Biophysics 205: Computational and Functional Genomics
Spring 2020

INTRODUCTORY HANDOUT

Course Website:
http://genetics.bwh.harvard.edu/courses/Biophysics205/Info/index.html

Course Description:
This is an upper-level critical paper reading and discussion course in the areas of experimental and computational functional genomics. Introductory lectures will be interspersed within the topic blocks, with most of the meeting time devoted to critical discussion of assigned journal articles. Journal articles will comprise both classic, landmark papers in genomics and also more recent papers. Students will be responsible for presenting assigned articles throughout the semester and for leading class discussions of those articles. There will be written and oral presentations of final student proposals at the end of the term.

Faculty:

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Guest Instructors:

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Teaching Fellow:

Emma Sydir	emsydir@fas.harvard.edu

Requirements:
Molecular biology and introductory statistics.
Permission of the instructors is required.
Enrollment will be limited to 20 students

Time and Place:
2:30-4:00 PM, Mondays and Wednesdays; Folin-Wu Room
NOTE: Class might start earlier and end later, exact times to-be-announced, on the final proposal presentation dates (see below).

Readings:
The assigned readings for the course will be the journal articles that we discuss. It is expected that all participants read the articles and review any Supplementary Reading Materials that may accompany the assigned articles in advance of class.
There is no required textbook for the course. Review articles will be posted throughout the term to accompany the lectures. We do recommend the following optional textbook to

supplement the material presented in the course:

- Durbin et al., Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acids, 1st edition, 1999.

Student Presentations:

Each participant will be expected to present at least two papers during the course. Presentations will be brief (~10 minutes) with group discussion to follow, such that the total time spent on a single paper is ~30 minutes. We will require "chalk talk" presentations (no PowerPoint!), in order to encourage informal, interactive discussion. All participants are expected to read all assigned papers and contribute to the discussions.

Written Research Proposal:

At the end of the course, participants are expected to write an original 5-page research proposal related to one of the discussion topics, due by Friday May 1st at 9:00 am. This will be followed by a brief (15-20 minutes) oral presentation to the class, allowing ~10 min group discussion of the proposal. Please expect that class may end late on these days.

Office Hours:

Office hours can be arranged by appointment. Presenters are encouraged to meet with the TF before class if there are questions regarding any topics or techniques covered in the assigned paper.

Grading:

1/3 class participation and preparedness
1/3 assigned paper presentations
1/3 end-of-term research proposal

Important Dates and Instructions:

Monday, April 6, 11:59 PM
Each student must submit a 1-page description outlining a potential final proposal. The instructors will provide feedback within approximately one week.

Friday, May 1, 11:59 PM
The written proposals should be emailed to the instructors and TF before midnight.

Monday, May 4 and Wednesday, May 6
In class oral proposal presentations.

Regular paper presentations: Presentation should be in "chalk-talk" format and last 5-10 minutes. The presenter is expected to know relevant background information if it comes up in discussion and to be familiar with key information in the supplementary material (e.g., methods). The presenter should briefly highlight the major findings, any new approaches that were developed and implemented in the study, how the data were analyzed, and if there were any potential concerns or caveats about the interpretations. Basic aspects of the experimental design or computational methodology should be presented. Presentations are expected not to simply

step through each figure. Please stand up and present from the front of the classroom and use the board to aid in your presentation. The presenter should also provide a few points of discussion or questions to get the conversation started.

Written proposal format: 5 single-spaced pages (Arial 11 or larger font), including figures but not references. Proposals must implement functional genomics experimental approaches and/or analyze functional genomics data. This is an opportunity for students to creatively apply what they learn throughout the semester and to explore a topic of interest that is *outside their current research area*. Proposals are not permitted to be written on thesis project or PQE aims, or on projects prepared for other courses nor on material in submitted manuscripts or previously published papers. The proposal must represent new aims and new material developed by the student and written expressly for this course. The proposal should be formatted around specific aims and could be hypothesis-driven or discovery-driven. The plan for experiments and/or computational analyses should be well thought-out, although emphasis should be on creativity and risk-taking. If development of a new technology or generation of a resource dataset is proposed, then the proposal must also include an aim describing the application of the new technology or resource towards a specific question in functional genomics. Projects should represent work within the scope of a 5-year thesis project, allowing for help by a technician, rather than consortium-level projects. Examples of past proposals will be provided. All sources (books, articles, websites, lectures, etc.) of material, including ideas or figures, even if previously published by the student, must be properly cited.

Oral proposal presentations: Presentations should be approximately 13 minutes in length leaving 10 minutes for questions and 2 minutes for transition (~25 minutes total). As in paper presentations, the instructors will not interrupt presentations unless they feel that it is absolutely necessary for clarification. You may use visual aids as you see fit.

Policy for auditors: You are expected to attend all classes and participate fully, as if you are taking the course. However, you are exempt from the oral and written final proposals.

Non-graded assignment during first 2 weeks of class: 1-page description of your thesis or rotation project (or for non-students, your current research project in your lab).

Collaboration Statement:

Discussion and the exchange of ideas are essential to doing academic work. In this course, you are welcome to consult with your classmates or other colleagues as you work on understanding the assigned papers. However, after such discussions, any presentation materials that you provide for evaluation must be the result of your own efforts. Students are expected to work on their own to prepare the end-of-term written and oral proposals, but are permitted to discuss their project ideas with classmates or other colleagues. However, all Specific Aims presented in the proposal must be the student's own ideas. You must cite any books, articles, websites, lectures, etc. that have helped you with your work using appropriate citation practices. Similarly, you must list the names of students with whom you have collaborated on paper presentations, or end-of-term written or oral proposals, and indicate what their specific contributions were. End-of-term proposals submitted for this course must not have been, or in the future be, submitted to fulfill a requirement for another course or for a departmental examination, such as a preliminary qualifying examination.