Syllabus for Citizen Science

Winter 2013

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| Dates and Times | Location | Module | Topic |
| Monday, Jan. 7- Thursday, Jan. 10  9-11:30 AM  1-3 PM | Olin 205 | Civic Engagement and Computer Lab | HIV |
| Friday, Jan. 11- Wednesday, Jan. 16  9-11:30 AM  1-3 PM | Olin LC 115 | Problem-Based Learning (PBL) | Cholera |
| \*Thursday, Jan. 17-Wednesday, Jan. 23  10-11:30AM  1-4 PM | AM: RKC 102  PM: RKC 114 | Laboratory | Antibiotic resistance |

\*Note: No class on Monday, Jan. 21 for Martin Luther King's Day.

Class Rules:

Class attendance is mandatory. Please be respectful of this learning opportunity and of your colleagues and arrive on time.

No phone in class, no personal computing (Facebook, checking e-mail, gaming, etc.) in class except during breaks. Each class session will have a 10-minute break. Laboratory sessions will not have a scheduled break.

No plagiarism! Always attribute all sources, and *never* copy word-for-word without using quotation marks or other appropriate denotation. If you have any questions about this, please ask.

Unless otherwise noted, all assignments can be typed and printed, e-mailed to me, or handwritten in order to give you maximal flexibility. If work is handwritten, it is your responsibility to make sure handwriting is legible and neat and written on an appropriate surface.

Recommended books:

*The Demon-Haunted World* by Carl Sagan

*Evolution* by Carl Zimmer

*The Immortal Life of Henrietta Lacks* by Rebecca Skloot

Syllabus for the First Module: Civic Engagement and Computer Lab

Monday, Jan. 7th

*In class*

Civic engagement training and discussion, the nature of science, and the computer as a tool in scientific research.

*Assignments*

Readings: Chapters from *The Demon-Haunted World* by Carl Sagan and *The Flamingo's Smile: Reflections in Natural History* by S.J. Gould.

Writing: In the S.J. Gould reading, three specific theories regarding the extinction of dinosaurs were discussed, two of which were shown to lack substantive data yet which were popularized in the mainstream media at the time of their synthesis. Can you find any other "scientific" theories, either about dinosaur extinction or other phenomena that subsequently fell out of favor? What evidence was there for or against this theory? Please write 500 words on the topic. Focus on distinguishing science (evidence-based) from pseudoscience. You may work with a partner.

Final project: Decide on what topic you want to work on, and whom you will be working with. You will sign up in class on Tuesday.

Tuesday, Jan. 8th

*In class*

The computer as a tool in scientific research. Civic engagement participation (11:45AM-1:30PM)

*Assignments*

Readings: Chapter from *How we die: Reflections on life's final chapter* by S. B. Nuland. This is a model example of your final project.

Read the DNA paper. Focus on the evidence used to build this model of DNA, and highlight any difficult passages you would like to go over.

Optional: Read 'Algorithm discovery by protein folding game players' (on Moodle site).

Writing: Write 250-500 words about your Civic Engagement experience.

Wednesday, Jan. 9th:

*In class*

Computer modeling of disease and epidemiology.

*Assignments*

Readings: "How HIV defeats the Immune System"

"Hope in a vial: Will there be an AIDS vaccine anytime soon?"

To hand in: Come up with your own summary diagram of one of the two readings.

Thursday, Jan 10th:

*In class*

Computer modeling of disease and epidemiology.

*Assignments*

Readings: "The web of human sexual contacts."

"Molecular evidence of HIV-1 transmission in a criminal case."

Optional: "Sexual risk behaviour and infection: epidemiological

considerations" (on Moodle site).

Writing: Provide a lay summary of either required reading article, 250-500 words, as if you are writing a column for a newspaper. Do not title your article.

Syllabus for the Second Module: Problem-Based Learning and Cholera

Monday, Jan. 14th

*In class*

AM: Mock trial (HIV/criminal intent). PM: The cholera epidemic in Haiti: reaction and recovery

*Assignments*

Writing: What is your recommendation to go forward with the treatment of cholera in Haiti? Take into account the limited resources available. Should the UN have to pay restitution? How can future tragedies like this one be prevented? Write ~350-500 words on the topic, to be presented in class the next day.

