**Program Overview:**

**Introduction to Infectious Disease Epidemiology**

**Program Summary:**

Infectious disease epidemiology is the study of the complex relationships among hosts, the environment and infectious agents. Epidemiologists are interested in the spread or transmission of infectious agents in the population, with the ultimate goal being to devise intervention strategies to mitigate spread. Participants will learn basic epidemiologic methods that are central to the understanding and control of infectious diseases in populations.

In this course, we walk through critical content in 6 modules (20 hours):

Module 1: general infectious disease concepts and measures

Module 2: binomial probability, basic reproductive rate (R0), effective reproductive rate (R), compartmental

models and serial intervals

Module 3: outbreak Investigations

Module 4: vaccines

Module 5: bias (confounding, selection, and information) and effect measure modification

Module 6: diagnostics (sensitivity, specificity, and predictive values)

Module 7: surveillance

**Competencies:**

* Understand basic concepts and measures of ID: attack rate, secondary attack, case fatality rate, incubation period, age specific rates, risk factors, measures of association
* Discuss, understand, and interpret transmission probability, R0, simple compartmental models, and serial intervals to explain how infections move through populations, how epidemics occur, and how control measures can reduce disease incidence
* Describe the general approach to investigating ID outbreaks and apply approach in case study of a real outbreak
* Discuss vaccination as a strategy for infectious disease prevention and control in individuals and populations
* Demonstrate an understanding of general infectious disease concepts and methods of infectious disease epidemiology, including study designs, measures of disease frequency, measures of association, diagnostic measures and bias
* Use examples from specific infectious diseases of public health importance to illustrate and apply infectious disease concepts and methods of infectious disease epidemiology

A basic working knowledge of Microsoft Excel and are necessary to be successful in the course.

# PHX: Introduction Infectious Disease Epidemiology Syllabus

Winter 2022

20 hours

10.00am to 2.00pm on-line

## Instructor information

## Dr. Alana Brennan, PhD, MPH

## Assistant Professor

## Departments of Global Health & Epidemiology

## Crosstown 392

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## Preferred pronouns: she/her/hers

Office Hours: TBD

## Course summary

PHX Infectious Disease Epidemiology will introduce traditional infectious disease epidemiology, focusing on practical issues in the study and control of infectious diseases in populations. Participants will learn epidemiologic methods that are central to the understanding and control of infectious diseases in populations. Specific infections that pose contemporary challenges in public health and have national or global public health impact will be discussed. The course is not intended to review all infectious diseases; rather, the intent of this course is to build an understanding of and an ability to apply the principles of infectious disease epidemiology and infectious disease control.

## Course competencies:

1. Demonstrate an understanding of general infectious disease concepts/principles and methods of infectious disease epidemiology, including study designs, measures of disease frequency/occurrence, measures of effect/association, diagnostic measures, and bias
2. Discuss and understand public health surveillance for infectious diseases, explaining how current public health goals for control of specific infections determine optimal methods for surveillance
3. Describe the general approach to investigating ID outbreaks and apply approach in case study of a real outbreak
4. Discuss, understand, and interpret transmission probability, R0, simple compartmental models, and serial intervals to explain how infections move through populations, how epidemics occur, and how control measures can reduce disease incidence
5. Discuss vaccination as a strategy for infectious disease prevention and control in individuals and populations
6. Use examples from specific infectious diseases of public health importance (e.g. diarrheal diseases, respiratory diseases, vector-borne diseases) to illustrate and apply infectious disease concepts/principles and methods of infectious disease epidemiology
7. Critically assess the infectious disease academic literature

# Learning resources

### Slack: Slack is a proprietary business communication platform developed by American software company Slack Technologies. Slack offers many features, including persistent chat rooms organized by topic, private groups, and direct messaging.

# Teaching methodology/Course format

Lectures: This course will cover the fundamental methods of infectious disease epidemiology.

Workshops: There will be 5 workshops that will address case studies that cover material presented in lectures and in course readings.

*Problem sets.* Students will complete 6 short (5-10 questions) problem sets at the end of each session. The questions will consist of short answer and calculations.

**Course Syllabus**

| **Date** | **Part I** | **Part II** | **Readings and problem sets** |
| --- | --- | --- | --- |
| **10 Jan**  **(module 1)** | Infectious disease measures and general concepts (**90 minutes Storyline**) | **Workshop 1:**  Introduction to infectious disease measures  (**90 minutes @@**) | * problem set 1 on basic ID measures and general concepts |
| **17 Jan**  **(module 2)** | Binomial probability model, R0, R, compartmental models, serial intervals (**90-120 minutes Storyline**) | **Workshop 2:**  R0 and S-I-R compartmental models  (**60 minutes @@**) | * reading ‘Althaus CL. Estimating the Reproduction Number of Ebola Virus (EBOV) During the 2014 Outbreak in West Africa. PLOS Currents Outbreaks. 2014 Sep 2. Edition 1.’ * problem set 2 on binomial probability model, R0, R, compartmental models, serial intervals |
| **24 Jan**  **(module 3)** | Outbreaks  (**60 minutes guest lecturer Storyline**) | **Workshop 3:**  Outbreak investigations  (**90 minutes @@**) | * ‘Steps in a Foodborne Outbreak Investigation’ [link](http://www.cdc.gov/foodsafety/outbreaks/investigating-outbreaks/investigations/index.html) * problem set 3 outbreaks |
| **31 Jan**  **(module 4)** | Vaccines  (**90 minutes guest lecturer Storyline**) | **Workshop 4:**  Vaccinations  (**90 minutes @@**) | * “Demos” – ‘How Vaccines Work, Types of Vaccines, How Vaccines are Made, How the Vaccinated Protect the Unvaccinated’ [link](https://www.cdc.gov/vaccines/vpd/vpd-vac-basics.html) * problem set 4 vaccine effectiveness |
| **7 Feb**  **(module 5)** | Bias  (**90-120 minutes Storyline**) | | * Review concepts covered in Introductory Epidemiology via Dr. LaMorte’s online Epi Learning Modules [link](https://sphweb.bumc.bu.edu/otlt/mph-modules/menu/) * problem set 5 bias |
| **14 Feb**  **(module 6)** | Surveillance  (**60 minutes guest lecturer Storyline**) | **Workshop 5:**  Diagnostics  (**90 minutes @@**) | * Willis SJ, et al. Electronic Health Record Use in Public Health Infectious Disease Surveillance, USA, 2018–2019. Current Infectious Disease Reports (2019) 21: 32. * problem set 6 surveillance & diagnostics |