BIOL 215 - Emerging Infectious Diseases Spring 2015

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SC-301, MWF 10:15-12:05. SC-311 for lab work as needed.

Required Reading Materials

Krasner and Shors - The Microbial Challenge (2014). ISBN 978-1-4496-7375-8
Hotez - Forgotten People Forgotten Diseases (2013). ISBN 978-1-5581-874-6
Garrett - The Coming Plague (1994). ISBN 978-0-1402-5091-6

Course Overview

Despite the technological and medical advances of the past century, infectious diseases remain a world-wide threat to human welfare. This course will explore both newly emerging and re-emerging infectious diseases. At its core, the study of infectious diseases is the study of ecology - the ways in which organisms interact with and alter each other and their environments.

By the end of the semester, you should be able to:

- Understand the differences between bacteria, viruses, eukaryotic parasites, and their hosts
- Understand the function of the human immune system in protecting against disease and in causing some of the damages associated with disease
- Read and analyze data on the health status of populations
- Assess environmental, medical and political strategies for controlling infectious diseases
- Identify the evolutionary processes that lead to adaptation and biological diversity
- Understand the genetic and behavioral reasons why there are increasing numbers of antibiotic resistant infections
- Formulate a research hypothesis, implement a study, and evaluate the results
- Demonstrate an acceptable level of competency in laboratory procedures, including sterile technique, using a microscope, and detecting and observing microbial specimens
- Evaluate and communicate news reports from the CDC on newly emerging infections, contrasting incidence and prevalence, and potential for control
- Develop expertise about one specific emerging infectious disease
- Evaluate global progress toward reaching MD6—to reduce the burden of HIV, TB, Malaria and other diseases
- Critically evaluate and effectively use textbooks, current research literature, online information, as well as information related to scientific and biological issues in the popular press
- Work effectively in collaborative groups

Moodle

I will rely upon Moodle for the dissemination of class-wide information, including reading assignments (both from your required text and external materials), syllabus updates, general class announcements, assignment descriptions and submissions, and other relevant materials.

Office Hours

I will have office hours throughout the semester. Appointments for office hours can be scheduled via my google appointment calendar at www.tinyurl.com/berg-appt. This link is also on Moodle. If the posted appointment slots do not work for your schedule, please e-mail me to schedule another time. I will do my absolute best to accommodate your requests. To assist with finding a time that might work for both of us, my weekly calendar showing my general availability can be accessed at www.tunyurl.com/berg-cal.

General Class policies

1. Attendance: Emerging infectious diseases is taught in a workshop environment where everyone contributes on a collaborative basis. For this reason, your attendance is mandatory in all classes with very few exceptions.
    - If you have an elevated temperature or other signs of influenza-like illness, you are excused from class but must inform me of your absence prior to class. Just as it is your responsibility to attend class when you are well, it is your responsibility to others to stay home when you have a contagious illness.
    - Unexcused absences will be detrimental to your grade. The definition of "unexcused absence" is wholly up to me as the instructor, and will include such absences as those due to oversleeping, off-campus travel without (and potentially with) prior notification, and general laziness. Absences related to sports will be considered excused ONLY if you notify me at least 24 hours prior to your absence. I do recognize that unforeseen emergencies (i.e. car accidents, family events, and zombie attacks) do occur, and I will be happy to arrange accommodations accordingly, but it is your responsibility to follow up with me after the emergency has passed.
    - If you arrive to class late, you will be considered to have an unexcused absence and may be asked to leave. I reserve the right to lock the door and to refuse admittance to anyone who arrives after the start of class.
2. Class Citizenship and Participation: We will be doing a significant amount of group work in this class. Your participation in in-class group discussions and presentations will directly contribute to your class citizenship grade. Class citizenship also includes evidence for engagement with the material beyond our class discussions. For instance, if you have identified external material that you found very helpful in understanding a difficult course concept and you think it would be helpful for your classmates (a YouTube video or TED talk), please share it and a short description of how you found it useful with me via e-mail, and I will post it on Moodle. This is just one example of engagement with the course material - many other opportunities are avialable! At the end of the semester, I will compile a Class Citizenship and Participation grade (including your attendance) as 15% of your grade.
3. Reading: This course includes a significant volume of reading. Through these readings, you will be better prepared to function as an informed and involved member of the class. Keep up with the reading and any new terminology to be successful in this course. Vocabulary lists for some of the readings will be posted on Moodle. Weekly quizzes will pull heavily from the reading assignments.
4. Labs: The lab portion of this course is a hybrid of bench work, computer simulations, and data analysis that will be incorporated into our regular MWF 8-9:50 time slot. The majority of the bench work will be completed during the first half of the semester, with simulations and data analysis-based labs throughout the semester. Our major lab project will be an epidemiological survey of the Beloit College campus.
5. Late policy: All assignments are due at the beginning of class or according to the due date and time posted on Moodle. Late work will be considered on a case-by-case-basis for a maximum of 50% credit and will not be accepted after 1 week following the original due date. Quizzes for unexcused absences cannot be made up. If you know you will be missing a class, you must contact me at least 24 hours prior to the class to make arrangements for turning in assignments or taking a quiz. If unforeseen circumstances arise (extreme sickness, a family emergency, etc.) and you miss class, come talk to me directly. The final decision on make-up work is mine.

