

# PHY 3305: Introduction to Modern Physics Syllabus

January 18, 2010

## Objectives

Upon successful completion of this course, students will be able to:

1. Explain why relativity, quantum mechanics, and statistical mechanics are needed to explain natural phenomena that are central to the modern world;
2. Apply their understanding of relativity, quantum mechanics, and statistical mechanics to a range of problems that occur in areas as diverse as medicine, communication, and computation;
3. Demonstrate the basic understanding of relativity, quantum mechanics, and statistical mechanics required to pursue more advanced topics in each of these and related areas.

## Course Information

<b>When/Where?</b>	The course is held in Fondren Science 157, Tue./Thur. 3:30-4:50 p.m.
<b>Instructor</b>	Professor Stephen Sekula Office: Fondren Science 39 Phone: (214)-768-7832 E-mail: sekula@physics.smu.edu Facebook: stephensekula Twitter: drsekula
<b>Office Hours</b>	Tuesday: 2-3 p.m. Wednesday: 3-4 p.m.
<b>Prerequisite(s)</b>	PHY 1304
<b>Textbook(s)</b>	Randy Harris, "Modern Physics" (Second Edition) Optional: Robert Eisberg and Robert Resnick, "Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles"

## Course Topics

In PHY 3305 (Modern Physics), you will learn the foundational concepts in modern physics: relativity, quantum mechanics, and statistical mechanics. The class will begin with two weeks of introduction to the

principles of special relativity and quantum physics. We will then expand on quantum physics, diving into the key mathematical ideas that describe quantum phenomena. We will then begin to discuss the application of these quantum and relativistic ideas to situations involving single particles. Such problems occur throughout the modern world in basic research, telecommunications, medicine, and computing. We will then explore the behavior of large numbers of particles - statistical mechanics. The course will close with a final series of more complex applications of all three foundational ideas. You will have opportunities to demonstrate your understanding of the material through homework, exams, and an in-class presentation on a particular topic in modern physics.

## Homework

Homework problems will be assigned in class. The due date for the problems will be announced in class, and the homework will be due no later than 3:30 p.m. on the due date. No credit will be given for late assignments.

## Exams

**There will be a mid-term exam (Thursday, February 25, 2010)** which will cover special relativity, quantum physics, and applications of the quantum theory to single particles. The final exam will cover primarily material from the second half of the course - advanced applications of the quantum theory, statistical mechanics, and applications of all three foundational ideas - but may also include topics from the first half of the class. **The final exam will be held on Monday, May 10 from 8:00 a.m. - 11:00 a.m.**

## Presentation

In addition to homework and exams, you will be assigned a topic after the mid-term which will serve as the basis of a 15-minute presentation. The presentations will be held during one or two class periods near the end of the semester. The expectations for the presentation, and assignment of topics, will be discussed after the mid-term.

## Grading

Your course grade will break-down as follows: Homework (25%), Mid-term Exam (25%), Final Exam (25%), and In-Class Presentation (25%).

## University Honor Code

The student code of conduct can be found on page 143 of the 2009-2010 student handbook. All students will be expected to adhere to it. Any student found cheating or plagiarizing another's work will be given a zero for that assignment and a complaint will be filed through the Vice President for Student Affairs Office.

## Disability Accommodations

Students needing academic accommodations for a disability must first contact Ms. Rebecca Marin, Coordinator of Services for Students with Disabilities (x84557) to verify and establish eligibility for accommodations. After that, please make an appointment with the instructor to make appropriate arrangements.

## University Policy on Religious Holidays

Religiously observant students wishing to be absent on holidays that require missing class should notify the instructor in writing at the beginning of the semester, and should discuss with them, in advance, acceptable ways of making up any work missed because of the absence. Wednesday 3, February 2010 is the last day to request a religious absence. (See University Policy No. 1.9.)

## Excused Absences for University Extracurricular Activities

Students participating in an officially sanctioned, scheduled University extracurricular activity will be given the opportunity to make up class assignments or other graded assignments missed as a result of their participation. It is the responsibility of the student to make arrangements with the instructor prior to any missed scheduled examination or other missed assignment for making up the work. (University Undergraduate Catalog)

## Important Dates

University Calendar: <http://smu.edu/registrar/Calendar/calendar09-10.asp>

- January 19: First day of classes.
- January 25: Last day to enroll, add courses or drop courses without grade record or tuition billing. Last day to file for May graduation.
- February 3: Last day to declare pass/fail, no credit or first- year repeated course grading options. Last day to request excused absence for observance of a religious holiday.
- March 6-14: Spring Break.
- April 2: University Holiday – Good Friday.
- April 5: Last day for continuing undergraduate students to change their majors before April enrollment.
- April 8: Last day to drop a course.
- April 12: Last Day for May graduation candidates to change grades of Incomplete.
- April 26: Last day to withdraw from the University.
- April 29-May 4: No final examinations or unscheduled tests and papers.
- May 4: Last day of instruction - Follows a Friday Class Schedule.
- May 5-11: Examinations (No examinations scheduled for Sunday).