

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

Maizie (Xin) Zhou, PhD

Class Information

Class Hours: Tuesday and Thursday 4:00 - 5:15

Room: FGJH 211

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

Grades: Grading will be based on the following elements:

Paper presentations

Discussion participation

Final project (writeup and presentation), due on week 13.

Assessment:

- **Paper Presentations 40%:** 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.)

- **Discussion Participation 20%:** Participation in the discussion of papers presented by other students provides an additional opportunity to demonstrate mastery of course material and will also count towards the final grade.

- **Final Project 40%:** 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.

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● Basics of DNA and High-throughput sequencing technologies
2	<ul style="list-style-type: none">● Whole Genome Sequencing Analysis● Linux and Python tutorial
3	<ul style="list-style-type: none">● Alignment_VariantCalling_handson_tutorial (in class practice)● Paper Discussion 1
4	<ul style="list-style-type: none">● DNA Assembly● Paper Discussion 2
5	<ul style="list-style-type: none">● Haplotype Phasing● Paper Discussion 3
6	<ul style="list-style-type: none">● Structural Variant Detection● Paper Discussion 4
7	<ul style="list-style-type: none">● Cancer Sequencing● Paper Discussion 5● Final Project Topic Selection
8	<ul style="list-style-type: none">● Intro to Bulk RNA-seq and Single-cell RNA-seq● Paper Discussion 6
9	<ul style="list-style-type: none">● scRNAseq: Intro to R/Bioconductor; Tabula Muris● Paper Discussion 7
10	<ul style="list-style-type: none">● Cleaning the Expression Matrix● Paper Discussion 8
11	<ul style="list-style-type: none">● scRNAseq: Biological analysis I● Paper Discussion 9
12	<ul style="list-style-type: none">● scRNAseq: Biological analysis II● Paper Discussion 10
13	Project Presentations
14 (online week)	Project Writeup Due