West Chester University

Department of Physics

Physics 140 – General Physics II

Sections 01 & 02

Meeting Time:	MWF 12:00 - 12:50 pm (section 01)
	MWF 1:00 - 1:50 pm (section 02)
Meeting Place:	Merion Science Center 112
Instructor:	Jeffrey J. Sudol (Dr. Jeff)
Office:	Merion Science Center 130
Office Phone:	610-436-2572
Office email:	jsudol@wcupa.edu
Office Hours:	MWF 10-11, R3-5

Course Description

Physics 140 is the second of two courses that serve as an introduction to the principles of physics. The content areas of this course are electricity and magnetism, circuits, optics, quantum mechanics, and nuclear physics. A passing grade in PHY130 is the pre-requisite for this course.

Required Course Materials

- ✓ *College Physics: A Strategic Approach*, 2nd edition, Volumes 1 & 2, Knight, Jones, and Field
- ✓ *College Physics: A Strategic Approach*, *Student Workbook*, 2nd Edition, Volumes 1 & 2, Knight and Andrews.
- ✓ *Ranking Tasks in Physics*, O'Kuma et al.
- ✓ *The Physics 140 Lab Manual.* Spring 2012 Edition. Sudol et al.
- ✓ a scientific calculator

Attendance Policy

Attendance is required.

Lab

This course has a laboratory component. Your lab grade is factored into your final grade for this course. You will not receive a separate lab grade on your transcript. Consult the lab syllabus for your particular lab section for more information. **Satisfactory completion of all labs is required to pass the course.**

Website

This course has a D2L website associated with it. I will post all of the course documents and announcements on the website on a regular basis. Please check D2L at least once a day for updates.

Physics Tutoring

Additional help with physics is available through three different forums: the Learning Assistance & Resource Center (LARC), the Department of Physics, and private tutors. More information about tutoring will become available during the second week of the semester.

Course Goals*

1. Exercise and develop language skills (reading, writing, and discourse).
2. Exercise and develop reasoning skills.
3. Exercise and develop metacognitive skills.
4. Improve those mental models needed to solve qualitative and quantitative problems in the content areas of the course.

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*The course goals include but are not limited to the following University goals for a general education science course:

1. Ability to communicate effectively.
2. Ability to employ quantitative concepts and mathematical models.
3. Ability to think critically and analytically.

Pedagogical Notes

Let's talk about door knobs.

Consider the door knob. If you go to a hardware store looking for a door knob, you are likely to find a hundred different varieties. Door knobs come in different shapes and sizes and colors and styles, but you expect all of them to work the same way. You have in your head a "mental model" about how doorknobs work. You grab the door knob, turn the knob to the right (clockwise), the latch moves free of the catch, and the door is free to open. Despite all of the varieties of doorknobs out there, all of them function in the same way, more or less. So, instead of having to learn to recognize all of the varieties of doorknobs in the world and how each particular doorknob works, you need only this one mental model of how a doorknob works in order to open doors without having to stop and think about how to open a door each time you encounter one. That is, until you go to Japan. You reach for the handle, you turn to the right, and nothing happens. That's because doorknobs in Japan turn to the left.

I will admit that I do not actually know if door knobs turn to the left in Japan, but I want to illustrate the point that sometimes your expectation of how things should work is inconsistent with how things do in fact work because your mental model is either incomplete or broken. That particular moment, when your expectation (the door is open) and reality (the door is not open) are in conflict, is quite powerful. It is in that moment that your brain is prepared to change its mental model of the world.

This whole thing about door knobs is highly simplified, but the point is this. You have in your head "mental models" about how things work that are often broken or incomplete. You have many "misconceptions" about how things work, especially when it comes to "physics." It's ok. It's expected. It's "human nature."

I have designed this course to expose and challenge your existing mental models and to help you change them and build more robust and accurate mental models. I want you to know right now that there is no "natural talent" for physics. Anyone who is good at doing physics has had to go through the same process that you will go through: challenging, changing, and advancing their mental models about how the world works.

For a cogent discussion about "mental models," I recommend *The Implications of Cognitive Studies for Teaching Physics* by E.F. Redish, available at the following website: http://www.physics.umd.edu/perg/papers/redish/cogsci.html.

Assessment

Your "grade" in this course will be based on your performance in the following categories of assessment with the following weights.

Lab	10%
Regular Exams	70%
Final Exam	20%

Regular exams are those exams that occur in lecture during the course of the semester. **At the end of the semester, I will drop your lowest regular exam score and average the remaining exam scores.** The final exam is cumulative, and it counts.

It sounds nice, but here's the catch!

Except for University sanctioned events (see below), there are no excused absences. There are no makeup exams, and you cannot take an exam early or late.

What does this mean? It means that if you miss a regular exam, you receive a score of a zero on that exam, regardless of the reason for missing the exam. I drop the lowest exam score, so you can miss one regular exam, and it will not affect your final grade. I recommend, however, that you make arrangements with me to take the exam as it will serve to test your knowledge of physics and prepare you for the final exam, which is cumulative, and it counts.

