

The Causes and Consequences of Infectious Disease

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Disease is one of the most important drivers of biological evolution.

Disease has reshaped human civilization.

Disease prevention should be on the mind of every college student.

The formative question of Bard Citizen Science is:

“How can we reduce the global burden of infectious disease?”

To address this question, I argue that we must first ask: *why* is there infectious disease? Only by understanding the ultimate *causes* of disease can we evaluate the methods proposed for the control of disease. Moreover, by studying the historical *consequences* of infectious disease we can better apprise which of the myriad known and unknown diseases threatening human civilization (e.g. should we be more concerned about HIV or wheat rust?) are of greatest concern.

The goal of Citizen Science is not for you to become a scientist (note that ‘citizen’ is listed first). Citizen Science aspires to show you the mental paradigm and methods that scientists use in their everyday work, as well as the pitfalls and limits of scientific methods. Over the next three weeks, you will:

- 1) Read a scientific paper, interpret the data and identify key points.
- 2) Perform a literature search to fact check scientific claims
- 3) Discuss the features of experimental design
- 4) Perform computer modeling to extrapolate beyond laboratory experiments
- 5) Write clearly, concisely and persuasively about complex scientific topics.

It doesn’t matter where you start, whether you’re a Written Arts or Biology major, the goal is that you make advances in *your* scientific literacy.

WARNING

As I’m sure you all know, you will not be graded for your work in this program. That does not mean that you do not have to do work to achieve a “Satisfactory” on your official transcript.

Lots of it. I expect you to read everything that is assigned. Read it twice. Complete assignments on time and to the best of your ability. In less threatening words, you will get out of this program what you put into it. Have fun!

EXPECTATIONS FOR ME

Treat all students with respect. Work with you in learning and discussing material. Facilitate a positive learning environment (This is primarily a student-driven discussion class so this one is the most important. All questions about science and the scientific method are good questions. If you have a question, ask it! Any negative feedback (laugh, chuckle, insult, etc) to a student question/comment is a serious offense and will be given a warning once, and dismissal from class the second time.) Provide prompt feedback. Be available for your questions (email or ask me during class for a time to meet outside of class). Start class on time. Give a break in the middle of class. Finish class on time. Any suggestions?

EXPECTATIONS FOR YOU

Attendance is required. You will have to meet with the Director (Dr. Amy Savage. Note the last name) if you miss more than one session. If you're sick – don't come to class, but I will need a note from the doctor. Three lates equals an absence. By late, I mean 9:01 if class starts at 9:00.

Assignments will be given daily. You should expect one hour of work a night. Never more than two. If you're spending more than two hours, send me an email and we can meet to discuss.

Participation is required. If you don't participate, I'll end up lecturing on the evolutionary genetics of disease for 4 hours a day. This would be bad for everyone involved. Participation includes but doesn't require speaking in class. If you're not comfortable speaking in class, demonstrate participate by writing, group work and talking with me. This is YOUR course.

Treat classmates, professor and classroom with respect.

Plagiarism and everything you're normally informed about in Bard courses applies for Citizen Science.

LOG AND LAB NOTEBOOK

In the notebook provided (or electronic format if you prefer), keep a log of the major topics that we covered each day. This should only take a few minutes. Describe one concept that you learned that you did not know previously, and one point that is still confusing. I will review these toward the end of each module.

During the Lab rotation, you should take notes on the experiments you are doing. Write down what you did, in order (i.e. I added 10 microliters of X to 90 microliters water to make a 1:10 dilution). In the evening you will write it in your log under the heading "Lab Book Entry."

During Computer Lab each day, keep track of how the results of your experiments changed with each outcome. Each evening, summarize the computer models that we did, briefly noting how changing the parameters of the program influenced the outcome. Add this to your log under the heading "Computer Lab Summary." (1-2 pages)

FINAL PROJECT

Working in groups of 2-4, you will complete a final project addressing the causes and/or consequences of infectious disease. Within moral, ethical and respectful bounds, you can do anything you want. Flex your creativity. A proposal is due at 9am on Thursday 1/17 for my feedback, and you will present your project (in whatever form) the last day of class, Wednesday 1/23.

GENERAL LABORATORY PREPAREDNESS

We will be starting in the laboratory first thing in the morning on the first day. As you prepare for class please remember the following:

- NO open toed shoes, sandals or flip-flops, NO bare feet
- NO eating or drinking in the lab at all. This includes coffee, granola bars, etc
- NO loose clothing
- Long hair should be tied back
- If you wear contacts lenses, you may might plan on wearing your glasses instead

Book bags must be left in the hallway

Schedule

*This schedule is more of a trajectory than a roadmap. It shows where I think this course might go, but remember that this is YOUR course, so we can (and will) make changes on the fly. Check your email and moodle **daily** for the most up-to-date information and assignments.*

Date Location	Topics covered
Lab Module – <i>Causes of Infectious Disease</i>	
Monday 1/7/13	
9-11:30am RKC 115	Lab Day 1
1-3pm RKC 103	Nature of Science; How to read a scientific paper, Biological diversity
Tuesday 1/8/13	
9-11:30am RKC 115	Lab Day 2
1-3pm RKC 103	Ultimate vs. proximate causation, causes of infectious disease
Wednesday 1/9/13	
9-11:30am RKC 115	Lab Day 3
1-3pm RKC 103	Statistics!
Thursday 1/10/13	
9-11:30am RKC 115	Lab Last Day!
1-3pm RKC 103	Antibiotic resistance
Computer Module – <i>Individual and Community Consequences of Infectious Disease</i>	
Friday 1/11/13	
9-11:30am New Hend 106a	SIR Modeling
1-3pm TBA	Civic Engagement Training

Monday 1/14/13	
9-11:30am TBA	Civic Engagement
1-3pm New Hend 106a	Contagion Models
Tuesday 1/15/13	
9-11:30am New Hend 106a	Computer modeling in R
1-3pm New Hend 106a	Diseases and behavior
Wednesday 1/16/13	
9-11:30am New Hend 106a	Computer modeling in R
1-3pm New Hend 106a	Community Health
Problem-based Learning Module – <i>Society and Civilization Consequences of Infectious Disease</i>	
Thursday 1/17/13	
9-11:30am Heg 308	Tuberculosis and City Development
1-3pm Heg 308	Bioethics
Friday 1/18/13	
9-11:30am Heg 308	Plague and the Little Ice Age
1-3pm Heg 308	Smallpox and Native Americans
Tuesday 1/22/13	
9-11:30am Heg 308	Bioterrorism
1-3pm Heg 308	<i>Faculty Lecture Series</i>
Wednesday 1/23/13	
9-11:30am Heg 308	Extra-terrestrial life
1-3pm Heg 308	Group Presentations