Physics 241E, General Physics II

Fall 2008

Section 1, MWF 9:00 - 9:50 AM
Blaine Norum

Section 2, MWF 10:00 - 10:50 AM
Craig Dukes

Physics 241E is a calculus-based introductory physics course covering electricity and magnetism along with a general treatment of waves and wave optics. It is part of the required Engineering School curriculum.

Location: Physics Room 203

Instructors:
Blaine Norum, Room 136 Physics Building (434) 924-6789, e-mail: ben@virginia.edu.
Office hours: Monday 3 - 5, Room 136 in the Physics Building or by appointment.

Craig Dukes, Room 22B Physics Building (434) 982-2968, e-mail: ecd3m@virginia.edu.
Office hours: Wednesday 11 - 12, Room 22B in the Physics Building or by appointment. Mr. Dukes principal office is located in the High Energy Physics (HEP) Building. For directions see map to HEP Building.

Required text:
Author: H.C. Ohanian and J.T. Markert
Title: Physics for Engineers and Scientists: Volume II
Publisher: Norton
Edition: 3
Cover: Paperback

Introduction

Read this!

The aim of this course, which is a continuation of Physics 142E and has as a prerequisite the material of that course, is to teach you to understand the physical world and to solve problems about that world. Both elements are important to you.
Your grade in the course will depend on your ability to solve problems. You will achieve such an ability by understanding the basic concepts and by practicing on a large variety of problems. The lectures are oriented towards helping you understand why and how we understand what we do about physics, not simply towards helping you learn how to plug in formulas in order to solve rote problems. There are two optional problem solving sessions, one led by Mr. Dukes and one by Mr. Norum. In these sessions problem solving techniques will be presented, discussed, and illustrated. No conceptually new material will be presented in these sessions. Understanding the concepts is the best long-term way for you to be able to solve the problems that an engineer faces.

Problem solving skills are honed by doing problems. You should look at more problems than the ones assigned as homework, at least to convince yourself that you would know how to handle them. Feel free to consult with each other on how to do the problems.

Course Structure

How your grade is determined:

- Tests: 60% for the average of three midterm tests
- Final exam: 40% for the final exam.

Three midterm tests

- Monday September 22, 5:00-6:30 pm and 7:00-8:30 pm
- Monday October 20, 5:00-6:30 pm and 7:00-8:30 pm
- Monday November 17, 5:00-6:30 pm and 7:00-8:30 pm
- The 5:00 PM and 7:00 PM sittings of the midterms tests will be held in Room 402 WILSON HALL.

You may take either exam on a given date, but not both! To do so is an honor violation. To discuss the exam with anyone prior to the end of the last sitting is also an honor violation.

Note:

No make-up exams are given!

With a valid excuse before the exam, the remaining elements of the course will be appropriately averaged. Without a valid excuse before the exam, the exam grade will be a zero.

The midterm exams will be a mixture of problems (like the ones you do in the homework or in the discussion sessions) and of conceptual, multiple choice questions; the final exams will be multiple choices.
**Final exam:**

- Section 1: Monday, 8 December 14:00-17:00
- Section 2: Tuesday, 16 December 9:00-12:00

If you have a conflict as defined by University rules then, by prior arrangement with both instructors, you may take the final exam with the other section.

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**Workshops**

The workshops ([http://www.people.virginia.edu/~rmm5a/241W/Fall2008/](http://www.people.virginia.edu/~rmm5a/241W/Fall2008/)) are labs, which will be completed in groups. All students should register for a workshop section. You must attend the first meeting on time, or your name will be dropped from that section. You must also buy the manual, which is available in the UVA bookstore. The workshops are an enjoyable way to work with your peers and increase your understanding of physics. Please note that the workshops are not formally part of this course but rather a separate entity and must be signed into or out of separately.

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**Homework**

Homework problems are chosen to illustrate the concepts discussed in class. Homework problems will be posted on the Assignment section of Toolkit. No problems will be handed in or graded. Solutions will be posted on the Materials section of Toolkit shortly after the problems are assigned.

**Getting help on the homeworks:**

- Questions regarding the assigned problems can be addressed to Messrs. Norum and Dukes during the discussion sessions, during their office hours, or by appointment.

- The engineering school also provides tutoring assistance; consult the Dean’s Office for specific hours.

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**Attendance policy**

Attendance at all lectures is strongly recommended. You are responsible for all assigned material, whether it is presented in lecture or not. You are also responsible for knowing the problem assignments and for any announcements that may be made in lecture of changes in the assignments, schedule, etc..