I do this for the following reason. It takes me about eight hours to write an exam. The exams are exquisitely crafted to test the objectives of the course, and the exam scores represent an accurate measurement of how well the students (and I) have met the objectives of the course (we are a team). If I were to allow students to take exams at different times, I would have to write multiple exams to preserve the integrity of each exam (this follows from a professional code of ethics; it's nothing personal), and I would have to do so in a way that all of the exams test the same objectives equally well. So, "makeup exams" represent a huge time sink, and I simply cannot afford that time sink.

I assign letter grades according to the following scale, rounding appropriately.

93 - 100	A
90 - 92	A-
87 - 89	B+
83 - 86	B
80 - 82	B-

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and so on...

I do not norm-reference (or scale) grades.

I also reserve the right to introduce different forms of assessment as needed and to alter the weight of each of the categories of assessment in the event of some unforeseen circumstance.

Disability Statement

If you require special accommodations because of a disability, please meet with me as soon as possible to discuss your needs. Supporting documentation is required.

Academic Integrity Statement

If you commit a violation of academic integrity, you will receive zero credit for the entire course. This is not negotiable. For more information regarding violations of academic integrity, consult the Undergraduate Catalog.

University Sanctioned Events

If you will be participating in a University-sanctioned event that occurs at the same time as an exam (the exam times on the schedule are fixed), you must notify me prior to the exam. Documentation supporting your participation in this event is required. We will then make arrangements for you to take the exam either prior to or at the scheduled exam time through a proctor. For more information on University Sanctioned Events, consult the Undergraduate Catalog.

Intellectual Property

All of the course materials, such as the PowerPoint lectures, worksheets, and exams, are the intellectual property of either the instructor or another author. Your use of these materials is restricted to your own studies for the duration of this course. It is illegal for you to distribute copies of these materials to anyone in any format.

Electronic Equipment in the Classroom (Unplug)

I do not permit the use of cell phones, cameras, voice recorders, computers, or similar electronic equipment in the classroom unless you need to use such a device to accommodate for a disability, in which case you should schedule a meeting with me to discuss the use of the device as soon as possible. Calculators are allowed, of course, and it is acceptable to use a cell phone as a calculator. The spirit of the rule is that the classroom should be an electronic free zone where we tune out the distractions of the world and focus on learning physics. The classroom is a place of dialogue, and the electronic gadgets of our modern culture are not necessary for that dialogue to take place.

	Date	Topic	Chapter	Lab
M	Jan. 23	Introduction	20	
W	Jan. 25	The Charge Model	20	*No Lab*
F	Jan. 27	The Charge Model	20	
M	Jan. 30	Forces	20	
W	Feb. 01	Forces	20	The Charge Model
F	Feb. 03	Fields	20	
M	Feb. 06	Field Lines	20	
W	Feb. 08	Potential Energy	21	Data Analysis II
F	Feb. 10	Potential	21	
M	Feb. 13	Connections	21	
W	Feb. 15	**Exam I**	20-21	*No Lab*
F	Feb. 17	Batteries and Current	22	
M	Feb. 20	Ohm's Law and Power	22	
W	Feb. 22	Resistors in Series & Parallel	23	Ohm's Law
F	Feb. 24	Circuit Analysis Part I	23	
M	Feb. 27	Circuit Analysis Part II	23	
W	Feb. 29	Switches and Shorts	23	Resistance Circuits
F	Mar. 02	Capacitance & RC Circuits	23	
M	Mar. 05	Connections	23	
W	Mar. 07	**Exam II**	22-23	*No Lab*
F	Mar. 09	Magnetism	24	
M	Mar. 12	*No Class - Spring Break*		
W	Mar. 14	*No Class - Spring Break*		*No Lab*
F	Mar. 16	*No Class - Spring Break*		
M	Mar. 19	Magnetic Fields Created by Currents	24	
W	Mar. 21	Magnetic Forces on Charges	24	Magnetism
F	Mar. 23	Magnetic Forces on Wires	24	
M	Mar. 26	Connections	24	
W	Mar. 28	Induced Currents	25	**Lab Practical I**
F	Mar. 30	Magnetic Flux	25	
M	Apr. 02	AC Circuits, Transformers	26	
W	Apr. 04	**Exam III**	24-26	*No Lab*
F	Apr. 06	The Nature of Light	17, 25	
M	Apr. 09	Interference	16	
W	Apr. 11	Double Slit Interference	17	Spectra
F	Apr. 13	Thin Film Interference	17	
M	Apr. 16	Diffraction	17	
W	Apr. 18	Reflection	18	Diffraction
F	Apr. 20	Refraction	18	
M	Apr. 23	Lenses	18	
W	Apr. 25	Mirrors	18	Lenses
F	Apr. 27	Quantum Physics	29	
M	Apr. 30	**Exam IV**	16-18	
W	May 02	Nuclear Physics	30	**Lab Practical II**
F	May 04	Nuclear Physics	30	
M	May 07	**1-3 Final Exam** section 02 (1:00-1:50)	16-30	
W	May 09	**1-3 Final Exam** section 01 (12:00-12:50)	16-30	