University of Wisconsin-Stevens Point
Physics and Astronomy
University Physics II — PHYS 250
2017 Spring

Course Information

- **Course title:** University Physics II - PHYS 250
- **Instructor:** Palash Banerjee
- **Contact:** B125 Science, 715-346-4187, palash.banerjee@uwsp.edu.
- **Office hours:** MTWF 12 noon - 1 p.m.
- **Pre-requisites:** PHYS 240 and MATH 121 is required.
- **Required:**
  1. Textbook: *"Principles of Physics"*, Serway and Jewett, fifth edition, Brooks-Cole.
  2. You must have a scientific calculator. A phone is not a scientific calculator and I will *not* allow you to use these devices in the exam.
  3. A ruler (straightedge) and a protractor.
  4. A 3 ring binder to keep your class handouts organized.
- **Laboratory manual:** Handouts for the laboratory will be provided.
- **Course description:** A continuation of the introductory calculus based sequence in physics for scientists and engineers which introduces you to important fundamental phenomena in electricity, magnetism, waves and optics. In this course, we will discover the fundamental laws of electricity and magnetism and apply these laws to the study of electric circuits and other practical devices. We will also see how these same laws predict the phenomena of electromagnetic waves which will lead us into the study of optics, optical instruments and imaging systems and several properties exhibited by waves such as polarization, interference and diffraction. Although my approach will be mathematically formal most of the time, I will make connections with applied physics, chemistry and engineering from time to time. You should also make these connections yourself by reading your textbook — for example, the production of electromagnetic waves and their detection using electric circuits is the basis for much of our telecommunications industry.
- **Course objectives:** By the end of the course, you should be able to:
  1. Describe the fundamental concepts of electricity, magnetism, waves and optics using the language of differential and integral calculus.
  2. Apply these fundamental concepts in a laboratory setting to verify theories and make and test predictions.
  3. Recognize the limitations of an experiment and become proficient at analyzing experimental uncertainties.
- **Classroom times:** All classes are held in the Science building.
  - **Lectures:** Mon, Wed & Fri 11 am – 12 noon in A107.
  - **Discussion:** Once a week in A107.
  - **Laboratory:** Once a week in B112.

- **Homeworks:** I will assign a short homework after most lectures and a longer homework after each discussion. Your written solutions will be due one week later in class. You may discuss the concepts and ideas with each other as you solve the homework problems but you *may not* copy each others' work. Homeworks count for 20% of your grade.

- **Discussion:** You will spend every discussion session on a class exercise. I will allow you to work in small groups, working out the solutions to a few problems. Many of the problems will re-emphasize the content of the lectures and give you a chance to practice basic physics techniques. Your performance in discussion will count for 7% of your grade.

- **Laboratory:** Physics is an experimental science and the lab is a good place for you to develop your intuition, learn some common experimental techniques and have first hand experience with some of the concepts that we will cover in the lectures. Plus, the ability to make careful and reliable measurements is an incredibly useful skill to have. You will work in groups of four and perform experiments once a week. A report will be due the end of the laboratory session. Your laboratory performance will count for 13% of your course grade.

- **Exams:** There will be *two* midterm exams (Thursday evenings 7 - 9 p.m. on February 23 and April 6) during the semester not counting your final exam. Each midterm counts for 20% of your course grade; the final exam is comprehensive and worth 20% of your course grade. Overall, your exams determine 60% of your grade.

- **Academic misconduct:** As a student at UWSP, I expect you to be familiar with the following document: `http://www3.uwsp.edu/stuaffairs/Documents/RightsRespons/SRR-2010/rightsChap14.pdf`, especially Section 14.03. Simply put, *do not* copy each others homework, lab reports and exams and pass them off as your own. Any confirmed incidence of academic misconduct, including plagiarism and other forms of cheating will be treated seriously and in accordance with University policy.

