Advanced Topics in Computational Genomics

Spring 2019

Instructor: Seyoung Kim
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Time: TR 3:00 – 4:20pm
Place: GHC 4101
Credit Hours: 12 (9 for undergraduates)

Course Website: Course information and schedule is available at www.cs.cmu.edu/~sssykim/teaching/s19/s19.html. Piazza piazza.com/class/jq61rczula82j2 will be used for course discussion. Students will be enrolled in the Piazza page before the first day of the course. If you enrolled after the first day of class, please visit the Piazza page to enroll yourself.

Office Hours: The instructor will be available on Thursdays from 4:30pm to 5:30pm in GHC 7721.

Main References: The course will take material from the recent literature.

Objectives: This course is primarily designed for graduate students to gain exposure to emerging topics in genomics that are not covered in existing course offerings. At the end of the course it is expected that students are able to demonstrate some knowledge of the topics presented. The goal is for each student to feel comfortable working with and discussing the topics being covered with anyone on the leading edge of the field. Additionally, the course may expose students to topics that could be of research interest to them later in their career and spur ideas for ongoing research opportunities. We encourage the participants to integrate the projects with their own research if the opportunity arises.

Prerequisites: 02-710 or equivalent. Highly advanced undergraduates who have passed 02-510 are welcome with instructor approval.

Important Dates:

First class meeting ................................................................. January 15
Part I paper selection due ..................................................... January 22
Project proposal due ............................................................. February 3
Part II paper selection due ..................................................... February 26
Spring Break (no classes) ....................................................... March 12 & 14, 2018
Project Part I due ................................................................. March 24
Project Part II due ............................................................... May 9
Last Class Meeting ............................................................... May 2

Tentative Course Outline: Tentative course schedule is available at www.cs.cmu.edu/~sssykim/teaching/s19/s19.html.

Class Policy: Regular attendance is essential and expected. Due to the high emphasis of group discussion and dialogue all students are discouraged from missing classes. Missed course meetings will be noted and chronic absences may impact the student’s grade if not discussed with the course instructor. While each student is responsible for their individual projects and paper presentations, cooperation and collaboration between students is highly encouraged but plagiarism will not be tolerated.

Grading Policy: Course participation (30%), paper summary (30%), projects (40%).

Paper Summary: Beginning the third week of the course, students will be expected to complete a paper summary and submit it via Piazza by midnight one day before each class. A template for this submission is
posted on the “Summary Submission” folder in Piazza. Students should bring a hardcopy of the summary page to each class meeting. We will use this for paper discussion. Students should turn in the hardcopy to the instructor at the end of each class. Seven randomly selected haredcopy summaries will be graded. We will not accept late submissions.

**Paper presentations:** Each student will be required to present papers related to topics covered in the course. Paper presentations will begin on the third week of the course. Depending on the enrollment each student will be asked to present one or more papers related to each of Part I and Part II. A sign up sheet will be available on the course website after the first day of the class. In each class meeting, a student is expected to present the paper marked with "+" on the course schedule but is encouraged to discuss the other related papers that are listed for the given class meeting or are not listed but relevant to the topic. It is expected that each student will begin by giving a review of the paper, pointing out what makes the method or result unique and what should be taken away from the publication. The student and instructor will then lead a discussion about the paper.

**Course project:** The course project is meant to expose the student to the topics being discussed. Students will complete a single project that consists of two parts, corresponding to “Part I single-cell RNA-seq” and “Part II single-cell RNA-seq and genetics” of the course schedule. Students will analyze the same dataset with an emphasis on the transcriptome data in Part I and with an emphasis on both transcriptome data and genetic information (CRISPR perturbations) in Part II. Each student will be asked to present their project to the class on the week of March 19 for Part I and on the last week of the class for Part II. Each student will build one project report for the entire semester but should submit a mid-way report for Part I. **One day late projects will receive 80% of the full credit and two day late projects will receive 50% of the full credit.**

**Academic Honesty:** All students will be held to the up most standard of university academic integrity. The full description of CMU’s policies can be found on the university webpage (https://www.cmu.edu/policies/student-and-student-life/academic-integrity.html). It is your responsibility of understanding and following all guidelines.

**Accommodations:** If you have a disability and require accommodations, please contact Catherine Getchell, Director of the Office of Disability Resources at getchell@cmu.edu or (412) 268-6121. If you have an accommodations letter from the Office of Disability Resources, please discuss your accommodations and needs with the instructor as early in the semester as possible. We will work with you to ensure that accommodations are provided as appropriate.

**Disclaimer:** This course syllabus is subject to change at the instructors discretion. Any changes will be discussed in class and/or posted on the course website.