Physics 112 – General Physics II: Electricity, Magnetism & Optics

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Course Website: We will use Moodle – http://moodle.lafayette.edu. "PHYS 112.01-Fall 2018 General Physics" or "PHYS 112.02-Fall 2018 General Physics" should be in your list of current courses. The syllabus, written homework, interesting links, etc, can all be accessed from this site. Announcements about class or homework logistics will be emailed to you through Moodle so make sure you are receiving emails from it.

Course Location and Times:

Class:	Hugel Science Center 100 **Section 01:** Monday, Wednesday, Friday; 11:00 – 11:50 AM **Section 02:** Monday, Wednesday, Friday; 2:10 - 3:00 PM
Office Hours:	Monday: 1:00 – 2:00PM & 3:00 – 4:00 PM Tuesday: 10:00 - 12:00 PM

If you cannot make it to office hours email me to set up a meeting. Please walk in with smaller questions whenever I am in my office. Always feel free to knock.

Classes on Snow Days, Kaiju Attacks and Other Emergencies: If I am unable to make it to class/class is cancelled or changed, I will send an email message via Moodle.

Description: This course is the second semester of a non-calculus-based introduction to the foundations of physics, designed primarily for students in science who do not require a calculus-based physics course. Topics include electric and magnetic forces and fields, DC circuits, induction, mechanical and electromagnetic waves, optics, and introductory atomic and nuclear physics. Recognizing and applying physical ideas is stressed; there will also be emphasis on problem solving.

Goals & Student Learning Outcomes: The main goal of this course is to help you understand, identify, and apply the fundamental principles of physics in a variety of situations. You should be able to use both qualitative reasoning and quantitative problem-solving skills in applying those principles. A second goal is to help introduce you to the process of doing physics, including skills such as developing and testing models, interpreting experimental data, solving problems, and communicating results. Specifically, upon successful completion of this course, you should be able to

- Calculate the electric potential and field due to simple charge configurations,
- Calculate the magnetic field due to simple current configurations,
- Predict the motion of charges in electric and magnetic fields,
- Build and analyze simple DC electrical circuits,
- Describe phenomena related to electromagnetic induction,
- Describe the characteristics of mechanical, sound, and electromagnetic waves,
- Apply the conditions for constructive or destructive interference of waves,
- Apply simple geometric optics,
- Perform simple quantum energy level calculations, and
- Predict basic properties of some common nuclear decays.

In addition to the outcomes listed above, this course (particularly the lab component) will promote the following outcomes from the Natural Sciences section of the Common Course of Study:

- NS 1 Employ the fundamental elements of the scientific method in the physical and natural world.
    - NS 1a Identify and/or formulate a testable scientific hypothesis.
    - NS 1b Generate and evaluate evidence necessary to test and/or revise a hypothesis.
- NS 2 Create, interpret, and evaluate descriptions and representations of scientific data including graphs, tables, and/or models.
- NS 3 Understand how scientific uncertainty informs the evaluation of hypotheses.

Text book: *College Physics: A Strategic Approach Technology Update,* third edition, by Randall D. Knight, Brian Jones, and Stuart Field, ISBN-13: 978-0-13-416783-1, along with its online homework component Mastering Physics. The book is an older edition (significantly cheaper than the latest one) and it is easiest to order it online. Used copies usually do not come with a key for the online component, but you can sign up for that at www.masteringphysics.com for approximately $70 (see sign up details below).

Physics 112 - Laboratory Manual will be available in the bookstore.

Grade breakdown

Homework:	20%
Tests :	45%
Lab:	15%
Final exam	20%

Homework Problems: Homework problems will be a combination of **online Mastering Physics problems** and **written problems**. Your lowest homework grade will be dropped at the end of the semester. All assignments and other relevant course information will be available on Moodle. The **Mastering Physics course IDs and course titles** respectively are:

ID: **PHYS112AHMED2019** TITLE: **PHYS112.AHMED.2019**

Online homework for the week will usually be due the following week's Wednesday morning before class while the written one will be due in class on Wednesday.

Online homework will go up Wednesday late afternoon and the corresponding written part will go up on Moodle at the same time. Homework is a significant part of your grade so please make sure you do them.

Tests: There will be three hour-long in-class tests on the dates marked on the syllabus. Each test will be worth 15%. There will also be a cumulative final.

Attendance: Make sure to attend class regularly and participate in class discussions. Asking questions during class is highly encouraged, not just for your own benefit but for the benefit of your classmates. Looking over/skimming the relevant chapters from the book *before* the class lecture is highly advised. Foreknowledge of where things are going aids greatly in understanding the material.

Supplemental Instruction (details of SI sessions will be discussed in class):
SI Leaders
TBA

Ethos for grading written material: What I am looking for is your understanding of the material. If you show me your steps and thought processes clearly, and assuming those are correct, you will get most of the points. The actual final answer has minimal impact.

