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. This course is an elective, and can be taken at any time in the program. There are no prerequisites, but it is helpful if students have at least some background in biology.

MPH/MSPH FOUNDATIONAL COMPETENCIES:
The following MPH competencies will be addressed in this course:

- Apply epidemiological methods to the breadth of settings and situations in public health practice
• Select quantitative and qualitative data collection methods appropriate for a given public health context
• Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate
• Select communication strategies for different audiences and sectors
• Communicate audience-appropriate public health content, both in writing and through oral presentation

CONCENTRATION COMPETENCIES:
The following EH/GEH competencies will be addressed in this course:
• Describe major environmental risks to human health ranging from the local to the global scale
• Apply the principles of exposure science to characterize and quantify environmental exposures
• Apply the principles of epidemiology to assess health effects of environmental exposures
• Explain major policy issues in global environmental health
• Use qualitative and quantitative data sources to assess global health outcomes and risk factors, including temporal trends such as past and current patterns as well as projected future trends, and distribution by socioeconomic and demographic predictors
• Appraise the strengths, limitations, and differences and similarities of various study designs with respect to given research questions
• Formulate an environmental epidemiology research question and study aims
• Describe select causes and consequences of health inequities within and/or across contexts
• Critique epidemiologic results in a causal framework

LEARNING OBJECTIVES
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

Course: EHS750: Environmental Determinants of Infectious Diseases
- 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

**EVALUATION**
Evaluation will be based on:

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Point Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class Participation (participation + attendance)</td>
<td>10 pts</td>
</tr>
<tr>
<td>Weekly reading questions (1pt each x 8 assignments, drop lowest grade)</td>
<td>7 pts</td>
</tr>
<tr>
<td>Pathogen report (in-class presentation)</td>
<td>5 pts</td>
</tr>
<tr>
<td>Blog post on news item + in-class presentation</td>
<td>5 pts</td>
</tr>
<tr>
<td>SIR model assignment #1</td>
<td>5 pts</td>
</tr>
<tr>
<td>SIR model assignment #2</td>
<td>5 pts</td>
</tr>
<tr>
<td>Midterm in-class exam</td>
<td>20 pts</td>
</tr>
<tr>
<td>Climate debate</td>
<td>5 pts</td>
</tr>
<tr>
<td>Paper critique</td>
<td>10 pts</td>
</tr>
<tr>
<td>Final project – written report</td>
<td>20 pts</td>
</tr>
<tr>
<td>Final project - 10 min in-class presentation</td>
<td>8 pts</td>
</tr>
</tbody>
</table>

**Letter grade cut-points:**
- A: 94+
- A-: 90-93
- B+: 87-89
- B: 84-86
- B-: 80-83
- C: 65-79
- F: <65

**COURSE STRUCTURE**
In general, class meetings will be broken into two lectures + in-class activities. This may vary from week to week.

General format:

1:00 – 1:15 pm  Student presentation – pathogen report or news report
1:15 – 2:00 pm  Lecture 1
2:00 – 2:10 pm  Break
2:10 – 2:40 pm  In-class activity
2:40 – 3:00 pm  Student presentation – pathogen report or news report
3:00 – 3:50 pm  Lecture 2
**Course Competency/Assignment Mapping**

As described in the Evaluation section, students will be evaluated based on a variety of assignments, including a midterm exam, written reports, oral reports, homework assignments, class participation, and weekly reading assignments. This variety of assignments will assess the MPH/MSPH and EH/GEH competencies as outlined below:

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<thead>
<tr>
<th>MPH/MSPH Foundational Competency</th>
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<tr>
<td>Apply epidemiological methods to the breadth of settings and situations in public health practice</td>
<td>SIR model assignments, Midterm, Climate debate, Final project</td>
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<td>Select quantitative and qualitative data collection methods appropriate for a given public health context</td>
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<tr>
<td>Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate</td>
<td>SIR model assignments</td>
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<tr>
<td>Select communication strategies for different audiences and sectors</td>
<td>Pathogen report, Blog post, Climate debate, Paper critique, Final project</td>
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<tr>
<td>Communicate audience-appropriate public health content, both in writing and through oral presentation</td>
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<tr>
<th>EH/GEH Competency</th>
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<td>Describe major environmental risks to human health ranging from the local to the global scale</td>
<td>Weekly reading questions, Pathogen report, Midterm, Climate debate, Blog post, Final project</td>
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<td>Apply the principles of exposure science to characterize and quantify environmental exposures</td>
<td>Midterm, Climate debate, Paper critique, Final project</td>
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<td>Apply the principles of epidemiology to assess health effects of environmental exposures</td>
<td>Weekly reading questions, Paper critique, Midterm, Final project</td>
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<td>Explain major policy issues in global environmental health</td>
<td>Weekly reading questions, Paper critique, Blog post, Final project</td>
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<td>Use qualitative and quantitative data sources to assess global health outcomes and risk factors, including temporal trends such as past and current patterns as well as projected future trends, and distribution by socioeconomic and demographic predictors</td>
<td>Weekly reading questions, Blog post, Paper critique, Climate debate, Final project</td>
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Course: *EHS750: Environmental Determinants of Infectious Diseases*
Appraise the strengths, limitations, and differences and similarities of various study designs with respect to given research questions | Weekly reading questions, Paper critique, Climate debate, Final project

Formulate an environmental epidemiology research question and study aims | Final project

Describe select causes and consequences of health inequities within and/or across contexts | Weekly reading questions, Paper critique, Final project

Critique epidemiologic results in a causal framework | Weekly reading questions, Paper critique, Final project

**COURSE POLICIES**

Enrollment is limited to 22 students

**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.

**Assignments**

* 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

**Learning Environment**

As the instructor of this course I endeavor to provide an inclusive learning environment. However, if you experience barriers to learning in this course, do not hesitate to discuss them with me and the Office for Equity and Inclusion, 404-727-9877.

