Instructor: Nate Tompkins, Abelson 210, Email: tompkinn@brandeis.edu

Class Times: 80 min Blocks G, H, P, V, X, and Z
   Tu/Fr am at 9:30 & 11:00 and Tu/Th pm at 3:30, 5:00, 6:30, & 8:00

Office Hours: Wednesday 2:00pm - 3:00pm, Abelson 307, and by appointment

Text: *Principles and Practice of Physics*, Mazur, via Perusall and MasteringPhysics

Intended Audience: This course is intended for students who have not taken university physics before and most likely will not take another university physics course after this. Students who intend to take Phys 20a should take Phys 11b. This course is explicitly an introduction to physical laws and phenomena, as such this course will take a more qualitative approach with less emphasis on the quantitative aspects of physics. Students who are majoring in other sciences or considering medical school will be well served by this course. Calculus is not a prerequisite for this course but students should be prepared to take calculus (have taken the prerequisites for calculus) and should not be surprised to see calculus used in the text.

Course Description:
   This course will be a fully flipped class. All reading will be due before class and in-class time will be focused on addressing common misconceptions, answering questions, working through problems, and demonstrating phenomena as applicable. Outside of class students will read the text on Perusall where they will be expected to ask questions and leave comments as part of an online discussion about the material. In class common questions and misconceptions will be addressed. Outside of class students will complete problem sets on MasteringPhysics which provides realtime advice and feedback. In class students will have the opportunity to ask specific questions about the problem sets. Practice “exam-like” problems will also be distributed in class to be worked on collaboratively.

Course Content:
   This course will cover electromagnetism, electric circuits, and optics with an emphasis on the physical laws and phenomena they describe. Please see the Course Schedule for a more detailed list of topics.

Course Objectives:
   Students who take this course will be able to:
   
   • understand the fundamental concepts in physics
   • outline the concepts behind physical phenomena
   • apply these concepts qualitatively as well as quantitatively
   • sketch a physical model for electromagnetic interactions
   • appreciate the role of physics in other scientific disciplines
Course Outline:

This course consists of six sections being team taught by graduate Teaching Fellows and undergraduate Teaching Assistants. Each section will have one team who will teach the course for the entire semester. The Lead Instructor will make sporadic appearances in the sections over the course of the semester.

- **Class:** Two 80 minutes class sessions per week following the content from the Course Schedule. The first class for each chapter will lecture on the topic and include demonstrating the phenomena as applicable. The following class will be focused on addressing common misconceptions, answering questions, and working through problems. All reading is due before the first class session as in-class time is focused on refining the topic and not on presenting the material for the first time.

- **Exams:** There will be three exams: two in-class midterms as shown in the Course Schedule and the final exam. These three exams together will account for 80% of the final grade, see Course Grading for a more specific breakdown.

Course Reading:

The course reading will be done online before class via Perusall. Perusall is an online textbook reading and collaborating platform where students can annotate and ask questions directly in the text to be seen and answered by other students and the teaching staff. The teaching staff will read the comments and questions and address frequent questions and misconceptions in class. Students will be graded based on participation in the reading community. This grade will account for 10% of the final grade.

Course Homework:

At the end of each reading a small number of online homework problems will be assigned for study. All students will be expected to be complete the problems online via MasteringPhysics. During class sessions additional “exam-like” problems will be assigned to be solved on the board with the other students. The teaching team will be available for help. The section leader will also report a grade for each student based on their class performance and participation during the class sections at the end of the semester. This grade will account for 10% of the final grade.

Course Expectations:

Students enrolled in this course are expected to be active members of the learning community, participating in both the online Perusall reading community and the in-class discussion community. Grades will be assigned for both completion and participation in reading and homework. Students are also expected to take ownership of their own learning. Before every class section all students are expected to have done the assigned reading and left comments/questions for others to read/answer. It is understood that different people learn best from different instruction methods and styles, as such there will be optional video lectures available to watch online.
Course Schedule:
The course schedule is subject to change but is initially planned as follows:

