DEPARTMENT: Environmental Health

COURSE NUMBER: EH548  SECTION NUMBER: 000
CREDIT HOURS: 3  SEMESTER: Spring 2019

COURSE TITLE: Research Methods for Studies of Water & Health

CLASS HOURS AND LOCATION: Mondays, 9-11:50AM
GCR P41 &
CNR 6th floor teaching lab

INSTRUCTOR NAME: Amy Kirby

INSTRUCTOR CONTACT INFORMATION

EMAIL: aekirby@emory.edu
PHONE: 404-718-3161
SCHOOL ADDRESS OR MAILBOX LOCATION: By appointment
OFFICE HOURS: By appointment

Teaching Assistant: Julia Sobolik
EMAIL: Julia.sobolik@emory.edu

OFFICE HOURS: Fridays, 10-11AM or by appointment
LOCATION: CNR 2nd Floor, Environmental Health Department Break Room

COURSE DESCRIPTION

This hands-on, elective course covers methods needed to carry out field studies focused on water and health. Through lecture and laboratory exercises, students will learn critical skills in measuring water quality exposure assessment and waterborne disease health outcomes that will enable them to conduct their own field studies and analyze the resulting data. The focus will be on issues of microbiological contamination in developing countries, but chemical contamination and domestic cases will also be covered.
COMPETENCIES

MPH/MSPH FOUNDATIONAL COMPETENCIES:
- 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
- Interpret results of data analysis for public health research, policy or practice
- Communicate audience-appropriate public health content, both in writing and through oral presentation

CONCENTRATION 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
- Communicate the key methods, findings, and public health implications of research on a poster and verbally to an audience of public health professionals
- 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

COURSE LEARNING OBJECTIVES
- Understand key issues in designing studies of water and health
- Learn theory behind and how to carry out microbiological assessment of water quality
- Learn theory behind and how to carry out physiochemical assessment of water quality
- Learn how to carry out field evaluation of water treatment technologies
- Learn how to carry out observational studies & observational techniques
- Learn how to design surveys specific to studies of water & health
- Learn how to carry out qualitative interviews
## EVALUATION

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
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<tbody>
<tr>
<td>EHSO training</td>
<td>1 pt</td>
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<tr>
<td>ODK aggregate set-up</td>
<td>2 pts</td>
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<tr>
<td>Skill Practice Assignments (Boxplot &amp; Serial Dilutions)</td>
<td>2 Assignments x 2 pts each = 4 pts</td>
</tr>
<tr>
<td>Reading quizzes (7 total, lowest score dropped)</td>
<td>6 quizzes x 2 pts each = 12 pts</td>
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<tr>
<td>Lab Homework</td>
<td>3 pts</td>
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<tr>
<td>Project Scoping Assignment</td>
<td>3 pts</td>
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<tr>
<td>Class Project Research Questions</td>
<td>5 pts</td>
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<tr>
<td>Water Quality Results Complete/Uploaded</td>
<td>5 pts</td>
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<tr>
<td>Draft of project tools (Surveys &amp; Structured Observations)</td>
<td>10 pts</td>
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<tr>
<td>Final Project</td>
<td>Written Report = 15 pts Presentation = 15 pts</td>
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<tr>
<td>Class participation</td>
<td>10 pts</td>
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<tr>
<td><strong>Total</strong></td>
<td>100 pts</td>
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Late assignments will be penalized by **10%** of the assignment's value per day past the due date. When stated, some assignments will not be accepted late and no credit will be given for these late submissions.

### Letter Grade Cutpoints:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>95-100</td>
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<tr>
<td>A-</td>
<td>90-94</td>
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<tr>
<td>B+</td>
<td>87-89</td>
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<tr>
<td>B</td>
<td>83-86</td>
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<tr>
<td>B-</td>
<td>80-82</td>
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<tr>
<td>C</td>
<td>70-79</td>
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<tr>
<td>F</td>
<td>≤ 69</td>
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### COURSE STRUCTURE

#### Group Project (55% of grade)

The group project is the centerpiece of this course. The best way to learn how to do research is to actually do research. This project will give you the opportunity to conceptualize, design, conduct, and present a novel water quality research project. The project will be completed in groups of 3-4 students. The project will be completed in stages:

1. Project scoping (3 pts, individual)
2. Develop research question (5 pts, individual)
3. Draft survey and structured observation forms (10 pts, group)(ODK setup 2 pts)
4. Collect data (5 pts, group)
5. Analyze data (group)
6. Present results (oral and written, 15 pts each, group)

An in-depth description of the project will be presented on Feb. 4th. A detailed guide is posted in the course Canvas site. Labs and lectures will provide instruction in the methods used in WASH research. There will be time in class to discuss your project with the instructor and TA, and they are available for further discussion by email or during office hours.

