BIMM 185: Advanced Bioinformatics Laboratory

Instructor: Dr. Katie Petrie, kpetrie@ucsd.edu
IA: Kanishk Asthana, kasthana@ucsd.edu
Class (mandatory): Tuesdays and Thursdays, WLH 2015, 5PM - 8PM
Dr. Petrie Office Hours (optional): Mondays, Muir Biology 1208, 7AM - 9AM
Kanishk Office Hours (optional): Fridays, Muir Biology 1208, 8:45AM - 9:45AM
Private appointments to discuss accommodations or special circumstances can be arranged by email.

This course emphasizes the hands-on application of bioinformatics methods to biological problems. Students will gain experience in the application of existing software, as well as in combining approaches to answer specific biological questions. This course is open to bioinformatics majors only.

Learning Objectives

By the end of the course, students will:

1) Be able to explain why bioinformatics approaches are important to understand and interpret results in many different biological areas of study.

2) Be able to utilize existing bioinformatics tools individually to analyze various kinds of biological data.

3) Be able to utilized existing bioinformatics tools in combination with one another to answer complex scientific questions.

4) Develop critical analysis and research skills that can be applied to understand and use new bioinformatics tools that are developed in the future.

5) Be able to access publically available biological data sets and bioinformatics tools.

Course Grading

For the first 7 weeks, students will work on a weekly lab project in class on Tuesday and Thursday. Reports for each week's project are due the following Tuesday at the start of class, and will be returned within one week. **All reports in total** will be worth **60% of the grade.** If **all** students fill out a course evaluation at the end of the quarter, the lowest scoring weekly report will be dropped. For the last 3 weeks of the quarter, students will work on an independent project and write up a report, which will be worth **15% of the grade**. Additionally, **in-class quizzes and participation questions** will be worth **15% of the grade**, and an **electronic laboratory notebook** will be worth **10% of the grade.** Attendance is mandatory, but in the case of valid excuses (must be approved by professor before scheduled class), quizzes and participation points can be made up.

Team work vs. individual work
In the classroom, while you are working on coding and analysis for each weeks project, you are encouraged to chat with your neighbors, look things up online, and ask the instructor and IA for help. However, when writing your lab reports, work independently, and make sure that the lab report is in your own words and reflects your own understanding. You may use scientific literature, but must cite it in the text. DO NOT directly copy/paste code to/from other students in the class or websites (your own journal and the weekly protocols are ok). DO NOT post questions about assignments on sites like seqanswers or stack overflow (you can research existing threads on these websites, just don't start new ones for the coursework). All work will be checked via turnitin. Violators of these policies may be subject to UCSD rules for academic integrity.

Course schedule (planned)
Week 1 (Mar 29/31): What causes antibiotic resistance? (alignment to reference, variant calling)

Week 2 (Apr 5/7): I got vaccinated, why did I get the flu?! (deep sequencing, error control)

Week 3 (Apr 12/14): If you give a mouse a diet coke…. (microbiota compositional and functional metagenomics: - what's there and what does it do?)

Week 4 (Apr 19/21): So where do all these reference sequences come from, anyway? (de novo genome assembly, computational subtraction)

Week 5 (Apr 26/28): TBA (GWAS, RNA-seq, or protein bioinformatics)

Week 6 (May 3/5): TBA (GWAS, RNA-seq, or protein bioinformatics)

Week 7 (May 10/12): Bioinformatics in the real world (primary literature review, software installation, data access)

Week 8 (May 17/19): Independent projects

Week 9 (May 24/26): Independent projects

Week 10 (May 31/Jun 2): Independent projects

Note: There is NO FINAL, but independent project report is due **TUESDAY, JUNE 7.** Please submit on TritonED before 5 PM!!!!!