Physics 164: First-year tutorial

Fall 2019

Instructor:  Prof. Matthew Headrick
E-mail: mph@brandeis.edu
Office: Abelson 313
Office hours: Tuesday 3:00–3:45, and by appointment. You are also welcome to knock on my door at any
time, and I will meet with you if I can.

Time and place:  Wednesday 5:00–6:20 in Abelson 229.

Credits:  Two-Credit Course (with 80 minutes of class time per week). Success in this 2 credit-hour course
is based on the expectation that students will spend a minimum of 4.5 hours of study time per week in
preparation for class (readings, problem sets, etc.).

Audience:  This course is required for first-year physics graduate students. It is also open to undergraduate
physics majors who have completed Physics 31a.

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 speak about physics with fellow physicists.
- 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 and problems:  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](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. In class, I will choose
students to summarize the material from the assigned reading as well as to present solutions to the assigned
problems.

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.

Exam:  There are no exams for this class.

Grade:  Your grade for the course will be calculated based on how prepared you are in each class with the
reading, problems, and mock quals.