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**Lectures**
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<th>Session</th>
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<td>Aug. 27</td>
<td>Introduction</td>
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<tr>
<td>#2</td>
<td>Aug. 29</td>
<td>Electric Force and Electric Charge</td>
<td>22.1-22.3</td>
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<tr>
<td>#3</td>
<td>Sept. 1</td>
<td>Electric Force and Electric Charge</td>
<td>22.4-22.5</td>
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<tr>
<td>#4</td>
<td>Sept. 3</td>
<td>The Electric Field</td>
<td>23.1-23.3</td>
</tr>
<tr>
<td>#5</td>
<td>Sept. 5</td>
<td>The Electric Field</td>
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</tr>
<tr>
<td>#6</td>
<td>Sept. 8</td>
<td>Gauss' Law</td>
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<td>#7</td>
<td>Sept. 10</td>
<td>Gauss' Law</td>
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<tr>
<td>#8</td>
<td>Sept. 12</td>
<td>Electrostatic Potential and Energy</td>
<td>25.1-25.2</td>
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<tr>
<td>#9</td>
<td>Sept. 15</td>
<td>Electrostatic Potential and Energy</td>
<td>25.3-25.4</td>
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<tr>
<td>#10</td>
<td>Sept. 17</td>
<td>Electrostatic Potential and Energy</td>
<td>25.5</td>
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<tr>
<td>#11</td>
<td>Sept. 19</td>
<td>Capacitors and Dielectrics</td>
<td>26.1-26.2</td>
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<tr>
<td>#12</td>
<td>Sept. 22</td>
<td>Capacitors and Dielectrics</td>
<td>26.3-26.4</td>
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Week of Sept. 22 Mon. Exam 1, 17:00-18:30/19:00-20:30 Chapters 22-25

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<td>#13</td>
<td>Sept. 24</td>
<td>Currents and Ohm's Law</td>
<td>27.1-27.3</td>
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<tr>
<td>#14</td>
<td>Sept. 26</td>
<td>Currents and Ohm's Law</td>
<td>27.4</td>
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<tr>
<td>#15</td>
<td>Sept. 29</td>
<td>Direct Current Circuits</td>
<td>28.1-28.3</td>
</tr>
<tr>
<td>#16</td>
<td>Oct. 1</td>
<td>Direct Current Circuits</td>
<td>28.4-28.5</td>
</tr>
<tr>
<td>#17</td>
<td>Oct. 3</td>
<td>Direct Current Circuits</td>
<td>28.6-28.8</td>
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<tr>
<td>#18</td>
<td>Oct. 6</td>
<td>Magnetic Force and Field</td>
<td>29.1-29.2</td>
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<tr>
<td>#19</td>
<td>Oct. 8</td>
<td>Magnetic Force and Field</td>
<td>29.3-29.4</td>
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<tr>
<td>#20</td>
<td>Oct. 10</td>
<td>Magnetic Force and Field</td>
<td>29.5</td>
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Saturday October 11 - Tuesday October 14: Reading Days

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<tr>
<td>#21</td>
<td>Oct. 15</td>
<td>Charges and Currents in Magnetic Fields</td>
<td>30.1-30.2</td>
</tr>
<tr>
<td>#22</td>
<td>Oct. 17</td>
<td>Charges and Currents in Magnetic Fields</td>
<td>30.3-30.5</td>
</tr>
<tr>
<td>#23</td>
<td>Oct. 20</td>
<td>Electromagnetic Induction</td>
<td>31.1-31.2</td>
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Week of Oct. 22 Mon. Exam 2, 17:00-18:30/19:00-20:30 Chapters 26-29

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<tr>
<th>Session</th>
<th>Date</th>
<th>Topic</th>
<th>Chapter</th>
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</thead>
<tbody>
<tr>
<td>#24</td>
<td>Oct. 22</td>
<td>Electromagnetic Induction</td>
<td>31.3-31.4</td>
</tr>
<tr>
<td>#25</td>
<td>Oct. 24</td>
<td>Electromagnetic Induction</td>
<td>31.5-31.6</td>
</tr>
<tr>
<td>#26</td>
<td>Oct. 27</td>
<td>Alternating Current Circuits</td>
<td>32.1-32.2</td>
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</table>
#27. Oct. 29 Wed. Alternating Current Circuits 32.3-32.4
#28. Oct. 31 Fri. Alternating Current Circuits 32.5-32.6
#29. Nov. 3 Mon. Electromagnetic Waves 33.1-33.2
#30. Nov. 5 Wed. Electromagnetic Waves 33.3-33.4
#31. Nov. 7 Fri. Electromagnetic Waves 33.5-33.6
#32. Nov. 10 Mon. Reflection, Refraction, and Optics 34.1-34.2
#33. Nov. 12 Wed. Reflection, Refraction, and Optics 34.3-34.4
#34. Nov. 14 Fri. Reflection, Refraction, and Optics 34.5-34.6
#35. Nov. 17 Mon. Interference and Diffraction 35.1-35.2