Readings: Please use the readings in your 'Cholera' chapter to inform your decision. Of particular interest may be the readings from *Genome*, 'Transmission dynamics and control of cholera in Haiti: An epidemic model', 'How many cholera deaths can be averted in Haiti?', and 'Despite sensitivities, scientists seek to solve Haiti's cholera riddle'.

Tuesday, Jan. 15th

*In class*

AM: Discussion of cholera recommendations, role-playing. Sari filtration and analysis of data. PM: Faculty talks (required attendance)

*Assignments*

Readings: 'Reduction of cholera in Bangladeshi villages by simple filtration', and 'Simple sari cloth filtration of water is sustainable and continues to protect villagers from cholera in Matlab, Bangledesh'.

Public Service Announcement: Develop a public service announcement to inform vulnerable populations on how to reduce the risk of cholera using the sari filtration method. This will be presented in class the next day.

Wednesday, Jan. 16th:

*In class*

AM: Presentation of cholera PSAs. Discussion of at-risk populations. PM: Guest speaker

*Assignment*

Attend Dr. Kaveh Khoshnood's lecture, 6-7PM, Olin Hall. Make sure to put your name on the sign-in sheet.

On Thursday, Jan 17th, the laboratory module will start, and we will meet in RKC 102 at 10AM. Please note the change in time and location.

Syllabus for the Third Module: Laboratory and Antibiotic Resistance

Thursday, Jan. 17th

*In class*

How does antibiotic resistance develop? Laboratory session.

*Assignments*

Readings: Read 'The challenge of antibiotic resistance' and at least two of the following: 'The hidden link between factory farms and human illnesses', 'US meat farmers brace for limits on antibiotics', and 'Use of antimicrobials outside human medicine and resultant antimicrobial resistance in humans'.

Writing: Do you think antibiotic resistance is being increased by American farms? Would you change these farming procedures if you could? (250-500 words).

Lab notebook.

Other: Identify a famous person who died of an antibiotic resistant infection.

Friday, January 18th

*In class*

Lady tasting tea, Statistics and Animal Models. Laboratory: bacterial transformation.

*Assignments*

Lab notebook.

Work on your final project!!!

Tuesday, Jan. 22nd:

*In class*

Final projects? Class wrap-up and citizen science activities. Gram-staining and GFP.

*Assignment*

Final projects.

Lab notebooks.

Wednesday, Jan. 23rd:

*In class*

Final projects! Laboratory presentation on environmental isolates.

Final Project:

Your final project is to tell the story of an infectious disease. There should be three aspects to this story:

1) INDIVIDUAL: What is the physiological effect of this disease on the individual? What might happen to the infected individual, both biologically and psychologically?

2) SOCIETAL: What was/is society's response to this health threat (historically and currently)? Was it ever met with superstition, rumors, or myths, and did one particular population suffer because of this? How did scientific research change the public perception of this disease?

3) BIOLOGICAL: What is the biological mechanism of this disease, and how was it discovered? Did this discovery lead to a cure or vaccination?

Your project can emphasize one aspect of the disease's story over the others, but all three aspects (individual, societal, biological) must be addressed at least briefly.

You MUST cite at least three sources from the primary scientific literature!

You may work in groups of 1-3.

You can tell your story in any format you would like! This may include a traditional essay format (typed, at least 1500 words per contributor), a graphical illustration, a children's book, a play or a movie, a public health brochure, or any other creative format you can come up with!

Projects will be presented on the last day of the class.

You can choose any infectious disease you are interested in, except for HIV/AIDS and Cholera, because these will be covered extensively in class. Some examples are:

Leprosy Polio

Lyme's Disease Salmonella

Herpes Ebola

Influenza Syphilis

Bubonic Plague Malaria

Tuberculosis HPV

Smallpox Mumps

Typhoid Hepatitis

Chicken Pox Yellow Fever

Measles West Nile Virus