Physics 252 - University Physics II (4 cr)

Session: Fall 2015  
Instructor: Prof. John B. Buncher  
Office: South Engineering 317  
Email: john.buncher@ndsu.edu  
Office Hours: 1:00 PM – 3:00 PM MTW, 10:00 AM – Noon PM Th or by appointment  
Class Meetings: MTuWF 11:00 AM – 11:50 AM  
Lecture Location: Ladd 107  
Final: Thursday, December 17, 2015, 8:00 AM, Ladd 107  
Prerequisites: PHYS 251 or ME 222, Corequisite: MATH 166

Course Materials

- The primary text for the course will be “Fundamentals of Physics 9th (or 10th) Edition - Volume 2”, by Halliday, Resnick, and Walker, published by Wiley.
- The homework for the course will be done through LON-CAPA (https://triton.physics.ndsu.nodak.edu/adm/roles). A $5 course fee is assessed for LON-CAPA server upgrades and maintenance.
- PreLectures & Checkpoints will be administered through SmartPhysics at www.smartphysics.com. You will need to purchase an access code either through the bookstore or online.
- Course materials (handouts, solutions) will be posted on the course Blackboard page. You can log in to Blackboard at https://bb.ndsu.nodak.edu/
- A scientific calculator will be required to complete homework assignments and exams.
- Five scantron/opscap sheets and a #2 pencil for taking exams.

Course Description

From the NDSU Catalog Course Description: Electric charge, field, potential, and current; magnetic field; capacitance; resistance; inductance; RC, RL, LC and RLC circuits; waves; optics.

This course will explore the question “How do charged particles interact?” In a previous course, you have studied what happens when objects interact (using the concepts of force, momentum, energy, etc.), but generally did not address the question of where those forces came from! In this course we will study how particles with electric charge interact through electric fields, magnetic fields, and electromagnetic waves in order to construct what the forces are that act on charged particles. We can then use our mechanics knowledge to predict the motion of the charged particles under the influence of those interactions. We will also study what is perhaps the most prevalent use of electric and magnetic fields, that of electric circuits and their components, as well as the properties of light through both ray and wave optics. Significant time will be devoted to an understanding of wave phenomena.
Course Objectives

Students completing Physics 252 should be able to solve waves, electrostatics, electrodynamics, circuits, and optics problems that require both conceptual and mathematical understanding of the material. Students must develop qualitative and quantitative reasoning skills necessary to answer novel questions that were not explicitly discussed in class. Students must be able to provide alternative solutions, check answers for consistency, and identify mistakes in their incorrect lines of reasoning (if appropriate).

Course Policies

Grades

Your final grade will be determined according to the following weights and cutoffs:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>SmartPhysics</td>
<td>10%</td>
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<tr>
<td>Weekly Homework</td>
<td>30%</td>
</tr>
<tr>
<td>Exams</td>
<td>20% (times 2 exams)</td>
</tr>
<tr>
<td>Final</td>
<td>20%</td>
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A 90 %  
B 80 %  
C 70 %  
D 60 %  
F < 60 %

Your LOWEST score of the THREE MIDTERM EXAMS will be DROPPED. I reserve the right to lower the grade cutoffs listed above, however they will not be raised.

Note that exams make up 60% of your final score! It is crucial that you prepare and study accordingly.

Homework

We will use the LON-CAPA and SmartPhysics on-line homework systems for assignments this semester. Each week will have (roughly) 1-2 on-line PreLecture and Checkpoint assignments in SmartPhysics, and one on-line Weekly Homework in LON-CAPA due.

Late Policy: Late assignments will normally be given zero credit. Official exceptions will be accepted (documented illness, family emergency, official university function, etc.).

Out of Class Time

The university defines that a student with adequate preparation should spend 3 hours per credit on the course each week in order to earn an average grade in the course. You should aim higher than “average student, average grade”, so expect to spend more than 6.5 hours per week (3 hours per credit times 3 credits minus three 50 minute lectures) on this course each week outside of class.
Attendance & Participation

To succeed in this course it is crucial that you attend the lecture and prepare accordingly. In order to receive the most out of lecture, you must arrive on-time and be prepared for that day’s class. Preparation includes (but is not limited to):

- Completing the SmartPhysics PreLectures & Checkpoints
- Bringing your Response Card to class
- Working the assigned problems
- Bringing any posted lecture slides/handouts to class

Additionally, when the class is asked a question (or asked to do something in groups), you are to make every effort to come up with an answer. In-class questions are designed to get you to think, so when answering do not worry about getting the wrong answer, if you knew everything already you would not need to enroll in the course!

Labs

The laboratory companion to this class is considered a separate course. Students taking the lecture course are not required to enroll in the lab course. The first meetings of PHYS 252L will be held the week of August 31st.

Exams

Exams will be closed-book and taken during lecture. You are not allowed to work with other students on the exams. Any topic covered in class, the reading assignments, or the homeworks may appear on the exam. Details of the format of the exams will be covered closer to the exam time.

Missed Exam Policy: Missed will normally be given zero credit. Only official exceptions will be accepted (documented illness, family emergency, official university function, etc.).

