

COURSE SYLLABUS

PHYS 1422 – Introduction to Physics II

Credit Hours: 4

Fall 2017

Farrington Building, Room 209

9:00 – 9:50 MWF

Laboratory: F209 2:00 - 4:50 Wed

Instructor: Dr. Joel W. Walker
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11-12 MWF or by appointment

Course Description: An introduction to the general topics of electricity and magnetism, and basic electrical circuits. The emphasis continues to be on problem solving with the laboratory/problem session an integral part of the course. Writing Enhanced. Prerequisites: PHYS 1411 and MATH 1430 (may be taken concurrently with department approval).

Course Goals: This course is designed to develop basic competencies in the unified subject of electricity and magnetism. Techniques will be developed for the analysis of problems dealing with electric charges and currents, the electric and magnetic fields which they produce, and engineering applications to resistors, capacitors, and inductors in circuits. All of classical electro-magnetic theory can be described using only the four “Maxwell” field equations in combination with the “Lorentz Force” law. We will study each of the basic phenomena that comprise the theory, and also convey understanding and intuition of their greater unified structure, which is related to consistency with special relativity, preceding (and motivating) Einstein’s formal theory by nearly three decades. We will see that rules of electrodynamics are not an à la carte list of imposed conditions, but rather the unique, cohesive and unavoidable consequence of very fundamental truths of nature. Beyond just the application of stock formulae to problems, each student must master the techniques of deriving equations applicable to special cases from more fundamental principles. Success in this course will not be achieved by rote memorization, or absorption of facts. Rather, the student must become adept at logical reasoning and creative problem solving.

Required Textbook:	Fundamentals of Physics, 10th Edition by Halliday, Resnick & Walker (Vol II or Combined)
Required Supplies:	A calculator with trigonometric functions is essential for this course. Graphing calculators are allowed, but not required. In all testing situations, your calculator may be utilized for standard arithmetic and trigonometric computation only. The use of internal memory for storage of notes is strictly and expressly prohibited.
Assignments:	Homework assignments will be given for each chapter covered in the course. Regular, personal application of the concepts encountered is essential to mastery of the required material. Furthermore, these problems will be a valuable insight into what material is considered important by your instructor. Careful completion of all assignments is in itself an effective way to boost your course average. Moreover, failure to participate will almost certainly damage your test and quiz performance.
Exams:	3-4 major examinations will be given during the semester, in addition to a comprehensive final. If a special situation exists which would cause you to miss an exam, this MUST be made known to me prior to the date of the test if possible. Otherwise, a makeup will be allowed in only the MOST EXCEPTIONAL situations, evaluated on a case-to-case basis.
Grading Plan:	The Laboratory, recitation, and homework are each worth 10%. The semester exams together will comprise 50% of your grade. It is intended that your confidence and ability will grow tremendously during the course of the semester. The comprehensive final is your chance to show how far you have come, and makes up 20% of the full semester average.
Class Rules:	<p>All class members are expected to respect the proceedings of this course, and the learning environment of their fellow students. This principle has several practical implications, some of which are enumerated below.</p> <ol style="list-style-type: none"> 1) Do not cheat. Violators are subject to dismissal on a 1st offence. 2) Regular punctual attendance is expected of all class members. 3) There is to be absolutely no use of Cellular phones in the classroom, for either voice or text communication. Parents of young children and professionals who may reasonably expect some chance of an emergency contact should silence their phones, and discreetly excuse themselves if it becomes necessary to take a call. All others should turn their phones off entirely.
Email Guidelines:	<p>Email communication with your instructor should be made in a professional manner. Instant-Message style notes are not acceptable in a business or academic setting. All email should employ the standard features listed following.</p> <ol style="list-style-type: none"> 1) Include your name, course number and class meeting time. 2) Include a proper salutation, body and closing. 3) Make a reasonable attempt at correct grammar, capitalization, punctuation, and spelling.

Week-by-Week Schedule

PHYS 1422 is the standard second semester calculus-based course in physics offered by universities around the world to continuing physics and engineering majors, as well as the students of several other hard science disciplines. The list of topics taught in this course is very well standardized. The following schedule, which provides a rough sequential summary of the expected coverage, is subject to revision at discretion of the instructor.

Week 1	Electric Charges and Coulomb's Law
Week 2	Electric Fields
Week 3	Electric Flux and Gauss' Law
Week 4	Voltage and Electric Potential Energy
Week 5	Capacitance
Week 6	Current and Ohm's Law
Week 7	Circuits and Kirchhoff's Laws
Week 8	Magnetic Fields and the Lorentz Force
Week 9	Enclosed Current and Ampere's Law
Week 10	Faraday's Law of Induction
Week 11	Maxwell's Equations
Week 12	Electromagnetic Waves
Week 13	Interference and Diffraction
Week 14	Lenses and Ray Optics
Week 15	Special Relativity

Tips for Success:

This is likely to be one of the more demanding courses you encounter during your college career. It can also be rewarding and enjoyable. Several suggestions for a good start are printed here.