    PLEASE NOTE: If you are struggling with assignment deadlines for this class, your best course of action will be to talk to me *at your earliest convenience* about your situation, especially if there

are extenuating circumstances. Major deadlines for your paper and exams are noted on the syllabus: it is your responsibility to keep track of these deadlines!

6. Accessibility: If you have a disability and need accommodations, contact the Learning Enrichment and Disability Services Office located on 2nd floor Pearsons (north side), call x: 2572, or email learning@beloit.edu. For accommodations in my class, you must bring me an Accommodation Verification Letter from the Director of that office and then we will discuss how to meet your needs. Contact that office promptly; accommodations can not be retroactive.
    - Free peer tutoring is available for most classes. For a tutor, apply by going to your Portal, to the Student Life tab, and then apply using the Tutoring Forms (on left) and Request a Tutor. If you have any questions, contact Learning Enrichment and Disability Services.
    - TA hours will be available outside of class. Please check Moodle for the schedule.
7. Academic Ownership: Academic dishonesty, including plagiarism and cheating on exams is a serious offense. Penalties for these types of activities can range from failure on the assignment or course to expulsion. All outside work must be cited. If you have questions or concerns about academic ownership or intellectual property in relation to work submitted for this class, be sure to ask me prior to submitting assignments. We will also discuss the broader issues related to using sources effectively throughout the semester.
    - Clearly mark all papers, including your name and assignment description. All writing not done as an in-class assignment must be typed. The majority of assignments will be submitted via Moodle, and must be in Word or PDF format.
8. Safety: Safety is of the highest importance. Although we will not be working with any known pathogenic bacteria and viruses, we will treat all biological materials as potentially hazardous. Safety is always a concern in the laboratory, and eating, drinking, and chewing gum are not permitted in Science Center 311. An exhaustive list of safety rules for lab (including no open-toed shoes in the lab) is posted on Moodle and will be covered during our first laboratory activity.
9. Technology: You are encouraged to bring your laptop or tablet to class for note taking and class work, though it is not required. In-class assignments that require individual internet access will be announced via Moodle, and we will attempt to pair up all students who don't have laptops with those who do. PLEASE no cell phones in class (including texting, instant messaging, or listening to music). There may, however, be times when it is useful to access the internet for definitions or perform calculations using your phone. In this case, I urge you to do so in a mature fashion, with the understanding that, if your phone becomes a distraction for you, me, or especially other students, I will confiscate your device for the remainder of the class period. Headphones MAY NOT be worn at any time during class, *especially* during exams.
10. Disclaimer: I reserve the right to make modifications to the syllabus and the course schedule should the need arise (which I'm sure it will). When in doubt, check Moodle for the most up-to-date syllabus and schedule.

Grade Breakdown

Grades are awarded within a range from A through F according to the following conventions:

A = unusual ability and distinctive achievement (A- = 90-93% A = 94-100%)
B = articulate, above-average performance (B- = 80-82%, B = 83-86%, B+ = 87-89%)
C = satisfactory performance (C = 73-76%, C+ = 77-79%)
C-, D+, D = passing work below the standard required for graduation (D to C-: 65-72%)
F = failure to achieve credit (F = 0-59%)

Weekly quizzes (most Fridays)	5%
Lab reports and graded class assignments and activities (including MMWR presentation)	20%
Class citizenship - attendance and participation	15%
Critical Problems in Emerging Diseases paper and presentation	25%
Exams (midterm and final)	35%
	100%

MMWR Surveillance presentations (50 points)

The Centers for Disease Control and Prevention publish a weekly newsletter called Morbidity and Mortality Weekly Reports (MMWR), which provides information on infectious diseases in the US and abroad and alerts health professionals to changing situations. For instance, MMWR published the first information of the AIDS epidemic in June 1981. These reports are available at http://www.cdc.gov/mmwr.

We will follow the current status of infectious diseases by reporting each week on infectious disease outbreaks from a recent MMWR bulletin. Each student, with one or two partners, will be responsible for a 10-15 minute report (do not exceed 15 minutes). The report must include a presentation via PowerPoint or Google Slides and should address the highlights of new information and their implications. A rubric for grading this presentation is posted on Moodle.

For your presentation, include the following

- the reason for the report
- background information sufficient for clear understanding of the problem
- a summary of the MMWR report in the context of the disease triangle.
- citations for all sources, including pictures, tables, and diagrams.