- **Advice:** Physics 250 covers more material at a substantially more abstract level than Physics 240. To do well, you should keep up with the material that is discussed in lectures and the lab and set aside some time *every day* for reading your notes, the textbook and working on your assignments. **It is not for me to tell you how to manage your schedule but be aware that you might need to invest more time than you anticipated in this course to obtain a desirable outcome**.

General Course Policies

- Food and drinks are absolutely **not** permitted in the laboratory. No exceptions.

- No make-up labs will be offered; No make-up exams will be offered.

- I will accept **only one** late assignment per student during the course. No excuses are needed. A second late homework will receive no more than 80% credit. Subsequent late submissions will not be accepted.

- Make-up work will only be accepted in the case of excused absences. Excused absences include death in the immediate family, illness with a note from the appropriate health care professional, religious observance, an event in which you officially represent the University of Wisconsin-Stevens Point and the event directly conflicts with an exam or lab. Excused absences must be approved with documenting materials prior to the date of absence.

- I will drop the lowest homework score, the lowest discussion score and the lowest lab score. *All* the exams count. If you miss any exam, you will receive a zero for that exam.

- The schedule for the finals is set by the University. I will not schedule an early or late final exam for whatever reason. Please don't ask.

- I *do not* assign work for extra credit. There are *no* bonus points that you can earn.

- **Once you hand in your final exam, there is nothing more you can do to change your grade**.

Grading and Evaluation

I will calculate your grade based on a weighted percentage of your scores as follows:

Assignment	Value
Homeworks	20%
Laboratory work	13%
Discussion	7%
Exams (2 midterms, 20% each)	40%
Final examination, comprehensive	20%

Your final grades will be determined as follows:

Total score	Grade
93% and above	A
90–92%	A-
87–89%	B+
83–86%	B
80–82%	B-
77-79%	C+
73–76%	C
70–72%	C-
67–69%	D+
60–66%	D
below 60%	F

I do *not* grade on a curve. Scores will be rounded according to the following example: 86.6 – 86.9% will be rounded up to 87% and earn a B+, but 86.0 – 86.5% will remain 86% and earn a B.

Tentative Course Schedule

The tentative course schedule is as follows. This might change and I will try my best to announce changes beforehand.

Week of	Topic (lectures+discussion)	Lab
(1): Jan 22	Ch 19: Electric forces & fields	Lab 0: review of Physics 240 – vectors, forces, work, energy and momentum.
(2): Jan 29	Ch 19: (continued);	(1): Intro to electrostatics
(3): Feb 5	Ch 20: Electric potential and capacitance	(2): Mapping electric field lines
(4): Feb 12	Ch 20: (continued)	(3): dc circuits, Ohm's law & non-ohmic resistors
(5): Feb 19	Ch 21: Current and dc circuits Exam 1, Thu Feb 23, 7 - 9 p.m., D101	(4): Electrical energy & power
(6): Feb 26	Ch 21: (continued)	(5): The capacitor and RC circuits
(7): Mar 5	Ch 22: Magnetic forces and fields	(6): Building circuits to harness light energy - the solar cell
(8): Mar 12	Ch 23: Faraday's Law	(7): Electromagnetic induction
(*) Mar 19	(*) Spring break (*)	(*)
(9): Mar 26	Ch 12: Oscillations	(8): Forced oscillations and resonance
(10): Apr 2	Ch 13: Mechanical waves Exam 2, Thu Apr 6, 7 – 9 p.m., D101	(9): Geometric optics – I, plane mirrors, virtual images and the method of parallax
(11): Apr 9	Ch 24: Electromagnetic waves	(10): Geometric optics – II, refraction of light
(12): Apr 16	Ch 25: Reflection and refraction	(11): Geometric optics – III, Image formation using mirrors and lenses
(13): Apr 23	Ch 26: Principles of imaging systems	(12): A compound two-lens imaging system
(14): Apr 30	Ch 27: Wave optics	(13): Measuring the wavelength of laser light using a grating
(15): May 7	Ch 27: (continued)	(14): Spectral analysis of atomic hydrogen
(16): May 14	Comprehensive final exam, Wed May 17, 12.30 – 2.30 p.m., A107 and B112	