- 1) Make sure that you are proficient in the mathematical prerequisites. Mathematics is the essential language used to concisely and precisely state the content of physical law. You must be able to speak the language in order to proceed in the course. We will make extensive use of algebra, trigonometry and calculus. We will assume a functioning knowledge of these subjects, but will review advanced topics as needed with detailed example solutions.
- 2) Attend class regularly and take effective notes. It is certainly the case that I will focus class time on the concepts and materials which I deem most valuable, beneficial and instructive. It stands to reason that the same material will form the core of what will subsequently be tested.
- 3) Focus on Ideas and Concepts, not Memory. This course is fundamentally different in design than most you have probably taken prior. Retention of facts alone will not suffice. Success will come instead from the skillful application of the tools and logical thought processes developed. We will employ only short list of equations. Your job will be to correctly understand how, when, and why each equation applies in context.
- 4) Complete all required homework, and attempt problems individually. Regular, personal application of the concepts encountered is the only way to go beyond understanding someone else's solution, and develop confidence in your own problem solving skills. There is simply no substitute here for the experience gained by long practice. Assignments will be given for each course chapter. These will be collected and assigned a grade. Failure to participate will also certainly damage your test and quiz performance. Additionally, these problems can give valuable insight into the material favored by your instructor.
- 5) Seek out help. It is certainly important to persevere through, and even focus your attention especially toward the problems which you have greatest difficulty in solving. However, repeated application of misunderstood tools and indefinite lockdown on a single issue are also damaging and discouraging. Study partners who are also enrolled in physics 1411 can be very beneficial for comparing and correctly completing homework. It is good strategy for each member to first attempt all problems alone prior to such meetings, or to intersperse private and group work during the meeting. Office hours are also available for your benefit, and groups are especially welcome. Additionally, the SPS offers free tutoring a few nights a week, later into the semester.
- 6) Don't give up. Don't fall into a destructive cycle where frustration blocks participation in the class and related activities. At exams, focus first on the things you know - then fight for each remaining point, never dismissing entire problems at a glance. It may take some time to learn the required way of thinking. However, it can sometimes finally "click" like a light switch, and a struggling student can rapidly shift from doing almost nothing correctly, to almost everything.
- 7) Worry less about your grade, and more about developing understanding. If you are dedicated to absorbing and taking ownership of the material, your grade will take care of itself.

Standard University Policies

The following are university-wide official policies which apply to this course. Additional details are available at the web address: <http://www.shsu.edu/syllabus/>

Academic Dishonesty: Students are expected to maintain honesty and integrity in the academic experiences both in and out of the classroom.

Classroom Rules of Conduct: Students are expected to assist in maintaining a classroom environment that is conducive to learning. Students are to treat faculty and students with respect. Students are to turn off all cell phones while in the classroom. Under no circumstances are cell phones or any electronic devices to be used or seen during times of examination. Students may tape record lectures provided they do not disturb other students in the process.

Student Absences on Religious Holy Days: Students are allowed to miss class and other required activities, including examinations, for the observance of a religious holy day, including travel for that purpose. Students remain responsible for all work.

Students with Disabilities Policy: It is the policy of Sam Houston State University that individuals otherwise qualified shall not be excluded, solely by reason of their disability, from participation in any academic program of the university. Further, they shall not be denied the benefits of these programs nor shall they be subjected to discrimination. Students with disabilities that might affect their academic performance should visit with the Office of Services for Students with Disabilities located in the Counseling Center.

Visitors in the Classroom: Only registered students may attend class. Exceptions can be made on a case-by-case basis by the professor. In all cases, visitors must not present a disruption to the class by their attendance. Students wishing to audit a class must apply to do so through the Registrar's Office.

USE OF TELEPHONES AND TEXT MESSAGERS IN ACADEMIC CLASSROOMS AND FACILITIES: The use by students of electronic devices that perform the function of a telephone or text messenger during class-time may be prohibited if deemed disruptive by the instructor to the conduct of the class. Arrangements for handling potential emergency situations may be granted at the discretion of the instructor. Failure to comply with the instructor's policy could result in expulsion from the classroom or with multiple offenses, failure of the course. Any use of a telephone or text messenger or any device that performs these functions during a test period is prohibited. These devices should not be present during a test or should be stored securely in such a way that they cannot be seen or used by the student. Even the visible presence of such a device during the test period will result in a zero for that test. Use of these devices during a test is considered de facto evidence of cheating and could result in a charge of academic dishonesty. <http://www.shsu.edu/students/guide/StudentGuidelines2010-2012.pdf#page=29>