Academic Honesty: Discussing homework and collaborating with others is encouraged but make sure that the work you hand in is yours. Discussing concepts with others is always a great way to gain new perspectives but you must also truthfully demonstrate your own abilities. Cheating and other forms of academic dishonesty hurts no one but you in the long run.

Laboratory: You are responsible for completing all the assigned experiments at the scheduled times. **If you can't make it to your scheduled lab, please try to attend another lab session and email your lab instructor about the change (this is a last resort solution, please attend your own lab at all times)**. You can't count on the equipment being available outside of the scheduled lab times.

Diversity, Inclusion and Equity Statement: Students should view this classroom as an inclusive space and safe haven for the free exchange of ideas. As your instructor one of my primary goals is to assure that the background, perspective and beliefs of each student are respected and appreciated regardless of race, ethnicity, gender, social class, sexual orientation, religion, political affiliation, ability level or learning style. Accordingly, I am committed to creating an atmosphere conducive to learning that respects diversity and inclusion and further promotes equity by removing educational barriers. As we work together to build this community of scholars, consider the following actionable points:

- Be open to the views of others.
- Feel free to share your own unique experiences.
- Honor and be enriched by the uniqueness of your classmates.
- View your classmates as respected resources of information and knowledge.
- Appreciate the opportunity to learn from classmates who may possess skill sets that complement your own.

Meeting Federal Credit Hour Standards: The student work in this course is in full compliance with the federal definition of a four-credit hour course.

Moodle & Privacy: Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws. Courses using Moodle will make student information visible to other students in this class. Please remember that this information is protected by these federal privacy laws and must not be shared with anyone outside the class. Questions can be referred to the Registrar's Office.

Physics 112 Lecture Schedule Spring 2019

Date	Topics	Chapter	HW due
Jan 28	Introduction; Oscillation Review	Ch. 14	
Jan 30	Traveling Waves	Ch. 15:1-3	
Feb 1	Sound & Light Waves; Energy;	Ch. 15:4-5	
Feb 4	Doppler Effect; Superposition	Ch. 15:7, 16:1-2	
Feb 6	Standing Waves	Ch. 16:3-4	HW #1
Feb 8	Interference; Beats;	Ch. 16:6-7	
Feb 11	Electromagnetic Waves; Interference	Ch. 17:1-3	
Feb 13	Single Slit Diffraction;	Ch. 17:5	HW #2
Feb 15	Thin Films	Ch. 17:4	
Feb 18	Reflection and Refraction	Ch. 18:1-4	
Feb 20	Lenses	Ch. 18:5,7	HW #3
Feb 22	Electric Charge + Coulomb's Law	Ch. 20:1-4	
Feb 25	Exam review		
Feb 27	**Hour Exam I**		
Mar 1	Electric Field	Ch. 20:5-6	
Mar 4	Forces and Torques	Ch. 20:7	
Mar 6	Electric Potential Energy	Ch. 21:1-2	HW #4
Mar 8	Electrical Potential and Field	Ch. 21:3-5	
Mar 11	Capacitors and Dielectrics	Ch. 21:6-8	
Mar 13	Electric Current; Batteries;	Ch. 22:1-3	HW #5
Mar 15	Resistance; Power	Ch. 22:4-6	
Mar 18			
Mar 20	*Spring Break*		
Mar 22			
Mar 25	Circuits; Series and Parallel;	Ch. 23:1-3	
Mar 27	DC Circuits;	Ch. 23:4-5	HW #6
Mar 29	Capacitors; RC Circuits	Ch. 23:6-8	
Apr 1	Magnetic Force and Field	Ch. 24:1-3	
Apr 3	Exam Review		
Apr 5	**Hour Exam II**		
Apr 8	Sources of Magnetic Field	Ch. 24:4	
Apr 10	Forces on Charged Particles and Currents	Ch. 24:5-6	HW #7
Apr 12	Torques; Magnetic Materials	Ch. 24:7-8	
Apr 15	Magnetic Flux	Ch. 25:1-3	
Apr 17	Faraday's Law;	Ch. 25:4-5	HW #8
Apr 19	Electromagnetic Waves;	Ch. 25:6-7	
Apr 22	Photons; Particles	Ch. 28:1-4	
Apr 24	Quantization; Uncertainty;	Ch. 28:5-8	HW # 9
Apr 26	The Hydrogen Spectrum;	Ch. 29:1-3	
Apr 29	The Bohr Model; Quantum Mechanics	Ch. 29:4-7	
May 1	Exam Review		
May 3	**Hour Exam III**		
May 6	Nuclear Physics;	Ch. 30:1-3	
May 8	Radioactivity and Half Life	Ch. 30:4-5	HW #10
May 10	Applications	Ch. 30:6-7	
	Final Exam (Scheduled by Registrar)	Cumulative	