Instructor: Brian Naranjo (naranjo@physics.ucla.edu)
TAs: Tim Wilson (timw@ucla.edu)
       Jiasheng He (jshhe@g.ucla.edu)
Course administrator: Mary Tran (mtran@physics.ucla.edu)
Lectures: TR 10-11:50AM, Kinsey Pavilion 1240B
Discussion sections:
   1A: W 10-10:50AM, Dodd 167
   1B: W 3-3:50PM, Boelter 5264
   1C: W 4-4:50PM, PAB 2434
   1D: F 8-8:50AM, PAB 2748
   1E: F 10-10:50AM, PAB 2748
Instructor’s office hours: TR 7-8AM, TR 1:30-3:20PM, or by appt., Knudsen 3-168
Final: Tuesday, June 13, 11:30AM-2:30PM, Location TBA
Good textbooks:
   Orear, *Physics* (1979)
Requisites: Physics 1A-1B, and Math 32A-32B are prerequisites, and Math 33A is a corequisite
Topics: Magnetic fields, Ampère’s law, Faraday’s law, inductance, alternating current circuits, Maxwell’s equations, electromagnetic waves, light, geometrical optics, interference, diffraction, and special relativity.

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1The figure above shows a plasma wakefield accelerator (PWFA) operating in the blowout regime, originally conceived and developed at UCLA. An ultrarelativistic driver pulse of electrons, in the blue region on the right, plows through a preionized plasma, driving out the plasma’s electrons, leaving behind a sequence of positively-charged bubbles. A second witness bunch of electrons is injected into the first yellow region, where it experiences acceleration gradients orders-of-magnitude beyond what is obtainable in a conventional accelerator. This fully 3D simulation of the relativistic charged-particle electrodynamics, with nearly half a billion macroparticles, was carried out on an 80GB nVidia A100 GPU.
Tentative schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Tuesday</th>
<th>Thursday</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Magnetostatics</td>
<td>L01</td>
<td>L02</td>
<td>27, 28</td>
</tr>
<tr>
<td>02</td>
<td>Induction</td>
<td>L03</td>
<td>L04</td>
<td>29.1-29.6, 30.1-30.3</td>
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<tr>
<td>03</td>
<td>AC circuits</td>
<td>L05</td>
<td>L06</td>
<td>30.4-30.6, 31</td>
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<tr>
<td>04</td>
<td>MT1 review</td>
<td>L07</td>
<td>MT1</td>
<td>No new reading or homework</td>
</tr>
<tr>
<td>05</td>
<td>Electromagnetic waves</td>
<td>L08</td>
<td>L09</td>
<td>29.7 (previously skipped), 32, 33.1-33.6</td>
</tr>
<tr>
<td>06</td>
<td>Geometric optics</td>
<td>L10</td>
<td>L11</td>
<td>34 (skim 34.4-34.8)</td>
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<tr>
<td>07</td>
<td>Interference</td>
<td>L12</td>
<td>L13</td>
<td>35</td>
</tr>
<tr>
<td>08</td>
<td>MT2 review</td>
<td>L14</td>
<td>MT2</td>
<td>No new reading or homework</td>
</tr>
<tr>
<td>09</td>
<td>Diffraction</td>
<td>L15</td>
<td>L16</td>
<td>33.7 (previously skipped), 36</td>
</tr>
<tr>
<td>10</td>
<td>Special relativity</td>
<td>L17</td>
<td>L18</td>
<td>37</td>
</tr>
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</table>

- Mastering Physics assignments are due Saturdays at 11:59 PM.
- Problem sets are due Mondays at 11:59 PM. Submit via Gradescope.
- MT1 (chapters 27-31) Thursday, April 27, 10AM-11:50AM, Kinsey Pavilion 1240B
- MT2 (chapters 32-35) Thursday, May 25, 10AM-11:50AM, Kinsey Pavilion 1240B
- Final (cumulative) Tuesday, June 13, 11:30AM-2:30PM, Location TBA

