

## University Physics II: PHYS 227N/232N

CRNs 20161/24396 and lab 22509/24397

Welcome to University Physics II at Old Dominion University. This course is intended to give you a solid introduction to basic principles of classical electricity and magnetism (E&M) from a calculus-based perspective. Nearly all phenomena you observe and encounter result from two forces: gravity, and E&M.

My objectives in this course are to develop your analytical problem-solving skills, and prepare you for a professional career in science and/or engineering. We will cover fewer topics, but in greater depth. We will divide our time between concepts, examples, problems, and computer-based labs.

The course working environment is SCALE-UP (Student-Centered Active Learning Environment for Undergraduate Programs). This environment encourages active and collaborative learning together in a studio-like setting. You'll be active class participants rather than passive audience members listening to me lecture. I welcome and encourage your participation – I prefer class to be a dialog rather than a lecture whenever possible; it's more enjoyable for me, and more productive for you!

In this environment, I'm more like your coach than your traditional professor. I'll coach you on technique (and you'll coach each other too), but it's up to you to exercise and practice so you can excel.

**Prerequisites** Phys 231N/226N; Math 211, Math 226, or permission of instructor.

**Corequisite** Math 212 or permission of instructor.

Math proficiency in the following areas is essential: algebra, trigonometry, vectors and introductory calculus. If you are uncertain about your preparation, email me or talk with me after class.

**Instructor** Dr. Todd J. Satogata (Center for Accelerator Science)

**Office:** OCNPS 213 (Oceanography and Physics Building, 2<sup>nd</sup> floor)

**Phone:** 631-807-0674 (cell)

**Email:** [tsatogat@odu.edu](mailto:tsatogat@odu.edu) (please put "PHYS 227/PHYS 232" in subject line)

**Class web page:** <http://www.toddsatogata.net/2014-ODU>

**Class** MW 11:00 – 12:50, F 12:00 – 12:50 in Oceanography & Physics, Room 142-144

**Course TAs** Fred Miller: [fmill005@odu.edu](mailto:fmill005@odu.edu)

**Materials** There are no required textbooks for this class. You may use any university physics (calculus based!) textbook and information on the web. However, I highly recommend *Essential University Physics* by R. Wolfson (2<sup>nd</sup> ed), available through the bookstore. I will also provide supplemental material for reading assignments through the class website. *Mastering Physics* (with interactive tutorials, simulations, applets, and homework) is also required! A bundle with *Essential University Physics* is also available. <http://www.masteringphysics.com/>

**Support resources** *Office hours:* by appointment in OCNPS 213

*Physics Learning Center:* a place where students in all physics courses can get help. The center is staffed by physics faculty and TAs (2<sup>nd</sup> Floor Atrium, Physical Sciences Building), [www.sci.odu.edu/physics/resources/learning\\_center.shtml](http://www.sci.odu.edu/physics/resources/learning_center.shtml)

<b>Time commitment</b>	Physics 227/232 is a demanding course and you should allocate sufficient time during the semester to do well in the course. This is up to about 12 hours per week outside of class time for review and practice, exercising the techniques you'll learn here. If you are spending much more time per week than that, please chat with me so we can develop a different study strategy that works for you.
<b>Course Grades</b>	<p>The final grade is calculated on an absolute scale. There are 100 points possible for this course:</p> <ul style="list-style-type: none"><li>45 points – Three Midterm Exams (15 each)</li><li>30 points – Final Exam (comprehensive)</li><li>05 points – Weekly Quizzes</li><li>10 points – Homework Assignments (including journal)</li><li>10 points – Laboratory</li></ul> <p>The grading policy is non-competitive and fairly lenient, but there is no curve. I can only assign a letter grade at the end of the term.</p>
<b>Class time</b>	<p>Each class period will consist of lectures, interactive discussions, problem solving, and conceptual quizzes.</p> <p>You will sometimes work in teams of three students (“a manager”, “a skeptic”, “a recorder”) in the SCALE-UP fashion to solve problems posed in class.</p>
<b>Homework</b>	<p>The homework is to be submitted via the web using <i>Mastering Physics</i>. The class ID is <b>ODU2014PHYS232SATOGATA</b></p> <p>Homework will be set as we progress through the course. One assignment will be due approximately each week, (about 12 assignments). Assignments are due before 24:00 at the Mastering Physics web site on the indicated date.</p> <p><b>Each student is required to keep an Assignment Journal</b> in which all assignment problems are to be completed before posting solutions on Mastering Physics. The journal will be collected, reviewed, and graded. No individual extension of assignment submission dates will be given. Doing the homework problems is one of the best ways to learn the material. Credit for homework is given to encourage practicing and thinking about physics on a regular basis. Think of it as exercise for your brain, and meant to be fun!</p>
<b>Reading Assignments</b>	For most classes you will be given a reading assignment. You may need to answer a few reading assignment questions. The reading assignment questions will be given as class quizzes or as Mastering Physics assignments.
<b>Laboratory</b>	Laboratory exercises will be run on selected Fridays as shown on the Lecture Course Schedule on the class website. You do not need to purchase a lab manual. Lab handouts will be posted on the course website. Labs will vary in length and complexity and will be done in groups. Labs require a formal report to be submitted by each student for grading. These should follow basic scientific report guidelines. Each student must write an individual report that <b>MUST</b> include original data collected in during the experiment and <b>signed by the instructor or TA</b> prior to leaving the lab. To get credit for the lab you must have attended and completed the experiment and submitted a satisfactory laboratory report. Incomplete/unsatisfactory reports (<75%) will be returned for revision.