Office Hours

You are highly encouraged to make use of Office Hours (listed on the front of the syllabus). Office Hour times may change as the semester progresses, and you will be notified if they do. If you need to meet outside of those times, email me and we should be able to work something out. During office hours, we can discuss anything that you wish (homework, grading, concepts, exams, topics of interest, etc.)
Accommodations

Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor and contact the Disability Services Office http://www.ndsu.edu/disabilityservices/ as soon as possible.

Feedback

If you have any concerns about the course or suggestions on how it may improve, please let me know! I am happy to consider and implement student suggestions, and I have had success implementing such suggestions in previous courses.

On Academic Dishonesty

The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at www.ndsu.edu/academichonesty .

You are highly encouraged to work with your fellow students, and to seek out their assistance or the assistance of the instructor, in all of your studies. Working with another person is highly beneficial for both people when there is a healthy working relationship. However, whatever you turn in must be your own work and words. Copying someone else’s work and turning it in as your own is a case of academic dishonesty. While we are using LON-CAPA for the homework this semester, the answers you enter still need to represent your own work. You are not permitted to collaborate with anyone else on exams.

If you have any questions about what constitutes academic dishonesty it is your responsibility to ask before the assignment is due.

Need Additional Help?

If you would like additional help outside of office hours, then you are in luck! Free individual drop-in tutoring is available in the Physics Department tutor room (South Engineering 322) and from NDSUs ACE program (http://www.ndsu.edu/studentsuccess/tutoring_schedule/). I will post the Physics Department tutor room hours as soon as they are available. Please use one of the tutoring resources if you have a large number of questions.

Advice

Here are some helpful tips for success in the course, from my own personal experience and suggestions of other professors.
1. **Work every day**: It is crucial that you keep up with the material and to develop your conceptual understanding. Working a little bit every day will get you much farther than working for a long time once a week or so. You will often need to read the problems, think about them, and then come back to them later once you’ve had a chance to reflect on them.

2. **Practice**: Physics cannot be learned simply by reading, attending lecture, and memorizing the pages of your physics text. The single best way to learn physics is to *do* it, by practicing via the in-class exercises, lab work, homework, the workbook, etc. This will help get you ready for the exams!

3. **Ask for Help**: Help is available through me via my office hours (or by appointment), other faculty in the department, your fellow students, and private tutoring.

4. **Read Before Lecture**: That way, you’re seeing the material for the second time, and are much better prepared to ask questions on things you’re having trouble understanding.

5. **Read Critically**: Ask questions and take notes! If something is not clear, make a note of it so you can ask in class. You should also be working through steps done (or omitted) in class and the text. As a friend of mine once said: “The exam will NOT ask if you agree with our solution, but will ask you to come up with your OWN solution.”

6. **Participate**: It may not seem like it, but attempting to answer the questions in class will significantly help you. Even if you don’t know the answer, thinking about what you *want* to answer will help you understand what ideas you need to spend more time on, and what specific things you need more practice with. Participate all the time!

7. **Use Time Effectively**: If you’ve been stuck on one problem for 30 minutes, switch to another one (which may cause you to think about the troublesome one in a different way), or seek assistance. That being said, do not despair if it is not obvious what to do after 5 minutes of thinking. These problems will require some extra thought.

8. **Don’t Panic**: Physics is challenging. Like anything else worthwhile, it will take practice and perseverance to succeed, but the rewards of understanding how the universe works at a deeper level are well worth it.
Course Schedule

The following schedule is tentative, and I reserve the right to change it to benefit student learning as the semester progresses. If the exam dates need to be changed, I will notify you at least one week ahead of the new exam date.

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<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Waves - Pulses &amp; Periodic</td>
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<td>2</td>
<td>Waves - Superposition &amp; Boundaries</td>
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<td>3</td>
<td>Waves - Reflection &amp; Transmission, Wave Fronts</td>
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<td>4</td>
<td>Charges &amp; Electric Forces</td>
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<td><strong>T 9/12</strong></td>
<td><strong>Exam 1 (Week 5)</strong></td>
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<td>5</td>
<td>Electric Field &amp; Flux</td>
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<td>6</td>
<td>Gauss’s Law</td>
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<td>7</td>
<td>Electric Potential</td>
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<td>8</td>
<td>Capacitance</td>
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<td><strong>T 10/20</strong></td>
<td><strong>Exam 2 (Week 9)</strong></td>
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<tr>
<td>9</td>
<td>Dielectrics</td>
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<td>10</td>
<td>Current &amp; Resistance</td>
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<tr>
<td>11</td>
<td>Circuits, Magnetic Fields</td>
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<tr>
<td>12</td>
<td>Magnetic Fields</td>
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<td><strong>T 11/17</strong></td>
<td><strong>Exam 3 - Week 13</strong></td>
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<tr>
<td>13</td>
<td>Magnetic Fields</td>
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<td>14</td>
<td>Magnetic Induction &amp; Maxwell’s Equations</td>
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<td>15</td>
<td>Images &amp; Interference</td>
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<tr>
<td>16</td>
<td>Catch-Up &amp; Various</td>
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<td><strong>Th 12/17</strong></td>
<td><strong>Final Exam - 8:00 AM – 10:00 AM</strong></td>
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