

BME 3890-07 | BME 8901-03. Special Topics - Computational Genomics

Maizie (Xin) Zhou, PhD

Class Information

Class Hours: Tuesday and Thursday 3:55 - 5:10

Room: Featheringill Hall 129

Office Hours: By appointment (maizie.zhou@vanderbilt.edu)

Grades: Grading will be based on the following elements:

In-class live coding participation, Homework Assignments, Midterm

Final project (writeup and presentation).

Assessment:

- **In class live coding participation 30%:** There will be living coding participation nearly for every Thursday.

- **Homework Assignments 20%:** There will be three homework assignments. You are allowed to work in groups on the homework, but you must write up your own solutions in your own words. ASSIGNMENTS ARE DUE AT 11:59 midnight OF THE DUE DATE THROUGH BRIGHTSPACE.

- **Midterm 15%:** Midterm will be a take-home exam.

- **Paper Presentations 15%:** Original Journal articles on the topics we cover will be assigned to each student. The paper presentation grade will evaluate understanding of the material covered in class, critical evaluation of the article, and ability to communicate scientific findings to peers.

(*Meet with me one week (Thursday 7pm through Zoom) before the lecture to discuss the paper/slides. Slides are due at noon before the lecture.)

- **Final Project 20%:** Groups of 2-3 students will be allowed to select between several possible project topics. Student proposed topics are also acceptable, but these have to be approved in advance. The project write up will be in the form of a 6 page paper, including an abstract, introduction to the topic, methods, results / figures, and discussion.

*Register an account on ACCRE by choosing this class group "BME3890 Computational Genomics (bme3890)" and finish the ACCRE training courses (intro to Unix, SLURM, and the ACCRE cluster)

Final Project Submission (only electronically): maizie.zhou@vanderbilt.edu

All academic work at Vanderbilt is done under the Honor System.

Class Announcements: All students are held responsible for all announcements made in the class and [Campuswire](#).

Course Materials: The course covers current concepts and practices. As such it is not based on a traditional textbook. Instead, it will rely on notes, Powerpoint presentations, and online resources.

Syllabus

Week	Topic
1	<ul style="list-style-type: none"> ● Introduction ● Intro to ACCRE/Slurm ● Homework 1 release
2	<ul style="list-style-type: none"> ● Basics of DNA and High-throughput sequencing technologies ● In-class live coding 1 - ACCRE/Slurm
3	<ul style="list-style-type: none"> ● Python tutorial I ● In-class live coding 2 - Python ● Homework 2 release (Homework 1 due)
4	<ul style="list-style-type: none"> ● Python tutorial II ● In-class live coding 3 - Python
6	<ul style="list-style-type: none"> ● Linux tutorial ● In-class live coding 4 - Linux ● Homework 3 release (Homework 2 due)
7	<ul style="list-style-type: none"> ● Whole Genome Sequencing Analysis ● In-class live coding 5/Paper Discussion 1
8	<ul style="list-style-type: none"> ● Alignment/VariantCalling hands on tutorial I ● In-class live coding 6/Paper Discussion 2 ● (Homework 3 due)
9	<ul style="list-style-type: none"> ● Alignment/VariantCalling hands on tutorial II ● In-class live coding 7/Paper Discussion 3 ● Final Project Topic Selection
10	<ul style="list-style-type: none"> ● DNA Assembly ● In-class live coding 8/Paper Discussion 4
11	<ul style="list-style-type: none"> ● Haplotype Phasing ● Paper Discussion 5, 6
12	<ul style="list-style-type: none"> ● Structural Variant Detection ● Paper Discussion 7, 8
13	Project Presentations
14 (online week)	Project Writeup Due