Instructor:
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Lecture: Monday 2:00-3:30 pm
Lab sections: Monday 3:30 pm till 7:20, Tuesday, Wednesday, Thursday and Friday 1:00 till 4:50 pm
Office Hours: Monday 3:30 pm till 5:30 or by appointment

Course Objectives:
- To teach you several basic physics concepts and how to apply that knowledge in an experimental setting.
- To familiarize you with several common techniques, processes, and equipment used in modern biophysics laboratories.
- To teach you how to design your own experiment, to test your own hypothesis, and to interpret your results critically and objectively.
- To familiarize you with working collaboratively with colleagues and peers.
- To help enhance your scientific communication skills.

You will find as we progress through this year, each assignment, experiment, and assessment is designed with at least one if not more of these criteria in mind.

Learning Objectives:
By the end of this course students should be able to:

- Perform basic biophysical laboratory techniques such as brightfield and fluorescence microscopy, digital video microscopy, data analysis using Matlab and ImageJ, and computer simulation.
- Create a simple laboratory protocol using web and peer reviewed resources.
- Troubleshoot and interpret data from scientific experiments using the aforementioned techniques.
- Formulate reasonable conclusions when presented scientific data and design rational hypotheses.

The following is required of every student enrolled in Physics 18a/b:

- You must attend the lab section for which you are registered. In the case of a legitimate scheduling conflict, email the course professor at least 24 hours in advance of the lab. You may be allowed to attend a different section on occasion.
- Before coming to lab, you should read the lab and complete the pre-lab assignment. The pre-lab assignment may be typed for submission to your TA when you arrive in lab. Late or inappropriately constructed pre-labs will not be accepted.
- You must attend the weekly lab lecture. During these lectures we will review topics, introduce new concepts, go over important announcements, and summarize the week’s laboratory information. You are responsible for knowing and understanding this information and it will be included on exams.
- You may not leave lab for any unauthorized reason during your scheduled lab section and you must stay until the day’s experiment is completed.
- You must be appropriately dressed for lab.
You must record all of your data while in lab. All calculations and metadata (such as the magnification of the objective, frame rate of the digital camera, etc.) must be recorded in your lab notebook. Electronic data files should be downloaded to a personal flash-drive before leaving.

You are expected to check the Physics 18a/b Latte site regularly and often. This course is constantly evolving. Important announcements and syllabus updates will be posted on a semi-regular basis and you are responsible for this information.

Email is a reliable way to contact staff members. Please expect a 48 business-hour turn-around time on all email inquiries (longer over weekends) and plan accordingly.

Grading and Evaluation

Grades will be determined based upon the following:

1. Writing Assignments (60%)

Learning how to write scientifically is a key component of this course. As a result, the bulk of your grade will come from six writing assignments, which taken together comprise the scientific writing process. Late submissions of your reports will not be accepted for any reason. If you fail to turn in your assignment, a zero will be averaged into your grade for this report. These assignments are due in printed form by 1:00 in section on the week following the labs’ completion. Written assignments will not be re-graded.

A. Lab 2: Presenting scientific data visually
   For this assignment, you will create one clear figure from your data. The figure should be created electronically, include indications of error, have a title, caption and legend if applicable.

B. Lab 3: Outlining a manuscript
   For this assignment, you will create an outline of a full manuscript based on this experiment. This assignment should be presented in bullet-point form indicating any important concepts, steps, images, and/or conclusions that should be included. You do not need to create figures or include images in your outline, rather you should indicate that they should be included.

C. Labs 4 & 5: Writing a Discussion
   For this assignment, you will write a discussion section. The discussion should be a maximum of one page single spaced. You should review the primary literature provided to you this semester to determine an appropriate format and be sure to note the inclusion of relevant data in most discussions.

D. Lab 6: Writing a Materials and Method section
   For this assignment, you will write a Materials and Methods section in paragraph form. You should review the primary literature provided to you this semester to determine an appropriate format. The materials and methods should be no more than one page single-spaced.

E. Lab 7 & 8: Writing an Introduction
   For this assignment, you will write an introduction. The introduction should be a maximum of one page single spaced. You should review the primary literature provided to you this semester to determine an appropriate format and be sure to note the inclusion of relevant conclusions in most discussions.