Labs (19% of grade)
Anyone conducting WASH research should be familiar with the basic lab methods used to assess water quality. In this course, you will gain experience with the most common analytic methods for measuring microbial contamination, chlorine levels, and turbidity. You will also evaluate common approaches to water purification. After completing the labs, you will understand how the tests are performed, how to interpret the results, and the strengths and limitations of each approach. The instructions for each lab are posted in the course Canvas site. You must read the instructions prior to lab to ensure that you understand the tasks you will be completing. Not only does that ensure that the lab is completed correctly, but it also helps you work safely in the lab. After each lab, you will complete the lab homework and upload it to Canvas prior to the next class.

Lectures (16% of grade)
The lectures in this course are designed to provide an overview of the methods used in WASH research. The lectures in the first half of the course will focus on the most common methods and those you will be using in your group project. The second half of the course will cover newer methods in the field, as well as specific approaches to WASH research such as outbreak investigations and randomized controlled trials. Lecture readings are listed below. All required reading should be completed prior to class to facilitate classroom discussion. Seven reading quizzes will be given throughout the semester with the lowest grade dropped. Quizzes will be administered at 9AM on the specified dates with no makeups or late quizzes allowed.

Participation (10% of grade)
Participation in class lectures and 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.

COURSE POLICIES

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. Students will lose 1 point of class participation for each unexcused absence (pro-rated for portions of class missed).

Course: EH548
In order to reduce the amount of distractions in class, **use of laptops and tablets during lectures is highly discouraged** to facilitate discussion and classroom engagement. **Laptops are not allowed in the lab.**

Safe work practices are a critical component of laboratory work. Your safety and the safety of your fellow students and instructors requires preparation prior to starting any lab work and attention and diligence while conducting lab work. **You must complete the EHSO Laboratory Safety Training by Jan. 22 (see directions on Canvas).** Prior to each lab, you must read the lab handouts carefully to understand the protocols you will be using. Any day you are conducting lab work, either as part of a lab class or for your class project, **you must wear long pants and closed toe shoes. Long hair must be tied back.**

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**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Due to Canvas*</th>
<th>Due in Class</th>
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<tbody>
<tr>
<td>Jan. 14</td>
<td>Course, Lab Introduction</td>
<td></td>
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<tr>
<td>Jan. 21</td>
<td>MLK Day- NO CLASS</td>
<td>EHSO training</td>
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<tr>
<td>Jan. 28</td>
<td>Microbial Indicators</td>
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<td>Quiz 1</td>
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<tr>
<td>Feb. 4</td>
<td>Project scoping, planning</td>
<td>Serial Dilution Practice</td>
<td>Quiz 2</td>
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<tr>
<td>Feb. 11</td>
<td>LAB: Microbial Indicators</td>
<td>Box Plot Practice</td>
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<td>Feb. 18</td>
<td>Interviews</td>
<td>Lab 1 Homework, Scoping Report</td>
<td>Scoping Presentation</td>
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<tr>
<td>Feb. 25</td>
<td>Structured Observations</td>
<td></td>
<td>Quiz 3</td>
</tr>
<tr>
<td>Mar. 4</td>
<td>Surveys</td>
<td>Research Questions</td>
<td>Quiz 4</td>
</tr>
<tr>
<td>Mar. 11</td>
<td>Spring Break- NO CLASS</td>
<td></td>
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<tr>
<td>Mar. 18</td>
<td>Open Data Kit</td>
<td>Survey, Str. Obs. forms</td>
<td>ODK install</td>
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<tr>
<td>Mar. 25</td>
<td>LAB: Chlorine and Turbidity</td>
<td></td>
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<tr>
<td>Apr. 1</td>
<td>Chemicals, Antibiotic Resistance</td>
<td>Lab 2 Homework</td>
<td>Quiz 5</td>
</tr>
<tr>
<td>Apr. 8</td>
<td>LAB: Purification Methods</td>
<td></td>
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<tr>
<td>Apr. 15</td>
<td>Outbreaks, Microbial Source Tracking</td>
<td>Lab 3 Homework, WQ Data Upload</td>
<td>Quiz 6</td>
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<tr>
<td>Apr. 22</td>
<td>Metagenomics, RCTs</td>
<td></td>
<td>Quiz 7</td>
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<tr>
<td>Apr. 29</td>
<td>Project Presentations</td>
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<td>Project Presentation</td>
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<tr>
<td>May 3</td>
<td>NO CLASS</td>
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<td></td>
<td></td>
<td>Project Paper</td>
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*Online submissions due at 11:59PM on the preceding Sunday unless otherwise specified*

