DEPARTMENT: Environmental Health

COURSE NUMBER: EHS750  SECTION NUMBER: 000  SEMESTER: Spring 2018

CREDIT HOURS: 3

COURSE TITLE: Environmental Determinants of Infectious Diseases

COURSE TIME: Wednesdays, 1-3:50pm  LOCATION: GCR 107

INSTRUCTOR NAME: Karen Levy
EMAIL: karen.levy@emory.edu
PHONE: 404.727.4502

SCHOOL ADDRESS OR MAILBOX LOCATION: 2019 CNR
OFFICE HOURS: Tuesdays 2-4:30, Wednesdays, 4-4:30 (sign up online https://tinyurl.com/y9c576n9)

TEACHING ASSISTANT: Molly Steele
EMAIL: molly.steele@emory.edu
OFFICE HOURS: Tuesday 1pm-2pm; CNR 2015

BRIEF COURSE DESCRIPTION

This course covers the many different ways that the environment influences the transmission and spread of infectious diseases in humans. We take a broad definition of "the environment", considering air, water, soil, animal, and human influences, with case studies on each of these environmental factors. The course will also cover a variety of methods used in the study of infectious, including epidemiology, mathematical modeling, risk analysis, social science, ecology, and molecular biology. The theme of this course is "Think like a pathogen"—students will learn to think from the perspective of a pathogen trying to maximize its fitness over both short- and long-term time scales.

PREREQUISITES
There are no specific pre-requisites, but students should have at least some background in biology

ENROLLMENT
Limited to 22 students
LIST SCHOOL LEVEL, DEPARTMENT, AND/ OR PROGRAM COMPETENCIES

RSFH Competencies

- Use analytic reasoning and quantitative methods to address questions in public health and population-based research
- Describe environmental conditions, including biological, physical and chemical factors, that affect the health of individuals, communities and populations
- Describe the use of epidemiology methods to study the etiology and control of disease and injury in populations
- Describe behavioral, social and cultural factors that contribute to the health and well being of individuals, communities and populations
- Assess global forces that influence the health of culturally diverse populations around the world

EH/GEH Competencies

- Describe major environmental risks to human health ranging from the local to global scale
- Assess the sources and movement of contaminants through the environment
- Characterize the magnitude, frequency and duration of environmental exposures
- Apply the principles of toxicology to assess health effects of environmental exposures
- Apply the principles of epidemiology to assess health effects of environmental exposures
- Appraise the environmental, behavioral and social factors that contribute to the emergence, re-emergence, and persistence of infectious diseases
- Assess the major forces that influence the health of populations around the world.

LIST LEARNING OBJECTIVES ASSOCIATED WITH THE COMPETENCIES

At the completion of the course, the successful student will be able to:

- Characterize the epidemiologic features of environmentally-mediated infectious diseases
- Demonstrate knowledge of the role of environmental phenomena in limiting, maintaining and facilitating infectious disease spread
- Apply their focus in the course to infectious disease problems in the developing world, considering both the health burden and potential solutions from a development perspective
- Understand the ways in which the effects of environmental phenomena, such as climate change, on infectious disease differ in the developing world
- Articulate the importance of integrating environmental sustainability into existing global health initiatives
- Develop strategies for communicating the environmental drivers of infectious disease to global health funders, agencies, and populations in the field
- Summarize measures for the control and prevention of environmentally-mediated infectious diseases
- Display competency with available methods for assessing the environmental drivers of infectious disease systems, including the strengths and shortcomings of various approaches
- Interpret the results of studies which explore coupled environment-disease systems, identifying sources of uncertainty

ACADEMIC HONOR CODE

The RSPH requires that all material submitted by a student in fulfilling his or her academic course of study must be the original work of the student.
EVALUATION

Evaluation will be based on:
Class participation - 10pts (participation + attendance*)
Weekly reading questions (3pts each x 10 assignments) - 30 pts total (drop the one with the lowest grade)
Pathogen report (in-class presentation) - 5 pts
SIR model assignment #1 - 5 pts
SIR model assignment #2 - 5 pts
Blog post on news item + in-class presentation - 5 pts
Climate debate - 5 pts
Paper critique #1 or #2 – 5 pts
Blurb about final project topic - 3 pts
Final project- written report - 20 pts
Final project- 20 min in-class presentation - 10 pts

