Human Genome Analysis - Fall 2022

Syllabus

BIOLOGY 497G/697G: HUMAN GENOME ANALYSIS

FALL SEMESTER 2022

Course Description
This course covers current topics in genetics and and the social, ethical and legal issues surrounding genetic technology. Topics include genome structure and evolution, genetics of disease, personal genomics, human microbiomes and epidemiology. Students will have the opportunity to submit their DNA for genome-wide SNP determination. Practical skills for analyzing genetic and genomic data are taught through weekly bioinformatic sessions in the R statistical programming language.

Learning Goals

The course supports Biology learning goals listed on our departmental web site (https://www.bio.umass.edu/biology/undergraduate/learning-goals).

The perspectives gained include:

- New insights into "how one thinks" about a problem, in particular about the depth and large scale of analyses possible with bioinformatics and R that make seemingly intractable hypotheses testable.
- An understanding of the interconnectedness of knowledge through working with genome annotation derived in large part from model systems.
- Confidence in oneself as a College-Trained Biologist through hands-on R labs that emphasis problem solving.
- A realization of the impact biological science can have on the environment and society.
- A consciousness of the need for clearly communicating and documenting R code
- An ability to understand different solutions to the same problem.

The skills acquired include:

- Applying quantitative reasoning to biological questions through analyzing data using statistical methods, constructing graphs and interpreting the results in their biological context using the statistical programming language R.
- Communicating ideas and arguments effectively through class presentations and a genetics testing poster
- Preparing reports for distribution through developing the genetic testing report
- Providing constructive feedback on written assignments and oral presentations

The development of these perspectives and skills will increase your competitiveness for internships, jobs, graduate programs and professional schools.

When and Where

Classes will be Mon 11:15 AM - 12:05 PM and Wed 9:05 AM - 12:05 PM in Morrill III 311

Contact Information

Instructor: Prof.
<PROF_FULL_NAME>

Office: Morrill III 409
Student Q&A (Help Session) hours: I will keep Tuesday 2:30-3:15 and Fri 1-1:45 in my schedule clear for Q&A hours via zoom. If you would like to meet outside these hours, we can schedule an appointment.
Email:<PROF_EMAIL>
pronouns: he/him or they/them

Course Materials

There is no text book for this course. Your genome is your reference book and you are encouraged to participate in one of the available genealogical testing services. Other course materials will be available freely on line and include primary research articles, scientific reviews, tutorials, videos, podcasts, Ted Talks, newspaper articles and other materials.

Moodle Site

On the Moodle site for Human Genome Analysis (<LINK_MOODLE>) is a posting of this syllabus, the detailed lecture and reading schedule, due dates, and links to more information.

Grading

There is a total of 263 possible points for 497
* Problem Sets (11 @ 15 pts) 165 pts
* Reading and Discussion Reflections (10 @ 2 pts) 18 pts (can drop 1)
* Attendance and Participation (This will be used to boost your grade if you are within 1% of the next highest grade)
* Genetic Testing Report 40 pts
* Genetic Testing Presentation 40 pts

There is a total of 278 possible points for 697
* Problem Sets (12 @ 15 pts) 180 pts
* Reading and Discussion Reflections (10 @ 2 pts) 18 pts (can drop 1)
* Attendance and Participation (This will be used to boost your grade if you are within 1% of the next highest grade)
* Genetic Testing Report 40 pts
* Genetic Testing Presentation 40 pts

There is no final exam, but the presentations will be during the final exam time slot.

Grade Percent
A 93
A- 90
B+ 87
B 83
B- 80
C+ 77
C 73
C- 70
D+ 67
D 63

Problems Sets. The R-based problems will take 2-4 hrs to complete (including class time). The problem sets are due on Moodle at the beginning of the next lab class. There are no points deducted for late assignments, but the labs are cumulative, so it is difficult to work on the next lab without having completed the previous lab.

Reading Reflection. Each student will write in the Moodle Assignments a short reflection of the reading. It only needs to be one paragraph (4-5 sentences) with a topic sentence and questions and thoughts you have regarding the article.

Discussion Reflection. Each student needs to contribute thoughtful ideas and comments to each discussion forum topic.

Attendance and Participation. You are expected to have read/view the assigned material prior to class. You are encouraged to ask questions during class and many classes will have a discussion component. I will call directly on students to foster participation.

Genetic Testing Report and Presentation. You will have the option of developing a comprehensive genetics testing report from the materials in this class. if you do not wish to test yourself, I recommend finding a family member (particularly a parent or grandparent) or a friend that is interested. During final class period each student will give a 5 minute summary presentation of their genetic report.

Academic Honesty

Cheating, plagiarism and signing in for other people are all forms of academic dishonesty and any violations of the University Academic Honesty Policy will be reported. For more information see the University's Academic Honesty Policy.

Accommodation Statement

The University of Massachusetts Amherst is committed to making reasonable, effective and appropriate accommodations to meet the needs of students with disabilities and help create a barrier-free campus. If you have a disability and require accommodations, please register with Disability Services (161 Whitmore Administration building; phone <PHONE>) to have an accommodation letter sent to your faculty. Information on services and materials for registering are also available on their website www.umass.edu/disability.

Diversity and Inclusion Statement

A culturally diverse campus is integral to academic excellence and that our students, faculty, and staff should reflect the diverse world in which we live. The university recognizes and values the wide range of voices and perspectives in all spheres of the academic enterprise. The University of Massachusetts Amherst is committed to policies that promote inclusiveness, social justice, and respect for all, regardless of race, color, religion, creed, gender, sexual orientation, age, national or ethnic origin, physical or mental disability, political belief or affiliation, marital status, veteran status, immigration status, gender identity and expression, genetic information, or any other characteristic or status protected by state or federal laws. I will acknowledge your gender pronoun preference listed in SPIRE and/or communicated to me during the course. For more information see the University's Office of Equity and Inclusion.

COVID Statement

I recognize that we are still facing many issues from the COVID pandemic that places additional stresses on many students. I strongly encourage you to check Support and Resources UMass Amherst Students. The Center for Counseling and Psychological Health and Center for Women and Community are both providing remote support for students who are struggling with mental health. For students who are experiencing financial insecurity, there are microgrants through the Undergraduate Student Emergency Grant Program and the Foster Student Success Fund Grant and short-term emergency loans through the Dean of Students Office.