Topics and dates are subject to change
COURSE OUTLINE AND READINGS

Jan. 14- Course and Lab Introduction
  • Complete EHSO Research Lab Safety Training (directions on Canvas) by Jan. 22

Jan. 21- NO CLASS

Jan. 28- Microbial Indicators
  • Required reading:
    o Ashbolt et al. Indicators of microbial water quality. 2001. pp 289-316
  • Optional reading:

Feb. 4- Project Scoping and Data Management
  • Guest Lecturer- Miranda Delahoy
  • Complete data management survey prior to class
  • Required readings:

Feb. 11- Microbial Indicators Lab (meet in teaching lab)
  • Collect water sample no more than 24 hours prior to class
  • Required readings:
    o Lab 1 Handout

Feb. 18- Interviews, Scoping Presentations
  • Guest Lecturer: Bethany Caruso
  • Each student will present a 3 minute overview of their scoping results and proposed water sample
• Required readings:
  o Hennink, Hutter, and Bailey. 2011. Qualitative Research Methods. Ch. 6 In-Depth Interviews.
• Optional readings:

Feb. 25- Structured Observations
• Required readings:
  o Hennink, Hutter, and Bailey. 2011. Qualitative Research Methods. Ch. 8 Observation.
  o Harvey. 2018. Observe before you leap: why observation provides critical insights for formative research and intervention design that you’ll never get from focus groups, interviews, or KAP surveys. Glob. Health Sci. Per. 6(2):299- 316.

Mar. 4- Surveys, Project time
• Required readings:
  o UNICEF & WHO. 2006. Core questions on drinking water and sanitation for household surveys
  o Rea and Parker. 2005. Designing and conducting survey research: A comprehensive guide
    ▪ Ch. 1: An overview of the sample survey process
    ▪ Ch. 2: Designing effective questionnaires: basic guidelines
    ▪ Ch. 3: Developing survey questions
    ▪ Ch. 9: Selecting a representative sample

Mar. 11- NO CLASS

Mar. 18- Open Data Kit Survey Development
• Bring laptop and Android device to class (each group needs access to one Android tablet or phone)

Mar. 25- Chlorine and Turbidity Lab (meet in teaching lab)
• Required reading:
  o Lab 2 Handout

Apr. 1- Chemical Contaminants, Antibiotic Resistance
• Guest Lecturer: Matt Gribble
• Required readings:

• Optional readings:
  o Discussion questions for Aderibigbe et al. and Vieira et al.
  o Rothrock et al. 2016. How should we be determining background and baseline antibiotic resistance levels in agroecosystem research? J. Env. Qual. 45:420-431.

Apr. 8- Water Purification Lab (meet in teaching lab)
• Required reading:
  o Lab 3 Handout

Apr. 15- Outbreak Investigations, Microbial Source Tracking
• Guest Lecturers: Jennifer Murphy, Mia Mattioli
• Group project microbial results must be uploaded by 11:59PM Apr. 14
• Required reading:

Apr. 22-Metagenomic Approaches, Intervention Studies
• Guest Lecturer: Tom Clasen
• Required reading:

Apr. 29- Final Presentations

May 3- Final papers due (uploaded to Canvas by 5:00 PM)