Please note: The MMWRs are different than the basic CDC.gov informational pages, which describe the general features of a disease. An MMWR is usually a report on an unusual event related to a particular disease, and frequently takes the format of a scientific paper, with figures and tables that can be useful in understanding the importance of the report. Be sure to use the "MMWR advanced search" function (on the left menu bar on the MMWR site) to search ONLY the MMWR publication for your topic. The search bar on the front page of the MMWR site will search all of the CDC.gov website. As you prepare your presentation, be cognizant of this and evaluate your search results accordingly. If you have questions about whether your source material is or is not a MMWR, please contact me.

To be clear: Your MMWR report should include an analysis of a disease-related event or phenomenon based on a scientific report from the MMWR newsletter. A presentation that provides only a summary of the basic features of your assigned disease will be considered *incomplete* and will not receive a passing grade.

Critical problems in Emerging Diseases Term Paper

Each student will individually research and develop a 7-10 page paper on a health problem of global epidemiological significance and present the findings to the class. Each presentation should take 10-12 (but no more than 15) minutes.

This research paper is very different from the MMWR report, though it can certainly use MMWR as one of the resources. This paper represents research and synthesis of resources from governmental sources, peer-reviewed journals (such as Science and Emerging Infectious Diseases) and current data from communication sources such as ProMed. The goal of this paper is to assess and analyze the data and evidence provided in the literature and synthesize a coherent discussion of the evidence that includes some conclusion about the status of the disease or treatment or challenge that is being discussed. This type of analysis and synthesis requires real, deep thought about the subject, which cannot be achieved in a 3-day writing binge the week that your paper and presentation are due. To facilitate engagement with your topic of interest early on in the semester, you must confirm your topic with me by the date listed on the course schedule below. In addition, a paper outline and references list and a first draft of your paper and presentations will be due prior to the final draft (dates listed below). Rubrics for your outline/references, first draft and final paper will be posted on Moodle.

Some options for topics are listed below. *This is by no means an exhaustive list*. You may, for instance, wish to focus on a disease, the status of health problems in a particular country, or the effectiveness of treatment strategies at the population level.

Possible topics

Gates Grand Challenges (http://www.grandchallenges.org)
Progress stopping African sleeping sickness (African trypanosomiasis)
Potential diseases on their way to eradication (Polio, Dracunculiasis)
Bioterrorism
Food Security - Plant diseases, crop breeding
Global warming and the threat of infectious human or plant diseases
Influenza - what is the real threat of pandemic flu?
Historical perspectives on cholera
New diseases (SARS, MERS, influenza, etc)
Mosquitoes, migration, and disease
Threats of spongiform encephalopathies, chronic wasting
Exotic pets/wildlife trade
The gut microbiome

Tentative course schedule: This schedule is subject to change, especially following Spring Break!

		Lecture/Discussion Topic	MMWR	Important Dates
1	19 - 23 Jan	Intro to microbes and epidemiology	Vaccine-preventable diseases	
2	26 - 30 Jan	Viruses and Viral Diseases - Ebola	Ebola (W. Africa 2014)	
3	2 - 6 Feb	Viral Diseases - Influenza, Oncogenes	Human Influenza	
4	9 - 13 Feb	The Immune System, Bacteria	Polio Eradication	
5	16 - 20 Feb	Bacterial Diseases - MRSA and TB	Whooping Cough (Pertussis)	Paper topic due - 18 Feb
6	23 - 27 Feb	Urban Diseases, STIs	HIV	
7	2 - 6 Mar	HIV - Viral biology and immune system effects	HIV and TB	Midterm Exam: 02 March 8:00 - 9:50 am
8	09 - 13 Mar: Spring break - No Class			
9	16 - 20 Mar	HIV - Social, political, behavioral considerations	Syringe exchange	References and outline for final paper due - 20 Mar
10	23 - 27 Mar	Influenza Survey Results	Avian Influenza (FRIDAY)	No class - 25 March (Advising Practicum)
11	30 Mar - 3 Apr	Global Health, Neglected Tropical Diseases	Chikungunya	
12	6 - 10 Apr	Protozoan diseases: Vectors and Malaria	Dengue	Critical Problems Paper Due 08 April
13	13 - 17 Apr	Protozoan diseases: Guinea Worm Disease, giardiasis, leishmaniasis	Dracunculiasis	Critical Problems Slides Due 17 April
14	20 - 24 Apr	Neglected Tropical Diseases	Malaria (MONDAY)	No class - 22 April (Spring Day)
15	27 Apr - May 01	Critical Problems Paper presentations	none	Paper and powerpoint due 27 April
16	04 - 08 May	Pandemic and Course wrap-up	none	
	11 - 15 May	FINAL EXAM	11 May, 9 AM - 12 PM	