Fall 2019
TR 12:30-1:45 – 145 SLC

BIOL2103H

Concepts in Biology - Honors

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Overview

Life on our planet is inexorably tied to soil. Soil sustains production of most of our food and carbon farming in soil may be an answer for lowering dangerous greenhouse gases and producing more food. In this course, we will use the theme of soil to explore concepts in biology while also considering questions of social responsibility, social justice, and civic life through service learning and partnerships with UGA's Watershed Network and Clarke County Schools.

Goals

Improve science literacy among non-science majors in the following areas:

- Improving foundational knowledge regarding biochemistry and cycling of nutrients, pathogenic organisms and their effect on human health, and transmission of genetic information.
- Evaluating new scientific findings and how the Internet, media, and businesses may dramatize and misrepresent those findings.
- Identifying, innovating, and implementing a public outreach strategy.
- Communicating to influence personal and public opinion and policies with a strong commitment and knowledge base.

Requirements

As part of this course, we will take a field trip during class time to our local watershed. Field trips not only relate to class discussions of water quality but provide a sense of the community context in which science is utilized. In addition, there will be at least two outreach opportunities to support that connection. A portion of your grade in this course will come from these service outreach opportunities to help apply science to the community's needs.

Evaluation

The course is structured with a series of online quizzes, case studies, tests, and reflective blogging assignments plus one outreach opportunity. Grades will be assigned based on the University's plus-minus system.

Materials

Readings for the course will be posted on eLC and will consist of

- Interactive Google slides
- Background content in a free open-source textbook – OpenStax
- Scientific articles (pdfs)

Field Trip

August 22

Campus Watershed walk - wear outdoor clothing

Outreach Opportunities

September 26-27

Visit to Clarke Central High School

October 5

Rivers Alive Watershed Cleanup

10% Online Quizzes – eLC quizzes will be used to assess comprehension of readings and collect survey data. These are meant to be a practice test of your knowledge. You will have two attempts at each quiz with the highest attempt counting as a grade.

5% Reflective Blog Posts – Reflections of work conducted to describe, examine, and articulate what was learned and how it fits into the bigger picture. There will be unique activities to incorporate creative multimedia and traditional forms of reflection.

40% Case Study Assignments – Each unit will include multiple case studies that examine real world implications of biology content. Students can collaborative on these in class, with some submitted as a group and others submitted individually.

40% Tests - Each unit will include a test to provide frequent feedback regarding learning, ability to synthesize material, and progress in making connections both among course content and between science and civic issues. These tests are open notes with access to all resources on computers including the Internet. You may use copies of your case studies as preparation for many of the test questions, but you cannot use other students in the class as resources during the tests.

5% Service-Learning Outreach – Students will work as a class to develop, plan, and implement a water quality outreach opportunity to help inform the community about antibiotic resistance or watershed cleanup.

Project Ideas

1. **Outreach with Clarke Central High School Students:** Due to uncontrolled use of antibiotics in agriculture, we are now dealing with a worldwide epidemic of harmful bacteria that are now no longer treatable with antibiotics. As a class we will be spending 2 days in lab in mid-September investigating the prevalence of antibiotic-resistant bacteria in the soils around Athens. In Trail Creek alone, two cattle farms were observed with no barriers to prevent cattle from entering and crossing tributaries and on more than one occasion, cows have been observed on the banks and in the streams. When it rains, this manure can runoff into the stream and may contribute fecal coliform bacteria to Trail Creek. Everyone in the class will collect their own soil samples from somewhere in Athens, and then we will spend a day in September in the lab culturing the bacteria that you find. As an outreach for this project, we could collaborate with Environmental Science students at Clarke Central High School on Milledge Avenue to help them plate their bacterial samples. If you wish to complete this outreach you will need to attend one class session to help the HS students analyze their data at the time their course is being offered - more data to come if you are interested.
2. **Tailgating** Trashing and litter is always a problem in our campus streams. If your students are particularly interested in tailgating we can work with them on a project. We've done clean ups before and after game days in tanyard. Last spring students also sorted and evaluated litter in that stream to identify the biggest culprits. If we did this after tailgating we could target educational campaigns for specific items. We've also had students go out and educate tailgaters during game days. If this is something your students are interested in doing, we have educational materials, recycling and trash bags to hand out, and t-shirts (and need to count how many we have left) that say 00 (for zero waste).
3. **Outfall Inspections** Outfall inspections is an on-going need every year. This includes watching the outfall inspection video and using the map and monitoring schedule and protocol for all of the outfalls/manholes throughout campus to look for leaks and problems.
4. **Rivers Alive Watershed Clean up** Athens Clarke County in collaboration with Watershed UGA holds and annual watershed clean ups each fall https://athensclarkecounty.com/1381/Rivers-Alive. It would be useful for a class to help evaluate what is found (cans, bottles, trash, etc.). The class could then develop outreach targeting the item most often found in streams and a form for Watershed UGA to use at future clean-ups to help us keep track of this information.