<table>
<thead>
<tr>
<th>Class Date</th>
<th>Concept</th>
<th>Book Sections</th>
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</thead>
<tbody>
<tr>
<td>1/17/2017</td>
<td>Electric Interactions</td>
<td>Chapter 22</td>
</tr>
<tr>
<td>1/19-20/2017</td>
<td>Electric Fields</td>
<td>Chapter 23</td>
</tr>
<tr>
<td>1/24/2017</td>
<td>Gauss’s Law</td>
<td>Chapter 24</td>
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<tr>
<td>1/26-27/2017</td>
<td>Q&amp;A</td>
<td></td>
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<tr>
<td>1/31/2017</td>
<td>Electric Potential</td>
<td>Chapter 25</td>
</tr>
<tr>
<td>2/2-3/2017</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>2/7/2017</td>
<td>Charge Storage</td>
<td>Chapter 26</td>
</tr>
<tr>
<td>2/9-10/2017</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>2/14/2017</td>
<td>Midterm 1</td>
<td>Electricity</td>
</tr>
<tr>
<td>2/16-17/2017</td>
<td>Magnetic Interactions</td>
<td>Chapter 27</td>
</tr>
<tr>
<td>2/28/2017</td>
<td>Magnetic Fields</td>
<td>Chapter 28</td>
</tr>
<tr>
<td>3/2-3/2017</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>3/7/2017</td>
<td>Faraday’s Law</td>
<td>Chapter 29</td>
</tr>
<tr>
<td>3/9-10/2017</td>
<td>Q&amp;A</td>
<td></td>
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<tr>
<td>3/14/2017</td>
<td>Electromagnetism</td>
<td>Chapter 30</td>
</tr>
<tr>
<td>3/16-17/2017</td>
<td>Q&amp;A</td>
<td></td>
</tr>
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<td>3/21/2017</td>
<td>Midterm 2</td>
<td>Magnetism</td>
</tr>
<tr>
<td>3/23-24/2017</td>
<td>Electric Circuits</td>
<td>Chapter 31</td>
</tr>
<tr>
<td>3/28/2017</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>3/30-31/2017</td>
<td>Electronics</td>
<td>Chapter 32</td>
</tr>
<tr>
<td>4/4/2017</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>4/6-7/2017</td>
<td>Optics</td>
<td>Chapter 33</td>
</tr>
<tr>
<td>4/20-21/2017</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>4/25/2017</td>
<td>Wave Optics</td>
<td>Chapter 34</td>
</tr>
<tr>
<td>4/27-28/2017</td>
<td>Q&amp;A</td>
<td></td>
</tr>
<tr>
<td>5/2/2017</td>
<td>Review Day</td>
<td>Electromagnetism &amp; Optics</td>
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Course Grading:

The final grade from the course will be calculated based on Exam Scores, Reading & *Perusall* Participation, and Class Participation & Homework Completion. The grading philosophy for this course is best described as *cumulative learning* where it is acknowledged that students will learn the material at different rates and that it matters only that you *do* learn the material not *when* you learn the material. Based on this philosophy the exams are scored so that students who don’t learn the material in time for the first exam will be able to recoup the points by demonstrating mastery of the material on a subsequent exam. Specifically, each midterm is weighted as 25% of the final grade however any missed points are added to the weight of the final. Another way of looking at it is that the final is initially 80% of the final grade and each midterm is an opportunity to “pre-earn” some of these points. Schematically this works out as:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class &amp; Homework</td>
<td>10%</td>
</tr>
<tr>
<td>Reading &amp; Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Midterm 1</td>
<td>25%</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>25%</td>
</tr>
<tr>
<td>Final</td>
<td>30-80%</td>
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<tr>
<td></td>
<td>80%-(M1%+M2%)/4</td>
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</tbody>
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Academic Policy Disclaimers:

- 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.

- You are expected to be familiar with and to follow the University’s policies on academic integrity (see http://www.brandeis.edu/studentlife/sdc/ai ). Faculty may refer any suspected instances of alleged dishonesty to the Office of Student Development and Conduct. Instances of academic dishonesty may result in sanctions including but not limited to, failing grades being issued, educational programs, and other consequences.

- Use of laptops during class for note-taking or web research related to the course can be helpful to learning. You are all adults and thus I expect you to be respectful of how your behavior may be distracting to yourself and others. Students whose behavior is distracting will be asked to put away the offending devices.

- Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc.).