Grading scheme

- Grades are weighted according to:

  Mastering Physics  5%
  Problem sets       10%
  First midterm      25%
  Second midterm     25%
  Final              35%

- Problem sets and exams are scored on the following hundred-point scale:

<table>
<thead>
<tr>
<th>A+</th>
<th>A</th>
<th>A-</th>
<th>B+</th>
<th>B</th>
<th>B-</th>
<th>C+</th>
<th>C</th>
<th>C-</th>
<th>D+</th>
<th>D</th>
<th>D-</th>
<th>F</th>
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<tbody>
<tr>
<td>[100,97]</td>
<td>(97,93]</td>
<td>(93,90]</td>
<td>(90,87]</td>
<td>(87,83]</td>
<td>(83,80]</td>
<td>(80,77]</td>
<td>(77,73]</td>
<td>(73,70]</td>
<td>(70,67]</td>
<td>(67,63]</td>
<td>(63,60]</td>
<td>&lt; 60</td>
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</tbody>
</table>

- Your course letter grade is determined using the same hundred-point scale, with no rounding.
- Your overall Mastering Physics score is given by the cumulative percentage of points earned during the quarter. You have unlimited attempts with no loss of credit for incorrect answers.
- Your overall problem set score is given by the average of the seven equally-weighted problem set scores.
• Each of the three exams is curved separately. As a rough guideline, typically 30% of the exams will be in the A range, 30% will be in the B range, 30% will be in the C range, and the remaining 10% will be Ds and Fs. I try to write exams that yield a broad distribution of scores, and I will only curve scores toward higher grades.

Homework policy

• Discussing homework with classmates is encouraged.

• Using Mathematica, Maple, SymPy, etc. to check algebra is fine and a good skill.

• Using \LaTeX for problem sets is fine. Making an excellent write-up (good diagrams, good verbal description, concise, insightful, etc.) will help solidify your understanding.

• No matter what assistance or guidance (e.g., from the instructor, a TA, a classmate, a solution manual, an AI chatbot, other textbooks, etc.) that you received in your understanding of a problem, your actual write-up must be your own work. If you can’t write your solution on a blank sheet of paper without using references, then you are ready for neither your write-up nor your exam.

• Please don’t post my problems on Chegg. Just ask me for help.

• Problems sets are graded for completeness.

• No late homework, either Mastering Physics or problem sets, will be accepted without an extension granted prior to the due date.

Exam policy

• Format of exam questions is similar to that of the problem sets.

• Calculators are not needed and are not permitted during exams.

• Exams are closed-book with no outside notes permitted.

Lecture

• Lecture and discussion attendance, while strongly encouraged, is not strictly mandatory.

• During lectures, I will write out notes on a tablet, whose display is projected onto the large screen in the lecture hall. To those who really must miss a lecture, I provide both these handwritten notes and my corresponding typeset notes on BruinLearn. Please keep in mind that a student’s class attendance is known to have an extremely high positive correlation with their resulting grade.²

• After lectures conclude, I will remain as long as there are questions, at least until the next instructor arrives for his 12:30 PM class. Feel free to discuss the lecture material or homework.

**Campuswire**

We will be using Campuswire for class discussion. Outside of office hours, this is the fastest and most efficient way to get help from classmates, the TAs, and myself. Rather than emailing questions to the teaching staff, you are encouraged to post your questions on Campuswire. Full anonymity is enabled, so you may choose to post anonymously. The join link and code are available on BruinLearn.

**Textbook**

This course is part of the UCLA Inclusive Access program. Your course materials are being automatically provided to you, digitally, through BruinLearn before the first day of class or upon enrollment. You will receive e-mail from the UCLA Store with program details and cost sent directly to your email address on file with the UCLA Registrar. It is your responsibility to read all communication coming from the bookstore. Check your spam folder if not received.

**Mastering Physics, a component of this course, is only available through Inclusive Access, so do not choose to opt out.** Any questions regarding the Inclusive Access program can be directed to inclusiveaccess@asucla.ucla.edu.