

QBRc Lab – EL24B

Jane Kondev, Physics Department, Abelson 301, Office hours: Tue 5:30-6:30PM or by appt.

Course Description. In this course, you will quantitatively explore the living world by doing experiments and theory in research labs at Brandeis. The emphasis is on interdisciplinary science where techniques and ideas from physics, chemistry and biology are used to develop a quantitative understanding of life at the molecular level.

Course Plan: The lab component will consist of two six week-long research projects. One hour-long lecture will take place every week. Additionally, you will spend three to four hours every week in a research lab performing experiments or doing computational work. Lecture and lab reflection will be Mondays 5-6:20PM.

Lectures are all by QBRc faculty and invited speakers from area universities. The goal of the lectures is to inform students about cutting edge research at the interface of the physical and life sciences and to introduce some of the key ideas and techniques employed in the QBRc labs.

Lab reflections will be an instructor moderated discussion of various aspects of lab work. The goal will be discovering common experiences shared by labs doing research in different subject areas, as well as establishing a common language (using concepts from math, physics, chemistry, and biology).

Each lab project will be researched by student pairs alongside a senior graduate student or postdoc who will serve as the QBRc Instructor. The projects are structured in such a way that each student will make, measure and model something in the lab under the tutelage of the QBRc Instructor. Every student will present their findings in a poster session and a five-page report to the instructor at the end of each project.

Research lab topics:

<u>QBRc Instructor</u>	<u>Lab</u>	<u>Project</u>
Bolun Chen	Miller (Neuro)	Exploring Neural Dynamics: from a Single Neuron to Large Populations
Alex Mitchell	Birren (Biology)	Be Still My Beating Heart: Synchronization and Proliferation in Cardiac Myocytes
Matthias Schlichting	Roshbash (Neuro)	Computational modeling of DNA repair processes
Tim Wiggin	Griffith (Neuro)	Animal Behavior at the Intersection of Learning, Sleep, and Motivation

By-Yi Jin	Street (Biochem)	Characterization of chaperones effect on the folding of Insulin like Growth Factor 2
Aishwarya Krishnamoorthy	Kadener (Biology)	Identifying and validating the cell types underlying the larval crawling phenotypes upon circular RNA (circRNA) knockdown
Chie Ueda	Street (Biochem)	Finding the natural substrate of diiron enzyme YqeK from <i>Bacillus halodurans</i>
Joe Rauch	Kondev (Physics)	Modeling the microbial world
Ian Hunter	Fraden (Physics)	Modeling chemical communication between microbes

Lecture Schedule:

<u>Week</u>	<u>Topic</u>
1 1/22	Project presentations (QBReC instructors)
2 1/28	Lab reflection: Showing off your science
3 2/4	Guest lecture: Prof. Michael Hagan
4 2/11	Lab reflection: The art of a good introduction
5 2/25	Guest lecture: Prof. Jeff Gelles
6 3/4	Poster Session 1 (Report due 3/15)
7 3/11	Guest lecture: Prof. Eve Marder
8 3/18	Lab reflection: Lightning talks
9 3/25	Guest lecture: TBA
10 4/1	Guest lecture: Prof. Andrew Murray (Harvard)
11 4/8	Guest lecture: Prof. Bruce Goode
12 4/15	Lab reflection: Interdisciplinary science
13 4/29	Poster Session 2 (Report due 5/10)

Evaluation: Lab notebook (10%), Posters (40%), Reports (40%), Class/Lab participation (10%).
Success in this 2 credit-hour course is based on the expectation that students will spend a 1-2 hours of study time per week in preparation for class and lab sessions. The total time commitment for this course is 6-7 hours a week.

Disabilities. If you are a student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please see me immediately.