

Biology 188 Seminar in Molecular Biology and Genetics

Meetings: We will meet from 12:00-1:15 every Tuesday and Thursday in Barnum 113. The first class will be Sept. 7, the last Dec. 9. There will be no class on Tues. Oct. 12 (Tuft's Monday), Thurs. November 11 (Veterans Day) or Thurs. Nov. 25 (Thanksgiving).

Instructors:

Catherine Freudenreich, Barnum 016, x7-4037, catherine.freudenreich@tufts.edu
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Office Hours: Dr. Freudenreich: Mondays 2-4
Dr. Mirkin: Wednesdays 2-4

Prerequisites: Biology 41 (Genetics) and junior standing or permission of instructor

Class Objectives: The aims of this seminar course are:

- 1) To understand groundbreaking research of this century that has led to the awarding of a Nobel Prize in Physiology or Medicine or Chemistry.
- 2) To learn to read and evaluate papers from the primary literature in the area of molecular biology and genetics.
- 3) To understand modern experimental methods used to ask fundamental questions
- 4) To practice synthesizing, presenting and critiquing original research.

Papers: About two-thirds of classes will be conducted as a "journal club". One person will present a paper, and everyone else will participate in discussing the paper and its implications. Each presentation should last approximately one hour and give background information needed to understand the paper, present the results thoroughly, and include a discussion and evaluation of the results. Everyone is expected to read the papers assigned for that day so that they can participate in the discussion.

All papers will be posted on the course Blackboard site: <http://blackboard.tufts.edu/> and can be downloaded and printed from there. Most papers are also available electronically and can be accessed through the library catalog: <http://www.library.tufts.edu/tisch/> by clicking on the electronic journals link or searching for the journal title in the Tufts library catalog.

Meeting with Professors: Each student is expected to arrange a meeting time with the professor on the Monday or Wednesday prior to their presentation to clear up any questions you have regarding the paper or presentation. You should have read the paper and have an outline of your presentation prepared before this meeting. After your presentation, we will schedule a brief post-presentation meeting to communicate your grade and to provide feedback.

Grading

40% from presentations, 40% from paper outlines, 20% from class participation. You do not need to turn in any paper outlines for any day that you are presenting. In addition, you can omit turning in two other outlines (in addition to those skipped on your presentation), or if you choose to turn them all in, we will drop the lowest two paper outline grades from your average.

1. Presentations: Presenting a paper involves four aspects. *First*, you should give some background that will help the other students understand the significance of the question in the context of other research in this area. You should focus on introducing background that relates to the paper. *Second*, you should go through the paper figure by figure. Your role here is to point out the purpose for each experiment and to assist the class in evaluating the data. To properly evaluate the data you must have a general understanding of how the experiment was done. *Third*, you should facilitate a discussion with your fellow students. Ideally, other students will interject their opinions or questions about the experiments as you present each one. You can encourage participation by pausing to ask specific questions. *Fourth*, you should also summarize the author's conclusions (usually found in the Discussion section of the paper) and encourage a discussion of these conclusions and future lines of inquiry suggested by these studies. For some papers, an evaluation of why this paper led to a Nobel Prize should be part of the discussion.

Grading of Presentations

30% - quality of background given – does it set up the paper well and include discussion of any background data or techniques needed to understand the paper?

35% - presentation of the figures

15% - role as discussion leader

20% - summary and discussion of conclusions/future directions

2. Class Participation: Learning to participate in a meaningful discussion of scientific data is a major goal of this course. You can only participate if you have read all assigned papers and come to class prepared. During the presentation, it is OK to interrupt (politely) to ask a question or make a comment. You should not save all your questions/comments until the end. The assigned discussants should take the lead, but active participation by everyone makes for a lively and interesting discussion. Your opinion is important, and you are encouraged to express it. Class participation makes up a significant portion of your grade (20%).

3. Paper Outlines: For each class where we cover a paper, everyone (except the presenting student) will be expected to hand in a Paper Outline using the provided form at the beginning of class (one for each article covered). You are allowed two outline skips in the semester without penalty in addition to those skipped on your presentation day, or we will drop the lowest two grades if you turn in all outlines.

COURSE SCHEDULE

Sept 7 Course Intro

Section I: RNA and Regulation of Gene Expression - Dr. Mirkin

Sept 9	Lecture	RNA Polymerase
Sept 14	Presentation/Discussion	Original paper of Roger Kornberg
Sept 16	Lecture	RNA Splicing
Sept 21	Presentation/Discussion	Original paper of Phil Sharp
Sept 23	Presentation/Discussion	Original paper of Ron Evans
Sept 28	Lecture	RNA World
Sept 30	Presentation/Discussion	Original paper of Tom Cech
Oct 5 (CF)	Presentation/Discussion	Original paper of Larry Gold
Oct 7	Lecture	RNA interference
Oct 12	No class, Tufts Monday	
Oct 14	Presentation/Discussion	Original paper of Andy Fire & Craig Mello
Oct 19	Lecture	Oncogenes and tumor suppressors
Oct 21	Presentation/Discussion	Original paper of Michael Bishop
Oct 26 (CF)	Presentation/Discussion	Original paper of Bert Vogelstein

Section II: Genome Structure and Polymorphism – Dr. Freudenreich

Oct 28	Lecture	Genome Sequencing
Nov 2	Presentation/Discussion	Original paper of Fred Sanger
Nov 4	Presentation/Discussion	New sequencing technologies paper
Nov 9	Lecture	Telomeres and telomerase
Nov 11	No class, Veterans Day	
Nov 16(SM)	Presentation/Discussion	Original paper of Jack Szostak & Liz Blackburn
Nov 18	Presentation/Discussion	Original paper of Carol Greider & Liz Blackburn
Nov 23	Lecture	Knockout mouse technology
Nov 25	No class, Thanksgiving	
Nov 30	Presentation/Discussion	Original papers Martin Evans and Mario Capecchi
Dec 2	Lecture	The Cell Cycle
Dec 7	Presentation/Discussion	Original paper of Tim Hunt
Dec 9	Presentation/Discussion	Original paper of Leland Hartwell