QBIO577: Computational Biology Laboratory

Organizers: Geoff Fudenberg & Adam MacLean

Time and Location: 2:00 - 3:50pm Tue, RRI 421

Description: This course provides practical experience across a range of current computational biology topics. Students will work with programming languages and bioinformatics software packages to perform molecular structure and dynamics, genomic, proteomic, epigenomic, and systems biology analyses.

Goals:
- To gain familiarity and competency in computational biology methods applicable to genomic, transcriptomic, and proteomic analyses, and the principles underlying these computational methods.
- To develop skills in the use and application of molecular biology, genomic and proteomic databases and ancillary software tools.
- To develop programming skills that enable systems-level insight into complex biological processes, e.g. molecular networks or dynamical systems.

Text: There is no required textbook. Handouts will be distributed.

Course Contents: This course will cover topics including: systems biology, structural bioninformatics, genetics and evolution, genome biology, epigenomics, ecosystems, genomic variation, population genetics, RNA-seq analyses, gene ontology, molecular dynamics, molecular networks, and structural genomics.

Homework: Three homework projects will be assigned throughout the semester. Each project should be submitted by the specified due date. Points will be subtracted for projects submitted late.

Grade: Course grades will be calculated as follows, from homework assignments and participation. Participation in every lecture will be graded by attendance and the submission of short (4 sentence) summaries of lectures.

Percentage of final grade:

Homework Projects (MacLean):	35 %
Homework Projects (Fudenberg):	35 %
Participation:	30 %

Course Schedule

1	08/24	Systems Biology (MacLean)
2	08/31	Systems Biology (MacLean)
3	09/07	Systems Biology (MacLean)
4	09/14	Structural Bioinformatics (Katritch)
5	09/21	Genetics and Evolution (Chiang)
6	09/28	Genome Biology (Fudenberg)
7	10/05	Cancer Systems Biology (Finley)
8	10/12	Marine Ecosystems (Levine)
9	10/19	RNA-seq and CRISPR (Pimental)
10	10/26	Genome Biology (Fudenberg)
11	11/02	Genome Biology (Fudenberg)
12	11/09	Population Genetics (Mooney)
13	11/16	Gene Ontology Tools (Mi)
14	11/23	Molecular Networks (Sun)
15	11/30	Structural Genomics (Rohs)

Statement for Observance of Religious Holidays:

The university's policy grants students excused absences from class to observe religious holidays (http://orl.usc.edu/religiouslife/holydays/absences.html). In this case, please contact your instructor in advance to agree on alternative course requirements.

Statement for Students with Disabilities:

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to your

instructor as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity:

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

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:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.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 Services (RSVP) - (213) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of 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.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation 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.

USC Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa
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.