West Chester University

Department of Physics

Physics 180 – Physics II

Section 01 – Lecture

Section 91 - Discussion

Meeting Times:	MWF 10:00 - 10:50 am (lecture)
	T 2:00 - 2:55 pm (discussion)
Meeting Place:	Merion Science Center 112 (lecture)
	Merion Science Center 112 (discussion)
Instructor:	Jeffrey J. Sudol (Dr. Jeff)
Office:	Merion Science Center 130
Office Phone:	610-436-2572
Office email:	jsudol@wcupa.edu
Office Hours:	M1-2, T3-4, W1-2, F1-3

Course Description

Physics II is the second of two courses that serve as an introduction to the principles of physics. The content areas of this course are electrostatics, electronics, magnetism, and optics. A passing grade in Physics I is the only pre-requisite for this course.

Required Course Materials

- ✓ *Fundamentals of Physics,* 9th edition, Volume 2, (Halliday & Resnick) Walker
- ✓ *An Introduction to Error Analysis,* 2nd edition, Taylor (same as Physics I)
- ✓ *The Physics 180 Laboratory Workbook, Spring 2014*, Waite
- ✓ a "Laboratory Notebook" from The BookFactory (same as Physics I)
- ✓ a scientific calculator (same as Physics I)

Attendance Policy

Attendance is required.

Website

This course has a D2L website associated with it. I will post all of the course documents and announcements on the D2L 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 Society of Physics Students in 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 rhetoric).
2. Exercise and develop deductive 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.

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. Cell phones may not be used as a calculator during exams. 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.

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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 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	20%
Regular Exams	60%
Final Exam	20%

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.

Categories of Assessment

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.**

Exams

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 there'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 if you miss an exam, 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. The exam scores therefore represent an accurate assessment 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 our education system does not afford me the luxury of time to sink.

Finally, exams are not a learning tool. Exams represent summative assessment. (If you are unfamiliar with the concept, an internet search for "formative vs. summative assessment" will enlighten you.) I keep all exams in my office, and exams are only available for review up until the next exam. In other words, after each exam, all previous exams will no longer be accessible to you for review. The reproduction of any exam question in any manner represents a violation of academic integrity.

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 from the Office of Services for Students with Disabilities (OSSD) 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 dates on the schedule will not change), 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.

		Date	Topic	Chapter	Lab
-	W	Jan. 22	Introduction	-	
1	F	Jan. 24	The Charge Model	21	
2	M	Jan. 27	The Charge Model	21	Data Analysis I
3	W	Jan. 29	Electrostatic Forces	21	
4	F	Jan. 31	Electrostatic Forces	21	
5	M	Feb. 03	Electrostatic Fields and Field Lines	22	Data Analysis II
6	W	Feb. 05	Force-Field Connection, Potential Energy	22	
7	F	Feb. 07	Potential	24	
8	M	Feb. 10	Field-Potential Connection	24	Determination of Electron Charge
9	W	Feb. 12	Field Theory, Gauss' Law	23	
10	F	Feb. 14	Gauss' Law	21-24	
-	M	Feb. 17	**Exam I**	21-24	*No Lab*
11	W	Feb. 19	Batteries and Current	26	
12	F	Feb. 21	Ohm's Law and Power	26	
13	M	Feb. 24	Resistance, Resistors in Series & Parallel	26	Resistance and Ohm's Law
14	W	Feb. 26	Circuit Analysis Part I	27	
15	F	Feb. 28	Circuit Analysis Part II	27	
16	M	Mar. 03	Switches and Shorts	27	DC Circuit Analysis
17	W	Mar. 05	Capacitance, Capacitors in Series & Parallel	25	
18	F	Mar. 07	RC Circuits	27	
19	M	Mar. 10	Magnetism	28, 32	RC Circuits
-	W	Mar. 12	**Exam II**	25-27	
20	F	Mar. 14	Magnetic Forces on Charges	28	
-	M	Mar. 17	*No Classes - Spring Break*		
-	W	Mar. 19	*No Classes - Spring Break*		
-	F	Mar. 21	*No Classes - Spring Break*		

		Date	Topic	Chapter	Lab
21	M	Mar. 24	Hall Effect, Magnetic Forces on Wires	28	
22	W	Mar. 26	Magnetic Fields Generated by Currents	29	**Lab Mid-Term**
23	F	Mar. 28	Ampere's Law	29	
24	M	Mar. 31	Magnetic Flux, Faraday's Law, Lenz's Law	30	
25	W	Apr. 02	Magnetic Flux, Faraday's Law, Lenz's Law	30	Earth's Magnetic Field
26	F	Apr. 04	Inductance, RL circuits	30	
27	M	Apr. 07	AC Circuits, Transformers	31	
-	W	Apr. 09	**Exam III**	28-32	AC Circuits
28	F	Apr. 11	The Electromagnetic Spectrum	33	
29	M	Apr. 14	Ray Optics	33	
30	W	Apr. 16	Refraction	33	Spectra
31	F	Apr. 18	Mirrors	34	
32	M	Apr. 21	Lenses	34	
33	W	Apr. 23	Interference	35	Refraction and Lenses
34	F	Apr. 25	Double Slit Interference	35	
35	M	Apr. 28	Thin Film Interference	35	
36	W	Apr. 30	Diffraction	36	Diffraction
-	F	May 02	**Exam IV**	33-36	
37	M	May 05	Polarization	33	**Lab Final**
-	T	May 06	**10:30 - 12:30 Final Exam**	21-36	