

Introduction to Genome Science - BISC 434

Syllabus - 2020 Spring Semester

Basic Information

<i>Course:</i>	Introduction to Genome Science, BISC 434, 4 credits
<i>Place and Time:</i>	Tuesday and Thursday: 12:30 pm - 1:50 pm Location: RRI421
<i>Faculty:</i>	Dr. Ian Ehrenreich Associate Professor, Molecular and Computational Biology
<i>Office:</i>	319A Ray I. Irani Building.
<i>Telephone:</i>	213-821-5349
<i>Email:</i>	ian.ehrenreich@usc.edu
<i>Office Hours:</i>	Monday 4:00 pm – 5:00 pm or by appointment
<i>Class Resources:</i>	Will be provided by email or using Dropbox links
<i>Final Exam:</i>	Wednesday, May 13 th from 2:00 pm – 4:00 pm
<i>Report Deadline:</i>	Students are expected to generate a presentation and report based on a topic in genomics. The report is due by midnight on Friday, May 8 th at the latest. Late submission of the report will result in a 5% reduction of the final project and presentation score per day following the deadline.

Course Goals and Learning Objectives

Characterizing the sequence, function, and evolution of genomes is a central focus of modern biology. In this course, we will learn about the core questions and methods of genome scientists. We will discuss techniques for comprehensively examining organisms at the levels of DNA, RNA, proteins, and metabolites. We will also talk about how this information is used to determine the molecular basis of phenotypes, such as evolutionary adaptations, crop improvements, and human disease. The goal of this course is for students to walk away conversant in modern genomics techniques and the biological problems genome researchers hope to solve. This course is best suited for students that have taken BISC325 or BISC502a, or have had equivalent prior training in genetics or molecular biology.

Required Readings

The field of genomics changes so rapidly that textbooks for this class rapidly became obsolete. For this reason, the course is now entirely based on primary readings. Most classes will be discussions, in which one or two papers will be analyzed. Students should come prepared with questions and comments on the papers. Further, *each student is expected to lead one class discussion*, with the specific dates determined by sign-up. Paper discussions will be a significant component of the 'Participation' grade. A dropbox link containing all papers will be provided to students in the class.

Classroom Policy

Any phones must be silenced, and no chat or texting programs are allowed in class. Using tablets or laptops to view papers and take notes is permitted, though it is expected these devices will not be used for other purposes. Staying attentive and focused during lectures and discussions will be critical.

Course Schedule

The class will involve lectures on focal topics, as well as guided discussions of papers, and will build to the point where students are capable of presenting on a relevant topic of their choosing. The following is the anticipated schedule for the class; however, please note this is subject to change.

Week	Date	Topic	Paper
1	January 14	Introduction and background	
	January 16	The human genome project and sequencing technologies I	1_1
2	January 21	The human genome project and sequencing technologies II	1_2
	January 23	Eukaryotic evolution and genomic change I	2_1
3	January 28	Eukaryotic evolution and genomic change II	2_2
	January 30	Population sequencing I	3_1
4	February 4	Population sequencing II	3_2
	February 6	The impact of genome sequences on human health and disease I	4_1
5	February 11	The impact of genome sequences on human health and disease II	4_2
	February 13	Genomics and anthropology: Human evolution, migration, and domestication of plants and animals I	5_1
6	February 18	Genomics and anthropology: Human evolution, migration, and domestication of plants and animals II	5_2
	February 20	Genomes of prokaryotes and viruses I	6_1
7	February 25	Genomes of prokaryotes and viruses II	6_2
	February 27	Exam 1	First Half of the Class
8	March 3	The transcriptome and proteome I	7_1
	March 5	The transcriptome and proteome II	7_2
9	March 10	The transcriptome and proteome III	7_3
	March 12	Systems biology and the interactome I	8_1
10	March 17	<i>Spring Break</i>	
	March 19	<i>Spring Break</i>	
11	March 24	Systems biology and the interactome II	8_2
	March 26	CRISPR technologies I	9_1
12	March 31	CRISPR technologies II	9_2
	April 2	Lineage tracking I	10_1
13	April 7	Lineage tracking II	10_2
	April 9	Synthetic genomics I	11_1
14	April 14	Synthetic genomics II	11_2
	April 16	Student presentations	
15	April 21	Student presentations	
	April 23	<i>No class – Ian out of town at The Allied Genetics Conference</i>	
16	April 28	Student presentations	
	April 30	Student presentations	
	May 13	Exam 2 (Non-Cumulative)	Second Half of the Class

Attendance and Participation Expectations

Attendance at all classes is required, unless an excused absence is obtained. At most, students are allowed two excused absences. Each unexcused absence or excused absence beyond the two that are allowed will result in a 5% reduction of the participation grade. Also, students are expected to arrive promptly, as the small size and discussion-based nature of this class requires all students being present and on time. Unexcused lateness may result in a 2% reduction of the participation grade. Students are expected to have carefully read and be capable of discussing each paper prior to class meetings.

Assessment

Grades will be based on four scores: 1) midterm exam grade, which will test understanding of material from the first part of the class, 2) final exam grade, which will largely focus on material from the second part of the class but will expect understanding of material from throughout the class, 3) final presentations, and 4) class participation:

Assessment Procedure	Percent
Midterm	30%
Final	30%
Final project presentation and report	30%
Participation	10%

Criteria for grading: The midterm and final exams will consist of a mixture of multiple choice, fill-in-the-blank, and free response questions. Some of the free response questions will ask students to formulate strategies for solving biological problems using tools from genomics. The final presentation and report will be graded according to clarity of scientific hypothesis, appropriateness of data to address that hypothesis, ability of the student to effectively communicate their strategy, and on the substance of conclusions.

Final presentation: Students will give a timed, 12-minute presentation to the rest of the class, with an additional three minutes for questions. Presentations will occur during the final four course meetings. Each presentation should include a number of slides that describe a biological problem of interest and how it could be addressed using genomics techniques. If enrollment for the class is higher than expected, the course schedule and allocation of time to each presentation may be modified to accommodate all student presentations.

Final report: Students will be expected to provide a single-spaced, 10-page paper describing the problem, methods to address the problem, and the potential range of outcomes for the proposed experiments. The paper should be written in Arial font with a font size of 12 and 1-inch margins on each side of the page. Primary literature should be used to reference salient points, and at least 25 papers should be referenced.

Participation: Participation grades will be assessed based on attendance, quality and quantity of participation during paper discussions, performance in leading a paper discussion, and other factors, such as questions asked during lecture.

Course grade: The course is not curved. Letter grades will follow a straight scale: 90% and above leading to A, between 80% <90% leading to B, etc. Pluses and minuses are assigned by dividing each range in corresponding halves (A, A-) or thirds (B+, B, B-, C+, ...).

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention and Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED)- (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following *protected characteristics*: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations. The university also prohibits sexual assault, non-consensual sexual contact, sexual misconduct, intimate partner violence, stalking, malicious dissuasion, retaliation, and violation of interim measures.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity |Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776

dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

Campus Support & Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.