ENVR 421: Environmental Health Microbiology

Spring

Lectures: Tuesday and Thursday 2:00-3:15PM, TBD
Labs: Wednesdays 3:30PM Room 1204 Michael Hooker Research Center (ENVR teaching lab)

Remaining lectures for semester may be in room 0009 Mitchell Hall, but awaiting confirmation

Instructor: Prof. Mark D. Sobsey Office: Room 149 Rosenau Hall Phone: 966-7303 E-mail: sobsey@email.unc.edu Office hours: by appointment	TA: Yvonne Yuen E-mail: yyuen@live.unc.edu

Overview

In this course we will explore microbes of public health significance from environmental exposures and microbiological aspects of the environment as related to human health. The role the environment in the transmission of infectious diseases, the specific microbes that cause environmentally transmitted disease of public health importance, their prevention and control by technological and other measures and how the health risks posed these microbes are assessed will be explored. We will consider the microbes and their diseases transmitted by wastes, water, air, food and vectors, the ways that these disease agents enter, survive and spread through the environment to result in human exposures, how their risks are assessed and measured and how these risks are prevented, controlled and managed through engineered/technical, policy and regulatory approaches. The course has a broad focus, from local to global, addressing the topic for both developed and developing world settings, conditions and populations.

The laboratory component of the course will use techniques for detecting, identifying and quantifying some of these health-related microbes in the environmental, their survival in environmental media and their removal and destruction by technological measures.

The course consists of lectures, applied laboratory skills and student participation, including presentations.

In the course, you will study:

- The significant microbes and infectious diseases of health concern and the environmental routes of their transmission
- The biology and ecology the microbes spread by human and animal waste, water, air, food, fomites and vectors
- Basic skills for working with and analyzing for microbes and how to detect them in environmental media
- Estimation and characterization of human disease risk from environmental exposures, assessment of infection and disease risk using microbial risk assessment and investigation and characterization of patterns of disease spread, such as outbreaks and other epidemiological evidence.
- The methods used to remove or destroy microbes in environmental media to prevent human exposure via wastes, water, food, fomites, air and vectors

Lecture topics for most classes will be supported by PowerPoint presentations that will be posted to the class website

Required (or Very Strongly Recommended) Text:

- Routledge Handbook of Water and Health, J. Bartram editor. Routledge, New York. Available online through UNC Libraries
- Principles of Public Health Microbiology [Paperback], Robert S. Burlage, Jones & Bartlett Learning; 1st edition (May 4, 2011). ISBN-10: 0763779822. ISBN-13: 978-0763779825. This book is not available online at UNC Libraries.

NOTE: CHAPTERS WILL BE ASSIGNED EARLY IN THE COURSE AS BACKGROUND READING TO SUPPORT LECTURES, PRESENTATIONS AND OTHERS READINGS.

Useful Texts

Environmental Microbiology of Aquatic and Waste Systems, Nduka Okafor, 2011. Springer; 1st Edition (July 1, 2011). ISBN-10: 9400714599. ISBN-13: 978-9400714595. Available online through UNC libraries

Recommended additional texts and reference books

- Communicable Disease Control Manual
- Brock's Biology of Microorganisms or other basic microbiology text
- Various World Health Organization documents available on the web. These documents or sections/chapters in them will be recommended readings for various class sessions.
- Selected chapters from other reference or textbooks, which will be identified for specific class sessions. Efforts are made to provide access to these chapters via links in the course syllabus at the Sakai site for ENVR 421

Assignments

There will be **two in class exams**. These will be objective with questions that are multiple choice, fill-in-the blank, true or false, definitions and other shorts answers and some calculations.

There will be **2 case study assignments** during the semester. These assignments will be done in groups or teams of students. You will choose a reading for each assignment from lists I will provide. You will write a short (500 word maximum) case study on this topic and give a 12-16 minute presentation in class as a team. If you are unable to be in class for your group's case study presentation, you will be required to do a separate case study writing assignment for credit.

For some lectures, there are assigned readings that you are expected to read before that class period. Some of these assignments will be book chapters, technical publications, journal articles or other documents available on the class website or from other sources. I may ask for volunteers or call on students at random to **give a brief explanation of some aspect of the class assignment and answer questions about the content**. You will receive **participation points for these contributions**. There will be multiple opportunities to earn these points throughout the semester.

Final Exam. A final exam will be required as per University policy. Each student will give a final presentation (approx 10-12 minutes) at the end of the semester as an element of the final exam. The other element of the final exam will be a take home final paper assignment that will be turned in on the day of the final exam period when student presentations will be made. Further guidelines for these presentations and the take-home final exam will be provided in class.

Lab. This class includes a laboratory component. There will be about 7-8 lab exercises and up to 6-7 lab reports. Reports will be due 1-2 weeks after the lab exercise is complete and the class data are compiled. You will work in groups in lab, but each individual student must complete a lab report. Labs will require some time outside of the scheduled class lab time to observe results of multi-day experiments.

Grading

In class exams: 20 pts. each, 40 pts. total Case studies (2): 5 pts. each, 10 pts. total Labs (up to 7-8): 20 pts. total Discussion participation: 10 pts. Final presentation and take-home exam: 20 pts.	90-100%: H (grad) or A (undergrad) 70-90%: P (grad) or B or C (undergrad) 60-70%: L (grad) or D (undergrad) <60: F (grad and undergrad) (scores may be scaled)

Honor Code and Ethics

All students are expected to comply with the UNC Honor Code on all assignments, presentations, examinations, lab reports and other assignments. All students are expected to practice ethical behavior with respect to taking credit for work done by not copying, plagiarizing or otherwise taking credit for the work of others.