<b>Quizzes</b>	Quizzes will be given on weeks that we don't have exams or midterms. A quiz consists of a few short problem-solving and/or conceptual questions. There are no make-up quizzes.
<b>Exams</b>	<p>There will be three midterm exams and one final exam. The midterm examinations will be given during the regularly scheduled class periods. All the exams will be closed book and closed computer, but I will display a slide with relevant equations and concepts. You will be instructed to put your cell phones in a baggie on your desk so you cannot use it during the exams for reference or as a calculator. You are responsible for providing your own calculator during exams and quizzes. The examinations will emphasize the material in lectures and homework assignments. Some material covered in class may be omitted. A typical exam will include problems and questions similar to the homework or discussions in class. Your work should be neat and orderly; with large, clear, and clearly labeled diagrams. Formulas and numbers alone won't do; you must show your work and explain your reasoning to earn full credit on a problem.</p> <p>All exams are hand-graded. The most credit is given for the correct method or "theory", so writing down how you would solve the problem is worth almost as much as actually solving it. It is your responsibility to communicate your answers clearly. The final examination is comprehensive. It is mandatory and will be given only at the scheduled time.</p> <p><u>Regrade</u>: Requests for correction of grading mistakes on exams can be made when the work is returned to you. The requests must be made by email within four days after getting your grade. You must explain why you believe there is a mistake in grading and why you deserve more credit than listed. Note that a regrade request can also give you a lower score than the original score, so there is some risk in making a regrade request! No make-up examinations will be given. In case you have a legitimate reason for missing an exam, consult with me before, or within 24 hours after the exam. If you miss a midterm examination for an officially excused reason (documented illness or family emergency, major religious holidays, or official university business) your missed examination score will be replaced with the appropriately scaled score on the portion of the final exam that covers same material as the missed midterm.</p>
<b>Midterm exams</b>	The exact dates for the midterms exams will be given in class and on the class website at least one week in advance (dates may depend on our class progress). Place: Oceanography & Physics, Room 142
<b>Final Exam</b>	Monday May 5th, 2014, 08:30 – 11:30, Oceanography & Physics, Room 142
<b>Course goals</b>	Understanding of the basic principles of classical mechanics, fluid mechanics and waves. Developing qualitative and quantitative thinking skills that can be applied in a broad variety of fields and circumstances. Cultivate individual and collaborative problem solving skills.

<b>Course structure</b>	Different people learn in different ways, and have different strengths and weaknesses. Therefore this course offers a learning environment with a diversified set of options that you can tailor to your individual learning style. We have class meetings, review sessions, homework assignments, office hours, and provide many ways for to get additional support to succeed.
<b>Keys to success</b>	What matters most in my courses is an understanding of underlying concepts. Advance reading, consistent participation inside and outside class, and timely completion of assignments are the keys to success. If you work regularly and allocate enough time each day to complete the assignments on time and keep up with the course, you will get the most out of the course both intellectually and for your grade. Two things that generally won't work are rote memorization, and cramming to catch up just before the examinations. Please use the support resources to clarify the material as soon as you feel unsure about something — I'm here to help you, coach you, and teach you about this interesting and fun way to look at the world that we all inhabit.
<b>Expectations</b>	<p>I expect you to be prepared for class by reading the planned material before class. Reading ahead requires some time and some discipline, but you'll find that class is much more fun and engaging when you know what's going on.</p> <p>I expect you to do your work in a neat way (clear diagrams, equations, explanations and numbers) in your notebook and in your exams. On exams, you must show your work and explain your reasoning to earn full credit.</p> <p>Finally, I expect you to ask for help when you feel you do not understand something. Do not wait until the final exam to address any problems with the material. I will respect you and do my best to help you understand the material.</p>
<b>Student Responsibilities</b>	Your responsibilities include attending class, coming to class prepared, reading assignments, doing the class homework, and asking for help when necessary.
<b>Honor Code</b>	We maintain the Monarch Creed, Honor Code, and Honor Creed for Old Dominion University, and promote high professional and ethical standards in this course. Plagiarism and cheating are serious offenses, and you disrespect your school, your peers, your professor, and most of all yourself if you engage in them.
<b>Collaboration</b>	<p>Collaboration in class activities and on homework assignments is strongly encouraged, and in many cases required. Because the course is graded on an absolute scale, you will never reduce your grade by helping each other. On the contrary, by doing so you will reinforce your own knowledge, learn together, and improve your performance. Sometimes the best people to learn from are your classmates and peers!</p> <p>However, you must still walk alone on some activities. You cannot collaborate on exams/quizzes, and you must still submit your own homework assignments since doing otherwise would defeat their purpose of exercising <b>your</b> brain.</p>

## Course Outline

We will basically follow Parts 1-3 of *Essential University Physics, Vol 2 (2<sup>nd</sup> ed)* by Wolfson though, as mentioned, that textbook is not required for this course and supplemental material will be provided through the class website.

### Subject

1. Review of Units and Dimensional Analysis. Math and Vectors
2. Electric Charges, Forces, Fields
3. Gauss's Law
4. Electric Potential
5. Electrostatic Energy and Capacitors
6. Electric Current
7. Electric Circuits, Kirchoff's Law
8. Magnetism
9. Electromagnetic Induction
10. AC Circuits
11. Maxwell's Equations, EM Waves
12. Optics
13. Reflection/Refraction
14. Optical Instruments, Adaptive Optics
15. Interference and Diffraction
16. Relativity
17. Introduction to Particle and Nuclear Physics\*

\* We'll see if we get this far!