**RSPH POLICIES**

**Accessibility and Accommodations**

Accessibility Services works with students who have disabilities to provide reasonable accommodations. In order to receive consideration for reasonable accommodations, you must contact the Office of Accessibility Services (OAS). It is the responsibility of the student to
register with OAS. Please note that accommodations are not retroactive and that disability accommodations are not provided until an accommodation letter has been processed.

Students who registered with OAS and have a letter outlining their academic accommodations are strongly encouraged to coordinate a meeting time with me to discuss a protocol to implement the accommodations as needed throughout the semester. This meeting should occur as early in the semester as possible.

Contact Accessibility Services for more information at (404) 727-9877 or accessibility@emory.edu. Additional information is available at the OAS website at http://equityandinclusion.emory.edu/access/students/index.html

Honor Code
You are bound by Emory University’s Student Honor and Conduct Code. RSPH requires that all material submitted by a student fulfilling his or her academic course of study must be the original work of the student. Violations of academic honor include any action by a student indicating dishonesty or a lack of integrity in academic ethics. Academic dishonesty refers to cheating, plagiarizing, assisting other students without authorization, lying, tampering, or stealing in performing any academic work, and will not be tolerated under any circumstances.

The RSPH Honor Code states: “Plagiarism is the act of presenting as one’s own work the expression, words, or ideas of another person whether published or unpublished (including the work of another student). A writer’s work should be regarded as his/her own property.” (http://www.sph.emory.edu/cms/current_students/enrollment_services/honor_code.html)

COURSE CALENDAR & OUTLINE
(Topics and dates may change as the semester progresses)


(Affordable copies of used versions available on amazon.com)

***ALL ASSIGNMENTS EXCEPT PATHOGEN REPORTS ARE DUE ON MONDAYS @ MIDNIGHT UNLESS OTHERWISE SPECIFIED. PATHOGEN REPORT SLIDES SHOULD BE UPLOADED BEFORE CLASS BEGINS***
<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture 1</th>
<th>Lecture 2</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 16</td>
<td>Course introduction, review of syllabus</td>
<td>Overview of infectious disease epidemiology approaches (Levy)</td>
<td>Discussion of Plague (the game)</td>
</tr>
</tbody>
</table>

Assignments:
1. Be prepared to discuss your experiences with trying to kill off the global population world (Plague)

Reading: n/a

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<tbody>
<tr>
<td>January 23</td>
<td>Biological Basics (Levy)</td>
<td>Connecting the environment &amp; infectious diseases (Levy)</td>
<td>Student presentations</td>
</tr>
</tbody>
</table>

Assignments:
1. Reading response #1

Reading:
1. Thomas & Weber Chapter 1
2. Thomas & Weber Chapter 3

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<tbody>
<tr>
<td>January 30</td>
<td>Concepts in Immunology (Collins)</td>
<td>Tackling the Ebola outbreak (Levine)</td>
<td>Student presentations</td>
</tr>
</tbody>
</table>

Assignments:
1. Reading response #2

Reading:
1. Thomas & Weber Chapter 2
2. Thomas & Weber Chapter 14

<table>
<thead>
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<th>Lecture 2</th>
<th>Activities</th>
</tr>
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<tbody>
<tr>
<td>February 6</td>
<td>Concepts in Transmission (Steele)</td>
<td>Transmission modeling Exercise I (Sajewski)</td>
<td>Student presentations</td>
</tr>
</tbody>
</table>

Assignments: n/a

Reading:
1. Thomas & Weber Chapter 4
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading</th>
<th>Assignments</th>
</tr>
</thead>
</table>
| February 13 (Dr. Levy out) | Human mobility or vector control (Prokopec) | Transmission modeling Exercise II (Sajewski) | Assignments:  
1. Reading response #3  
2. Modeling homework #1  
Reading:  
1. Thomas & Weber Chapter 12  
2. Prokopec reading TBD  |
| February 20 | Lyme disease & the Dilution Effect (Shaw) | Discussion of how to critique a scientific paper | Assignments:  
1. Reading response #4  
2. Modeling homework #2  
Reading:  
| February 27 | Evolution of Virulence (Allman) | Vectorborne diseases + climate (Levy) | Assignments:  
1. Reading response #5  
Reading:  
3. Allman reading TBD  |
| March 6 | MIDTERM EXAM | Al Gore climate & health video | Overview of climate debate, meet with climate debate groups (if time) |
| March 13 | Spring Break / no class | | |
### March 20
**Zoonotics and WASH (Levy)**

**Paper critique 1**

**Student presentations, introduce final paper topic**

**Assignments:**
1. Reading response #6
2. Paper critique (Group 1)

**Reading:**
1. Thomas & Weber Chapter 11

### March 27
** Produce safety (Mattioli)**

**In-class debate: Is climate-change responsible for shifts in malaria distribution?**

**Assignments:**
1. Reading response #7
2. Short blurb on final project topic
3. Prepare for climate debate

**Reading:**
1. Mattioli reading TBD

### April 3
**Hantavirus (Buller)**

**Paper critique 2**

**Student presentations**

**Assignments:**
1. Reading response #8
2. Paper critique (Group 2)

**Reading:**

### April 10
**How to give an effective presentation (Levy)**

**Infectious Disease Charades**

**Student presentations**

### April 17
**FINAL STUDENT PRESENTATIONS – GROUP I**

### April 24
**FINAL STUDENT PRESENTATIONS – GROUP II**

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Course: **EHS750: Environmental Determinants of Infectious Diseases**
Assignment:
Final project due April 29 at midnight