F. Lab 9: Constructing an Abstract
For this assignment, you will construct an abstract. Note that an abstract often contains a brief background statement, a rationale or purpose for an experiment, a description of the technique used, a brief statement of the results and the accompanying conclusions, and a implication of a future experiment or impact of the results. Your abstract should contain and title and authors and should not exceed a 300 word maximum.

2. Exams (25%)

There will be two exams in lab lecture. Each exam is worth 12.5% of your grade. Because exams are scheduled during regular class time, there is a no make-up policy for any exam in Phys18a.

Exam 1: October 25, 2016
Material covered: Lab and lectures: Weeks 1-5

Exam 2: December 5, 2016
Material covered: Lab and lectures: Weeks 1-10

All exams will be electronically scanned before being returned.

Exam regrades must be submitted in writing within 48 hours of exams being returned. These must be submitted in writing directly to the course professor. All regrade requests must be accompanied by a student signature. In all cases, your entire exam will be regraded.

3. Presentation (5%)

During week 1 you will be asked to deliver a group presentation that you will create in class. The presentation will be 10 minutes in length and describe a fundamental concept in biological physics.

4. Participation and Professionalism (10%)

Participation and professionalism points will be determined from the following:

- A written “Purpose” and completed pre-lab questions must be handed in at the beginning of lab every week on notebook paper. Your answers should reflect your best attempts at correctly and completely answering the questions provided. If all questions are attempted, you will receive full credit. (5%)
- Completed results and discussion questions must be handed in at the beginning of lab for the prior week’s laboratory on carbon-copy lab notebook paper. Your answers should reflect your best attempts at correctly and completely answering the questions provided. Collaborative discussion with your partner and/or course staff is encouraged. These submissions will be graded for completion and accuracy (5%).
- Conduct and participation in lab (NEGATIVE points assessed against the weekly 10%).
  - Paying attention to course staff
  - Participating in class-wide discussions and question sessions
  - Respecting the lab environment
  - Maintaining a respectful, professional tone in conversations, office hours, in the laboratory, and via email
Cleaning up after yourself

Working/dressing/behaving in a safe and professional manner

Punctuality

**Academic Integrity**

Academic integrity is central to the mission of educational excellence at Brandeis University. Each student is expected to turn in work completed independently, except when assignments specifically authorize collaborative effort. It is acceptable to use the words or ideas of another person provided the source is properly acknowledged. You must use proper citations and quotation marks to indicate the source of any phrases, sentences, paragraphs or ideas found in published volumes, on the internet, or created by another student. Note that the use of full quotations is not acceptable. Violations of University policy on academic integrity, described in Section 4 of Rights and Responsibilities, may result in failure in the course or on the assignment, and could end in suspension from the University. If you are in doubt about the instructions for any assignment in this course, you must ask for clarification. Further, please notice that this course and the assignments contained within it are different from previous years. The use of written assignments from previous years as reference material is strongly discouraged as expectations and rubrics change from year to year.

Any course materials including assignments, exams, podcasts, procedures, etc. are the sole property of the course professor in connection with Brandeis University and are to be used only by students enrolled in Physics 18a/b. Any unauthorized electronic or print distribution of this material is expressly prohibited.

**Disability**

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 Professor Dogic immediately.

**Expectations**

Success in this 2 credit hour course is based on the expectation that students will spend a minimum of 6 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc.

**Experiential Learning Statement**

This course is designated as an Experiential Learning course. You will perform hands-on scientific experiments every week that will require your participation in inquiry-driven problem solving, like that encountered in academic research. You will need to design your own experimental procedures and think on your feet to solve problems as they crop up. Working together with your classmates, you will develop experimental techniques for observing and measuring the physics of motion in fluids and interpret your results quantitatively. You will also read and analyze primary literature relevant to your ongoing work. You will learn to communicate your results and your interpretation to a scientific audience through visual aids (e.g. graphs and illustrations), written documents, and verbal presentation. The skills you will acquire in this class, including both experimental design, analysis, and interpretation, as well as scientific communication, will be useful as you pursue careers in research and medicine.