Physics 164: First-year tutorial

Fall 2018

Instructor:  Prof. Matthew Headrick
E-mail: mph@brandeis.edu
Office: Abelson 313
Office hours: Wednesdays 4–5, and by appointment. You are also welcome to knock on my door at any time, and I will meet with you if I can.


Content and goals:  This tutorial course will focus on skills for problem-solving and communication that are important for physicists in any field to master. The focus will not be on any particular area of physics, but we will learn some interesting physics along the way. Some of the specific goals include:

• To improve your ability to write and speak (both extemporaneously and from a prepared presentation) about physics to fellow physicists.

• To improve your ability to understand and learn from the departmental colloquia.

• To help you master certain general principles of physics (such as dimensional analysis and the use of symmetries and conservation laws) and their application to solving problems.

• To help you learn certain essential facts (such as the values of certain fundamental constants) that are part of the working knowledge of any physicist.

• To help prepare you for the oral qualifying exams.

Readings:  Each week there will be a reading from the book The Art of Insight in Science and Engineering: Mastering Complexity by Sanjoy Mahajan. This book can be downloaded for free at https://mitpress.mit.edu/books/art-insight-science-and-engineering. A physical copy can also be purchased for around $25. A few problems will be assigned with each reading, which we will discuss in class.

Mock quals:  Each week you will be given a problem from a previous year’s oral qualifying exam. You should solve this problem and prepare to present your solution before arriving in class. In class, we will conduct a mock exam based on that problem.

Colloquium reports:  Each student will be assigned (based partly on their preferences) one departmental colloquium, on which they will prepare a written report (around 5 pages in PRL format) and give a 30-minute oral presentation on it. The report and presentation should give a preview of the colloquium while explaining the necessary background material to understand it. The schedule is as follows:

• At least 2 weeks before your colloquium, you should start gathering info on the topic. Find and read relevant papers and watch recordings of relevant lectures and talks. You may contact the speaker to get information about what he/she is planning to talk about. You are welcome to get help in the process from me and other faculty in the department.

• On Wednesday of the week before the colloquium, send me a draft of your written report.

• On Thursday of the week before the colloquium, we will meet and I will give you feedback on your written report. You will also show me a draft of your oral presentation and I will give you feedback on that as well.

• On Sunday before the colloquium, send your written report to your classmates.

• The day before the colloquium, present your oral report to the class.
Exam: There are no exams for this class.

Grade: Your grade for the course will be calculated based on a combination of class participation and your colloquium report.