Unit Topics:

1. Water, Bacteria, and Antibiotics
2. Global Cycling
3. Genetics

University Honor Code and Academic Honesty Policy

As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, "A Culture of Honesty," and the Student Honor Code. All academic work must meet the standards described in "A Culture of Honesty" found

at: https://ovpi.uga.edu/academic-honesty/academic-honesty-policy. Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

Students with Disabilities

Students with disabilities who require reasonable accommodations to participate in course activities or meet course requirements should contact the instructor during regular office hours or by appointment. If you plan to request accommodations for a disability, please register with the Disability Resource Center. They can be reached by visiting Clark Howell Hall, calling 706-542-8719 (voice) or 706-542-8778 (TTY), or by visiting http://drc.uga.edu

General Disclaimer

The course syllabus is a general plan for the course, deviations announced to the class by the instructor may be necessary.

Schedule of Class Meetings

Date	Topic:	Assignments:
Unit 1: Evolution of Antibiotic Resistance		
August 15	Welcome to the Course – Projects	Initial Introductory Blog Post 1
August 20	Cells, Antibiotics, and Resistance	**Cells, Antibiotics & Resistance Quiz (Due 8-27)**
August 22	Introduction to Watersheds	**Pre-class Quiz (Due by class time; Post Quiz & Reflective Blog Post (Due 8-29)**
August 27	Bacterial Evolution of Resistance	Case Study #1 **Bacterial Evol of Resistance Quiz (Due 9-3)**
August 29	Methods to Assess DNA Differences During Evolution of Antibiotic Resistance	Case Study #2 **Determining Evolutionary Relationships Quiz (Due 9-5)**
September 3	Drug Resistance Using Online Tools	Case Study #3 **DNA/Gene Express Quiz (Due 9-10)**
September 5	Finish Drug Resistance Using Online Tools	
September 10	Outbreak Case	Case Study #4 **Harmful Bacteria Quiz (Due 9-12)**
September 12	Beneficial Bacteria (Human Gut Microbiome)	Case Study #5 **Beneficial Bacteria Quiz Due (9-17)**
September 17	Lab to Dilute and Plate Soil Samples (1/2 class)	Test #1 During Class (1/2 class)
September 19	Lab to Dilute and Plate Soil Samples (1/2 class)	Test #1 During Class (1/2 class)
Unit 2: Global Cycling of Nutrients		
September 24	Count colonies and enter data on the PARE site	Lab Activity
September 26	BPA in our water	Case Study #6 **Experimental Design Quiz (Due 10-3)**
October 1	Coral Bleaching	Case Study #7 **Coral Bleaching Quiz (Due 10-8)**
October 3	Nutrient Cycling Lecture	Case Study #8 **Nutrient Cycling Quiz (Due 10-10)**
October 8		**Blog Post 2 – Outreach Photo Reflection**
October 10	Analyzing Watershed Data - Graphing	**Blog Post 3 – Infographics**
October 15	Analyzing Watershed Data - interpretations	
October 17	Pharmaceuticals in our Streams	Case Study #7
October 22	Test #2 During Class	**Reflective Blog Post 4 (Final Reflections)**
Unit 3: Susceptibility to Disease - Genetics and Evolution		
October 24	Introduction to Genetic Testing	Case Study #10 **SNPs and Genetic Testing Quiz (Due 10-31)**
October 29	SNPedia Tour	
October 31	Patterns of Inheritance	Case Study #11 **Patterns of Inheritance Quiz (Due 11-7)**
November 5	Genetics – gene to protein & phenotype change	Case Study #12 Androgen insensitivity syndrome
November 7	Time to work on Genetic Testing	Submit draft idea of genetic testing PPT
November 12	Design a Genetic Test	Case Study #13 – Genetic Testing Techniques
November 14	PPT presentations (submit feedback cards)	**Qualtrics Taste Survey (Due 11-18)**
November 19	PPT presentations	Case Study #14 Final Versions of genetic testing PPTs
November 21	Complex Traits and Nature versus Nurture	Case #15 **Multifactorial Traits Quiz (Due 11-25)**
November 26	Genetics of Skin Color	Case Study #16
December 3	Neanderthal DNA sequences	Case Study #17
December 10	Test #3 12:00-3:00 pm	