.

This PDF also has helpful tips on how to use Zoom:
https://courseplus.jhu.edu/fileDepot/onlineLibrary/2143/LiveTalks- JoiningViaZoom.pdf
(https://drive.google.com/file/d/1Hcm4UU79C2Qa9ijZviqaP_F3-w4ep6i/view)

Course Schedule

Please see the course schedule (/core/index.cfm/go/about.schedule/coid/21541) for a full list of dates and items for this course.

Prerequisites

Introduction to Online Learning

Objectives

<u>Lecture 1</u>: History of Infectious Disease Epidemiology
1. Identify key milestones in the development of germ theory.
2. List several factors that delayed acceptance of the fact that microscopic organisms cause disease.
3. Identify key milestones in the prevention of infectious diseases.
4. Assess the role of infectious diseases in the history of epidemiology.

<u>Lecture 2</u>: Overview of Microbiology
1. List the major classes of infectious agents of humans
2. Differentiate eukaryotic and prokaryotic microorganisms
3. Describe the types of serological tests to measure immune response to an infection and their general relative sensitivity and specificity
4. Describe the differences and utility of enrichment media, selective media, and specialized media in the isolation of microorganisms and give an example of each

<u>Lecture 3</u>: Study Design in Infectious Disease Epidemiology
1. Describe four study designs commonly used to study infectious diseases
2. Determine appropriate study designs for various questions related to the natural history of disease

<u>Lecture 4</u>: Models of Infectious Disease Dynamics
1. Summarize the epidemiological insights about endemicity, age at infection, and mass immunization that emerge from a simple *SIR* mathematical model of those who are susceptible, infective, or immune (recovered)
2. Understand the effects of extensions of the *SIR* mathematical model for different contact rates in different age groups, for latent periods before an infected person can transmit an infection, and for probabilistic (stochastic) contacts
3. Describe the trade-offs between simplicity and complexity in mathematical models applied to epidemiology
4. Understand the importance of sharing concepts about mathematical models across disciplines

<u>Lecture 5</u>: Molecular Epidemiology and Phylogenetics : A Brief Introduction
1. Define molecular epidemiology
2. Introduce common molecular tests and describe their use in epidemiologic studies
3. Introduce phylogenetic trees and describe inferences about epidemiology of infectious diseases that can be drawn from phylogenic analyses

<u>Lecture 6</u>: Vaccines: An Introduction, Vaccine Development and Trials, Vaccine Decisions in Context
1. Explain what a vaccine is and broad groups of vaccines
2. Recall that vaccine success masks underlying risk and associated vulnerabilities
3. Describe the broad steps of vaccine development
4. Discuss trials versus real life
5. List challenges in vaccine policy
6. Define pharmacovigilance, trust, and hesitancy

<u>Lecture 7</u>: Disease Eradication
1. Differentiate between disease eradication and disease control
2. List the benefits of and additional requirements for eradicating an infectious disease and compare to the benefits of and requirements for controlling the disease
3. Describe or list the epidemiological characteristics of an infectious disease that would make it a favorable candidate for eradication
4. Describe the characteristics of smallpox that made it a good disease to target an eradication strategy
5. Contrast the public health strategies for the eradication of smallpox and the eradication of polio

<u>Lecture 8</u>: Measles
1. List the different goals of measles control programs
2. Describe the virologic and clinical characteristics of measles
3. Describe the epidemiologic characteristics of measles virus transmission

4. Describe the strategies for measles control and elimination
5. Describe the obstacles to measles control and elimination
6. Provide arguments for and against measles eradication

Lecture 9: Influenza
1. Describe the clinical presentation of influenza virus and the burden of disease it causes
2. Summarize the biology of influenza viruses and how this relates to the epidemiology
3. Present the epidemiology of seasonal and novel influenza viruses
4. Outline the medical and non-pharmaceutical interventions for the prevention and control of influenza

Lecture 10: Pneumococcal
1. Describe the clinical illness, including differences between carriage and invasive infection, and risk factors for invasive disease
2. Name some of the difficulties related to development of a vaccine against pneumococcal disease
3. Describe where and how the vaccine is currently used and concerns around serotype replacement

Lecture 11: Tuberculosis
1. Discuss the general epidemiology of tuberculosis worldwide and in the US
2. Summarize the natural history of tuberculosis
3. Describe how tuberculosis is diagnosed
4. Define tuberculosis control and differentiate the various strategies for its control
5. Define DOTS and discuss its impact
6. Outline the major challenges to tuberculosis control
7. Compare the strategies for global MDR tuberculosis control

Lecture 12: The Epidemiology of Sexually Transmitted Infections
1. Recognize some general principles that govern the epidemiology of sexually transmitted infections (STIs)
2. Describe certain aspects of the epidemiology of gonorrhea, syphilis, and human papillomaviruses

Lecture 13: Viral Hepatitis A, B, C, D, and E
1. Compare and contrast hepatitis A, B, C, D and E in terms of causative pathogen, natural history, clinical presentation, and global distribution
2. Identify modes of transmission for each of the hepatitis viruses and the resulting risk factors for each
3. Present the global burden of disease for each of these diseases and the most effective control and prevention strategies for each

Lecture 14: Cholera
1. Describe the causative agent of cholera and different ways to classify the bacteria.
2. List the primary prevention and control measures used for cholera.
3. Describe some of the challenges in understanding the burden of cholera related to both surveillance systems and diagnostics.
4. Discuss the potential role of weather and climate in driving cholera transmission.

Lecture 15: Emerging Zoonotic Infections: Nipah Virus as a Case Study
1. Define emerging zoonotic infections
2. Introduce the concept of One Health
3. Describe the epidemiology of Nipah virus, including zoonotic as well as person-to-person transmission
4. Identify the measures that have been used in Bangladesh to reduce the risk for Nipah virus transmission

Lecture 16: Lyme Disease and Its Epidemiology
1. Describe how Lyme disease was first detected and the causative organism identified
2. Present the complex life cycle of B. burgdorferi, including the role of ticks and wildlife
3. Describe the epidemiology of Lyme disease in the US and risk factors for infection

Lecture 17: Malaria
1. Introduce the malaria parasites that infect humans and their basic biology

2. Describe the diagnosis, clinical presentation, and global burden of malaria
3. Discuss the most important malaria prevention and control strategies and global targets for burden reduction

Lecture 18: Mystery Outbreak In Bangladesh
1. Provide an example of an outbreak investigation in Bangladesh
2. Review the 5-step outbreak investigation process in a complex investigation
3. Discuss how we determine "cause" in outbreak investigations
4. Illustrate the strengths of a multidisciplinary approach to outbreak investigation