

QUEEN'S PUBLIC HEALTH SCIENCES, EPID 828: INFECTIOUS DISEASES

WINTER 2022

This course provides a foundation in infectious disease epidemiology. Principles and methods related to infectious disease biology, outbreak detection and investigation, and the methodological, analytical, and diagnostic tools are covered. Specific infectious diseases that pose contemporary challenges in public health and/or have national or global public health impact are discussed. We will also revisit some key concepts and principles of epidemiology, deepen your understanding of these concepts and principles, and apply these to the study of infectious diseases.

Queen's PHS EPID 801, Introduction to Epidemiology or permission of instructor (typically an equivalent epidemiology course from another institution) is a prerequisite for EPID 828.

INSTRUCTOR: Dr. Susan Brogly, Adjunct Associate Professor, Department of Surgery (Queen's), Adjunct Faculty Public Health Sciences (Queen's), susan.brogly@queensu.ca, 613.549.6666 ext. 8227

CLASS SESSIONS: Monday 2-5pm; Carruthers Hall, Room 102

ASSIGNMENTS: Assignments are due in the OnQ Drop Box at the start of class as listed in the table below. The Drop Box will close at 2:15. Assignments will be graded and returned a week later. You may work in groups on your assignments but each student must turn in his or her own work for grading.

CLASS PARTICIPATION & STUDENT: Attendance at class sessions and participation in discussions is expected. Students are encouraged to add to the learning of the class by discussing newspaper articles, web posts or other infectious disease related stories from the media.

READINGS: For assignment or course readings students required to obtain articles through Queen's PubMed or on OnQ.

STUDENT ASSESSMENT:

Assignments	20%
In Class Participation	10%
Midterm	30%
<u>Final Exam</u>	<u>40%</u>

CLASS SESSION DETAILS:

Date	Topic	Learning Objectives	Reading	Due
10-Jan	<p><u>General Infectious Disease Concepts</u></p> <p><u>In Class Exercise</u></p>	<ul style="list-style-type: none"> • Understand the host-agent-environment model • Describe methods of transmission and relevant means of prevention • Calculate attack rate, secondary attack rate, and case fatality rate 	<p>Reading for In-Class Exercise</p> <p>Optional: Chapter 27, Infectious Disease Epidemiology, in Modern Epidemiology, 3rd Ed. Rothman, Greenland & Lash; to the top of page 561.</p>	
17-Jan	<p>Guest lecture: Dr. Prameet Sheth, Clinical Microbiologist, KHSC</p> <p><u>Pathogens</u></p> <p><u>Transmission Probability, Incidence & R₀</u></p>	<ul style="list-style-type: none"> • Identify and describe the different types of pathogens • Define characteristics of the infectious agent • Describe modes of transmission of particular pathogens • Describe pathogens associated with particular diseases • Use the binomial probability and exponential model to calculate the probability of infection • Describe the formula and estimate the incidence rate in changing (non-steady state) conditions • Define the reproductive number (R₀) and effective reproductive number (R) and be able to calculate the two given their various components • Describe the relationship between R₀ and an epidemic 	<p>Concepts of Transmission & Dynamics, E Halloran (p. 56-66 to Herd Immunity)</p>	<p>Assignment 1 Due</p>
24-Jan	<p>Guest Lecture: Dr. Santiago Pérez-Patrigeon, ID Physician, Queen's</p> <p><u>The Immune System</u></p> <p><u>HIV/AIDS</u></p>	<ul style="list-style-type: none"> • Describe the components of innate and adaptive immunity and how they protect against infection and/or severe disease • Describe the effects of HIV on our immune response • Describe the HIV virus and modes of HIV transmission • Apply epidemiologic principles to evaluate landmark studies in HIV prevention and treatment • Apply infectious disease principles in a study of HIV infection or prevention • Understand the concepts of error (bias and random error), risk and comparative measures of effect as discussed in class 	<p>Gottlieb MS et al. N Engl J Med 1981;305(24):1425-31.</p> <p>Fischl MA et al. The efficacy of azidothymidine (AZT) in the treatment of patients with AIDS and AIDS-related complex. A double-blind, placebo-controlled</p>	

Date	Topic	Learning Objectives	Reading	Due
		<ul style="list-style-type: none"> • Draw a DAG showing the relationship between a study determinant, outcome and confounder for an infectious disease and interpret the likely effect of confounding based on your ID knowledge 	trial. N Engl J Med. 1987 23;317(4):185-91.	
31-Jan	<u>Outbreak Investigation</u> <u>In Class Exercise</u>	<ul style="list-style-type: none"> • Apply the steps taken in an outbreak investigation • Create a case definition and describe the use and impact of different case definitions on an outbreak investigation • Interpret epidemic curves • Understand factors that affect choice of study design in an outbreak 	Dwyer and Groves, Outbreak Epidemiology	Assignment 2 Due
7-Feb	<u>Surveillance</u>	<ul style="list-style-type: none"> • Describe the purpose of public health surveillance • Identify and describe methods for surveillance • Understand differences between types of surveillance and strengths and weaknesses of each • Describe real and artificial reasons for an increase in case numbers 		
14-Feb	<u>Midterm Test</u>	*Closed book*		
21-Feb	<u>Reading Week</u>	*No class*		
28-Feb	<u>Vaccines</u> <u>In Class Exercise</u>	<ul style="list-style-type: none"> • Define vaccine efficacy, vaccine effectiveness, herd immunity • Calculate vaccine efficacy from RCT, cohort and case-control studies • Understanding the test-negative design for estimating vaccine effectiveness and be able to estimate VE from such a study • Describe some limitations of case-control and cohort studies in estimating VE • Differentiate between the direct, indirect, total and overall effects of vaccination • Explain why the proportion of cases of a disease that was vaccinated increases as vaccine coverage increases • Describe the importance of studying vaccine safety and some challenges in epidemiologic studies that aim to do this • Describe vaccine hesitancy and its potential effects on the spread of disease 		
7-Mar	Guest Lecture: Dr. Brad Stoner, PHS Head <u>STI and Sexual Networks</u>	<ul style="list-style-type: none"> • Discuss core epidemiological principles of sexually transmitted infections (STIs) • Describe fundamental aspects of STI transmission dynamics • Understand benefits and limitations of syndromic approaches for global STI prevention and control 		Assignment 3 Due

