Bio 54 Molecular Genetics Project Lab

Meetings: We will meet from 1:30-4:30 every Wednesday (lab session) and 2:30-3:20 every Friday (recitation session) in SEC lab 027A; attendance at both is mandatory. The schedule is posted on the Bio 54 Canvas site. Short visits to the laboratory outside class time to take out plates or start cultures may be necessary. Some labs may run past 4:30.

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Teaching Fellow: Katia Spivakovsky, Rm 4748, 200 Boston Ave, Ekaterina.Spivakovsky_Gonzalez@tufts.edu
Teaching Assistant: Taylor Stewart, Rm 4892D, 200 Boston Ave Taylor.Stewart@tufts.edu

Office Hours: Dr. Freudenreich: Mondays 3-4, office rm 4738, 200 Boston Ave
Fridays 3:30-3:50, SEC 027A, or by appointment
Katia and Taylor: by appointment

Prerequisites: Biology 13. Pre- or Co-requisite of Bio 41 (Genetics)

General Laboratory Rules:
1. Come to lab prepared (i.e., check the schedule, read any handouts, print out appropriate protocols, and plan your work).
2. Before you start an experiment or procedure, THINK! Try to understand what you are doing and why.
3. Always consider proper technique and safety as you work.
4. At the end of each laboratory session, clean up your working area and put all equipment away.

Required Supplies:
1. notebook + folder, devoted to recording procedures and data, divided into 3 sections: data, protocols, notes

Objectives:
1. To learn and practice experimental approaches to biological problems (formulating hypotheses; design of genetic or molecular assays, use of controls, sources of error, verification/reproducibility, recording data, etc.).
2. To understand the biological concepts which underlie the experimental exercises.
3. To practice scientific communication, in both oral and written formats. (organization; language of science reporting; data analysis; drawing conclusions).

4. To learn accurate and safe laboratory procedures for a series of commonly used techniques (sterile technique, pipetting, making solutions, PCR, genetic manipulation of genomes, genetic assays).

5. To make new scientific discoveries!

**Recording Experimental Data:**
All data and details of procedure should be recorded DIRECTLY, IMMEDIATELY, and NEATLY in your laboratory notebook. Notebook entries need to be finished before leaving lab for the day. Follow the guidelines for “Keeping a Notebook”.

**Student Evaluation Based On:**
1. Observation of performance in the laboratory: preparedness, initiative, understanding, collegiality, accuracy, notebook, fill-in of spreadsheet data on time (25% of grade)
2. Class presentation (20% of grade)
3. 2 Quizzes (15%)
4. Paper outlines and Journal clubs (20%)
5. Final paper (20%)

**Class Participation**
Science is a team effort. Team members who are absent hurt that effort. Verified illness and travel for university business are the only valid excuses for missing a lab. Planned absences must be communicated to Dr. Freudenreich ahead of time. If you are too ill to attend a lab or recitation, you must email Dr. Freudenreich as soon as possible. Attendance of the Friday recitation is mandatory, as presentation of safety information, lab planning, and presentations will occur; recitation is an integral part of the class. If you have a valid excuse for missing a recitation, you must notify Dr. Freudenreich ahead of time. There will be penalties for non-excused absences in the performance grade. Similarly, I expect you to arrive on time for both lab and recitation.

**Class Assignments**
- Paper outlines (3)
- Lab meeting presentations (1)
- Journal clubs (2)
- Final term paper (1)
Core Competencies

- Understand how to pursue scientific inquiry through formulating hypotheses, designing controlled experiments, gathering or generating data, and analyzing and evaluating results
- Be able to generate and to analyze data, organize it for presentation, draw appropriate conclusions based on trends and/or supported by statistics, and to formulate new questions based on findings
- Be able to find and understand primary literature pertinent to a given topic in biological sciences, to examine and interpret data presented in figures and tables, and to evaluate conclusions based on the data presented
- Be able to understand techniques and methods described in current literature, or to investigate such methods through scholarly publications
- Be able to perform standard laboratory techniques accurately and safely
- Be able to access and utilize pertinent large databases
- Be able to report experimental results in a standard written format and to write coherently and persuasively about conclusions from such results and their significance
- Be able to make connections between concepts in biology and the other sciences and everyday life
- Be mindful of ethical considerations and societal outcomes in research and in technological advancement

Knowledge base

-- An understanding of the major paradigms in biology, including genetic inheritance, mutations, protein function, and cell biology,
-- An understanding of the relationship between genotype and phenotype
-- An understanding of the information flow between DNA, RNA, and proteins, and a basic knowledge of the processes that govern cellular function and division.
-- Familiarity with the processes through which cellular evolution occurs, and an understanding of how selection acts on the cellular level
-- Recognition that biological processes are fundamental to life, and that fundamental knowledge of the function of genes, proteins, and cells informs medicine, health, and policy.