Physics 112 – General Physics II: Electricity, Magnetism & Optics
Course Description, Policies and Syllabus – Spring 2020

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Course Website: We will use Moodle – http://moodle.lafayette.edu. "PHYS 112.01-Spring 2020 General Physics-Elec, Mag, Opt" or "PHYS 112.02-Spring 2020 General Physics-Elec, Mag, Opt" should be in your list of current courses. The syllabus and other contents 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 AM – 11:50 AM
Section 02: Monday, Wednesday, Friday; 2:10 PM – 3:00 PM

Office Hours: Thursday: 4:00 – 7:00 PM
If you cannot make it to office hours, **email me to set up a meeting**. Always feel free to walk in with smaller questions whenever I am in my office.

Supplemental Instruction
SI leader: Amelia Reilly < reillya@lafayette.edu > in **Hugel room # 115**.

- SI hour: Monday 6 – 7 pm, Wednesday 7 – 8 pm.
- Drop-in hour: Monday 7 – 8 pm, Wednesday 6 – 7 pm

Classes on Snow Days or 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 an algebra-based introduction to the foundations of physics, designed primarily for students in science who do not require a calculus-based physics course. Topics include mechanical waves, optics, electric field, current and circuits, magnetic force and induction, electromagnetic waves, introductory atomic and nuclear physics. Recognizing and applying physical ideas is stressed; there will also be emphasis on problem solving.

Textbook: *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 is available in the bookstore.

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 apply 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.

Grade breakdown

Lab:	20%
Homework:	15%
Tests (see below):	43%
Final exam:	20%
Participation (see below):	2%

Homework: Assignments will be a combination of **online Mastering Physics problems** and/or **written problems**. Your lowest homework grade will be dropped at the end of the semester. All assignments and other relevant course information will be made available via Moodle. The **Mastering Physics** can be accessed through the Moodle course homepage.

Assignments for the week will usually be posted at the end of week by Saturday (sometimes Sunday). Please pay attention to the due date specified for each assignment. Usually you will be given 4 to 7 days depending on the difficulty level of the problems.

Tests: There will be three hour-long in-class tests around the dates marked on the syllabus. The best scoring test will be worth 19%, the 2nd best will be worth 16%, and the lowest one will be worth 8%. There will also be a cumulative final. All the tests and exam will be **closed** book and notes, except the equation sheet or review summary sheet provided before the test.

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. However, if you feel your question might require lengthy discussion, please raise your question nearing the end of lecture. 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.

Participation: Occasionally a short quiz type question will be posted on the Moodle. You will just need to write a sentence or two based on preceding lecture. **Due before the following lecture**. The answer would have been already explained during the lecture, and same answer among the class will **NOT** be considered plagiarism. This easy 2% grade is a little reward for being attentive to the lecture and discussing with your peer or consulting the textbook.

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 Tentative Lecture Plan Spring 2020

Date	Topics	Chapter	HW due
Jan 27	Review Physics I, Introduction to waves	Ch. 15.1	
Jan 29	Properties of Waves	Ch. 15:2-4	
Jan 31	Energy, Intensity, Doppler Effect	Ch. 15:5-7	
Feb 3	Superposition, Interference	Ch. 16:1 -> 16.6	
Feb 5	Standing waves	Ch. 16:2-4	HW #1
Feb 7	Interference of light waves	Ch. 17.1-2	(Ch. 15)
Feb 10	Single Slit Diffraction, Grating	Ch. 17:5 -> 17.3	
Feb 12	Ray optics, Reflection	Ch. 18.1-2	HW #2
Feb 14	Refraction, Index of Refraction (p. 538-539)	Ch. 18.3-4	(Ch. 16~17)
Feb 17	Ray tracing	Ch. 18:5-6	
Feb 19	Thin Lens Equation, Human Eye	Ch. 18:7, 19.2	
Feb 21	Review Ch. 15~19		
Feb 24	**Hour Exam I**		
Feb 26	Electric Charge, Coulomb's Law	Ch. 20.1-3	HW #3
Feb 28	Electric Field	Ch. 20:4-6	(Ch. 17~18)
Mar 2	Forces and Torques	Ch. 20:7	
Mar 4	Electric Potential	Ch. 21:1-3	HW #4
Mar 6	Potential and Field	Ch. 21:4-5	(Ch. 20)
Mar 9	Capacitors and Energy	Ch. 21:6-8	
Mar 11	Electric Current and Potential	Ch. 22:1-4	HW #5
Mar 13	Ohm's Law I	Ch. 22:5	(Ch. 21)
Mar 16 Mar 18 Mar 20	*Spring Break*		
Mar 23	Ohm's Law II, Power	Ch. 22:6	
Mar 25	Circuits, Kirchhoff's Law (p. 706)	Ch. 23:1-2	HW #6
Mar 27	Series Circuits	Ch. 23:3-4	(Ch. 22)
Mar 30	Parallel Circuits, RC Circuits	Ch. 23:5-7	
Apr 1	Review Ch. 20~23		HW #7
Apr 3	**Hour Exam II**		(Ch. 23)
Apr 6	Magnetic Fields	Ch. 24:1-3	
Apr 8	Magnetic Field Sources	Ch. 24.4	
Apr 10	Forces on Charged Particles and Currents	Ch. 24:5-6	
Apr 13	Induced Current	Ch. 25:1-2	
Apr 15	Faraday's Law	Ch. 25:3-4	HW #8
Apr 17	Electromagnetic Waves	Ch. 25:5	(Ch. 24)
Apr 20	Photon Model, Photoelectric Effect	Ch. 25.6, 28.2	
Apr 22	Matter wave	Ch. 28:3-4	HW # 9
Apr 24	Quantization, Energy Levels	Ch. 28.5-7	(Ch. 25)
Apr 27	Review Ch. 24,25,28		
Apr 29	**Hour Exam III**		HW # 10
May 1	The Bohr Model	Ch. 29:2-4	(Ch. 28)
May 4	Quantum Mechanics	Ch. 29:5-6	
May 6	Nuclear Physics	Ch. 30:1-3	HW #11
May 8	Radioactivity	Ch. 30:4-6	(Ch. 29)
	Final Exam (Scheduled by Registrar)	Cumulative	