Week of Nov. 17 Mon. Exam 3, 17:00-18:30/19:00-20:30 Chapters 30-33

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<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Topic</th>
<th>Chapter</th>
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</thead>
<tbody>
<tr>
<td>#36.</td>
<td>Nov. 19 Wed</td>
<td>Interference and Diffraction</td>
<td>35.3-35.4</td>
</tr>
<tr>
<td>#37.</td>
<td>Nov. 21 Fri</td>
<td>Interference and Diffraction</td>
<td>35.5-35.6</td>
</tr>
<tr>
<td>#38.</td>
<td>Nov. 24 Mon</td>
<td>The Theory of Special Relativity</td>
<td>36.1-36.3</td>
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Thanksgiving recess: Wednesday, November 26 - Sunday, November 30

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<th>Session</th>
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<th>Topic</th>
<th>Chapter</th>
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<tbody>
<tr>
<td>#39.</td>
<td>Dec. 1 Mon</td>
<td>The Theory of Special Relativity</td>
<td>36.4-36.5</td>
</tr>
<tr>
<td>#40.</td>
<td>Dec. 3 Wed</td>
<td>The Theory of Special Relativity</td>
<td>36.6-36.7</td>
</tr>
<tr>
<td>#41.</td>
<td>Dec. 5 Fri</td>
<td>Review / catch up</td>
<td>22-36</td>
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Discussion Sessions

Discussion sessions will be held on
Monday 14:00-14:50 in Wilson Hall 301 led by Mr. Dukes
and
Wednesday 15:30-16:20 in Physics 203 led by Mr. Norum

Note that the discussion leaders for the two sessions are reversed from what appears in the COD.

These discussion sections will focus on strategies and techniques for solving problems. No new material will be introduced in these sessions. Attendance is optional but highly recommended as a principal goal of this class is the development of problem solving abilities.
Summary of Course Rules

These rules may seem onerous and perhaps a bit pedantic, but they are needed to avoid misunderstandings. There is a story, some incredible, behind almost every one. A set of unambiguous rules is particularly needed in a class of this size where, unfortunately, it is impossible to be as flexible as in smaller classes.

Tests:

- Tests will only be given on the date and time indicated on the syllabus, without exception.
- By enrolling in this course you are acknowledging that you can take the tests at the times given in the syllabus.
- If you cannot make an exam for a valid reason (see below) then you must inform us ahead of time, unless of course you are physically unable to do so.
- Valid reasons for missing an exam are:
  - an incapacitating illness or injury;
  - a death in the family;
  - a University sponsored trip.
- Invalid reasons for missing an exam include: a job interview, death of a pet, late return from vacation, early departure for vacation, oversleeping, attending a family reunion, a conflict with another course, etc.
- No make-up tests will be given, even for valid excused absences. If you miss an test with an excused absence then the other tests' weights will be increased accordingly when determining your final grade.
- For students with a crowded final exam schedule - three or more exams in a row - we will allow you to take the other section's final, but only by prior arrangement.
- All material covered in class, and assigned in the syllabus is fair game for the exams.

Grading and Regrading:

- All grading is final except in cases where the scores were added or recorded incorrectly. However, we may, at our option, regrade materials that are brought to us in person during the 48 hour period after the class at which those materials were returned. When submitting a test for a regrade the test must be accompanied by a written statement of the basis for the request. We will not regrade work that is poorly written and note that regrading may result in a lower score.
- Test and exam scores will be posted on Toolkit. It is the responsibility of the student to check that the correct scores have been entered into the database.

General:
We do not give incompletes. If for whatever reason you can not keep up with the course requirements then you are expected to withdraw from the course.

We do not give any extra credit work.

We will enforce all of the rules of the University of Virginia's Honor System, including those associated with academic fraud. By enrolling in this course, a student implicitly agrees to be bound by that honor system and its rules.

The honor pledge is implicit for the itest and final exam. By turning in any one of those items, with or without a written pledge, a student agrees to be bound by the honor pledge and the UVa Honor System with regard to that item.

If, in our judgement, it is beyond a reasonable doubt that a student has committed an honor violation with regard to a given exam, that student will receive an immediate grade of "F" for that work, irrespective of any subsequent action taken by the Honor Committee.

We will contact the University Administration, the University Police, and/or the University Judiciary Committee regarding any student who attempts to intimidate us or harass us in an effort to improve their grade or to obtain any special consideration or exception from the normal class rules.

If you are interested in hiring a tutor see the Departmental secretary; she usually has the names of graduate students who are willing to tutor. The Engineering School also provides tutorial assistance.

(Modified: 21 August 2008)

Links

- [HyperPhysics](http://hyperphysics.yale.edu/hyperRef/em/elec.html) Click on Electricity and Magnetism
- [Interactive Java Tutorials](http://www.physics.ucsc.edu/physics/11A/)
- [Visualizing Electricity and Magnetism at MIT](http://web.mit.edu/2.24/www/index.html)
- [On-line integrator](http://www.integralcalc.com)