# GCB/CIS/MTR 535: Introduction to Bioinformatics

## Course Staff

### Course Directors

**Benjamin F. Voight, PhD**

Department of Systems Pharmacology and Translational Therapeutics Department of Genetics 10-126 Smilow Center for Translational Research (SCTR) 3400 Civic Center Blvd 215-746-8083 bvoight@upenn.edu

**Casey S. Greene, PhD**

Department of Systems Pharmacology and Translational Therapeutics 10-131 Smilow Center for Translational Research (SCTR) 3400 Civic Center Blvd 215-573-2991 csgreene@upenn.edu

### Teaching assistants

- Katie Siewert ksiewert@mail.med.upenn.edu
- Kelsey Johnson kelsj@mail.med.upenn.edu

### Guest proctors:

- Greg Grant

### Keywords

- Ben Voight: genetic variation, human genetics, diabetes
- Casey Greene: machine learning, systems biology, gene expression
- Katie Siewert: evolution, human genetics
- Kelsey Johnson: human genetics, evolution

## Location and time

MWF 10a-11a SCTR 10-146

## Office hours

TA office hours are open door. Please feel free to attend at your convenience. Office hours with Ben and Casey are generally open door. However, students may schedule meetings during this time with the course directors, and scheduled students will receive precedence. To schedule a meeting, send a quick e-mail to the course directors. There are some days where there are preexisting conflicts with regularly scheduled office hours. We've created a table with details for your convenience.

- BFV: Wednesday 11a-12p in SCTR 10-126
- CSG: Friday 11a-12p in SCTR 10-131
- TAs: Wednesday 4-5 PM in Room 10-100, Thursday 4-5 PM in Room 10-120

# Course web site

We will use SageMathCloud for in class exercises and homework. Completed assignments will be collected through this system. Canvas is used to return grades to students.

# Course description

This course provides broad overview of bioinformatics and computational biology as applied to biomedical research. A primary objective of the course is to enable students to integrate modern bioinformatics tools into their research activities. Course material is aimed to address biological questions using computational approaches and the analysis of data.

A basic primer in programming and operating in a UNIX environment will be presented, and students will also be introduced to Python, R, and tools for reproducible research. This course emphasizes direct, hands-on experience with applications to current biological research problems. The course is **NOT INTENDED** for computer science students who want to learn about biologically motivated algorithmic problems; GCB/CIS/BIOL536 and GCB537 is more appropriate.

Areas include DNA sequence alignment, genetic variation and analysis, motif discovery, study design for high-throughput sequencing, RNA and gene expression, single gene and whole-genome analysis, machine learning, and topics in systems biology. The relevant principles underlying methods used for analysis in these areas will be introduced and discussed at a level appropriate for biologists without a background in computer science.

The course will assume a solid knowledge of modern biology. An advanced undergraduate course such as BIOL421 or a graduate course in biology such as BIOL526 (Experimental Principles in Cell and Molecular Biology), BIOL527 (Advanced Molecular Biology and Genetics), BIOL528 (Advanced Molecular Genetics), BIOL540 (Genetic Systems), or equivalent, is a prerequisite.

# Equipment prerequisite

All students are required to bring a laptop to class for in class activities. TAs will provide help with the material, but students should be computer-capable with their own laptop, and should be willing/capable to download and install free software from the Internet.

# Schedule

The most up to date schedule for the course is available in the course calendar.

# Grading

## Composition of grades

Grades are composed of:

- the course project (50% total, 25% written proposal, 25% oral presentation)
- homework assignments (30%)
- prelab assignments (10%)
- class participation (10%).

For the homework grade, we will drop scores from the 3 lowest scoring assignments when determining the final grade.

## Late grading policy:

Our late grading policy is driven by fairness. This policy allows us to return assignments quickly while providing flexibility where it is required.

- Prelab assignments are collected at the start of class. We are unable to accept late turn-ins. This material is required in order to fully participate in the in class exercises.
- Homework is due at the start of class immediately following the class in which it was assigned (e.g. homework assigned Monday is due at the start of class on Wednesday). Homework will be accepted up to one class period after its due date (e.g. assigned Monday would be accepted at the start of class on Friday), but grades will be penalized (minus 30% off). If you would like to have an assignment graded under this late policy, you must e-mail one of the course directors before the start of the class period in question.

# Plagiarism policy

Consistent with the University of Pennsylvania's honor code and policies on academic integrity, we maintain a zero-tolerance policy on plagiarism. For assignments containing text that the instructors determine is plagiarized, students will receive a grade of zero for the assignment and the case will be referred to the Office of Student Conduct for disciplinary measures. Students may not always be aware of what constitutes plagiarism in their work. If you are unsure, please contact one of the course directors. Please see links below regarding the office of academic integrity for Penn's policy on plagiarism and our discretion on grading.

https://provost.upenn.edu/policies/faculty-handbook/students/iv-d
http://www.upenn.edu/academicintegrity/ai_violations.html