

COURSE SYLLABUS

PHY 245 – Introduction to Physics II

Credit Hours: 4

Spring 2008

Farrington Building, Room 209

9:00 – 9:50 MWF

Laboratory: F205 12:00 - 1:50 Wed (Starts 1/30/07)

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Course Description: An introduction to topics in heat and wave motion including sound and light. The quantitative description of phenomena is emphasized. The laboratory continues as an integral part of the course. Writing Enhanced. Prerequisites: PHY 141 and MTH 142. Credit 4.

This course is designed to build upon the basic competencies and techniques of problem analysis developed in PHY 141 (Classical Mechanics). It may be taken either before or after PHY 142 (Electricity and Magnetism). Harmonic motion and propagation of waves have a ubiquitous role in our understanding of the world. The simple differential equation of a block suspended by a spring is echoed in an endlessly diverse set of topics such as elliptical planetary motion, radio tuning circuits, sound transmission, bio-feedback stabilization mechanisms within our bodies, vibration modes of bridges, regulation of fusion within the Sun, population dynamics and the quantum description of light. Basic wave characteristics such as interference, reflection, refraction, diffraction, dispersion and Doppler shifting have application to fields as widespread as astronomy and cosmology, optics, ultra precise measurement, acoustics, communications, analytical forensics, materials testing, medical imaging, hydrocarbon exploration and modeling of the atom. The harnessing and efficient mechanical transduction of the heat energy released by the burning of coal powered the industrial revolution of the Western world. Insight garnered from macroscopic thermo-statistical physics also played a crucial role in the unraveling of the mysteries surrounding the hidden sub microscopic world. During this semester we will undertake a mathematical study of the key features of thermal physics and oscillatory and wave motion, emphasizing a correspondence of these features across a range of phenomena. As time allows, we will follow the natural extension of these ideas into the physics of the 20th Century.

- Required Textbook: Fundamentals of Physics, 8th Edition
by Halliday, Resnick & Walker
- 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.
- Quizzes: A quiz (usually a homework styled problem) will be given in class approximately weekly. It is possible to have multiple quizzes in one week. Good class attendance will increase the chances of announced quiz dates and topics. Two quizzes will be dropped from grading for the semester. With rare exceptions (e.g. prolonged medical absence), additional drops will not be granted.
- Exams: Three major examinations will be given during the semester (number is subject to reevaluation) 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: Quizzes and the Laboratory will each be worth 15%. Homework will be worth 10%. The three semester exams together will comprise 40% 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:

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.

- 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:

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.

- 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.

Tips for Success: This is a demanding course, but it is intended to 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. 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 graded both for completeness and accuracy. 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 245 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.