* Late assignments will be penalized by 10% of the assignment’s value per day past the due date.
* Sign ups will occur during Week 1 for pathogen reports, blog posts, and paper critiques. Each student will sign up for one slot for the semester for each of these assignments

CLASS CONDUCT
Participation in class discussions is a vital part of the learning process and will help to reinforce the information from the readings. Students are expected to positively contribute to the lectures and discussions in class.
* Attendance at all class sessions is MANDATORY. Please contact instructor for any extenuating circumstances. Absences with a valid excuse must be pre-approved by course instructor, otherwise students will lose 1pt per absence (pro-rated for portions of class missed)
* In order to reduce the amount of distractions in class, and to facilitate discussion and classroom engagement use of laptops during lectures is highly discouraged.

COURSE FORMAT
Class meetings will be broken into two lectures + in-class activities

General format, which may vary from week to week:

1-1:15pm Student presentation – pathogen report or news report
1:15-2pm Lecture 1
2-2:10pm Break
2:10-2:40pm In-class activity
2:40-3pm Student presentation – pathogen report or news report
3-3:50pm Lecture 2
<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture 1</th>
<th>Lecture 2</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OVERVIEW</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 17</td>
<td>* CANCELLED DUE TO INCLEMENT WEATHER *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 24</td>
<td>Course introduction, review of syllabus (Steele)</td>
<td>Concepts in IDs (Steele)</td>
<td>Discussion of Plague (the game)</td>
</tr>
<tr>
<td>(Dr. Levy out)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January 31</td>
<td>Overview of analytic methods used in infectious disease epidemiology (Levy)</td>
<td>EnvID Matrix (Levy)</td>
<td>Writing for a non-scientific audience (Levy)</td>
</tr>
<tr>
<td><strong>VECTORBORNE DISEASES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February 7</td>
<td>Ebola (Levine + Sandi)</td>
<td>VBDs (Guagliardo)</td>
<td></td>
</tr>
<tr>
<td>(Dr. Levy out)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February 14</td>
<td>Vectorborne diseases + climate (Levy)</td>
<td>Mathematical models of Infectious disease transmission + SIR modeling exercise (Steele)</td>
<td>Meet with climate debate groups</td>
</tr>
<tr>
<td>February 21</td>
<td>Mosquitoes, Viruses and Supercomputers: Using Science to Improve Zika Virus Emergency Control (Prokopec)</td>
<td></td>
<td>Discussion of how to critique a scientific paper</td>
</tr>
<tr>
<td>February 28</td>
<td>Hantavirus (Buller)</td>
<td>In-class debate: Is climate-change responsible for shifts in malaria distribution?</td>
<td></td>
</tr>
<tr>
<td><strong>WATERBORNE DISEASES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 7</td>
<td>Diarrheal diseases + Cholera (Levy)</td>
<td>Math models II (Steele)</td>
<td></td>
</tr>
<tr>
<td>March 14</td>
<td>Spring Break / no class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 21</td>
<td>Cholera dynamics (Koelle)</td>
<td>Soil-transmitted helminths (Freeman)</td>
<td>Paper critique #1</td>
</tr>
<tr>
<td><strong>ZOONOTIC DISEASES + MICROBIOME</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March 28</td>
<td>Lyme disease/the dilution effect (McMillan)</td>
<td>Molecular Epidemiology (Levy)</td>
<td>Paper critique #2</td>
</tr>
<tr>
<td>April 4</td>
<td>No class meeting; sign up for individual meetings with TA to discuss final project. <em>Bring blurb about project topic</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Dr. Levy out)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 11</td>
<td>The Microbiome of the Built Environment (Levy)</td>
<td>How to give an effective presentation (Levy)</td>
<td>Charades</td>
</tr>
<tr>
<td><strong>FINAL PRESENTATIONS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 18</td>
<td>Final student presentations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>April 25</td>
<td>Final student presentations</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***ALL ASSIGNMENTS ARE DUE ON MONDAYS @ MIDNIGHT UNLESS OTHERWISE SPECIFIED***
Due Date | Readings
---|---


February 28

March 7

March 21
[Koelle readings TBD]

March 28

April 11