

Syllabus for PHY 361 Spring 2010

Principles of Modern Physics

Class schedule: M W F 11:00–11:50, CP 183
Instructor: Christopher B. Crawford
CP 373, 257-2504, crawford@pa.uky.edu
Office hours: TBD
Homepage: http://www.pa.uky.edu/~crawford/phy361_sp10
Textbook: Paul A. Tipler & Ralph A. Llewellyn, “Modern Physics” 5th Ed.

Course Description

This class is the last in a series of the four introductory physics courses: PHY 231, 232, 228, and 361. It is an introduction to revolutionary ideas of quantum mechanics, developed in the early 20th century. We will explore experimental discoveries and the resulting theoretical framework. Because quantum phenomena occur at the microscopic level and are unobservable in normal life, we do not have a natural intuition of quantum principles. However, resulting technologies permeate our modern world: for example semiconductors, lasers, superconductors, X-rays, MRI, and nuclear power. Because the quantum mechanics is so prevalent in modern technology, this course is a gateway to many topics in modern physics, chemistry, biology, material science, and engineering. We will focus both on an intuitive understanding of the radical principles of quantum mechanics, as well as learning basic calculational skills to apply these principles to real life.

The course closely follows the required textbook (Tipler & Llewellyn) and is divided into three sections:

1. Chapters 3–5. Experimental developments dictating the need for quantum mechanics. Key principles such as quantization and wave-particle duality, and probability, and uncertainty are covered in detail.
2. Chapters 6–8. Wave mechanics, the quantum analog of Newton’s laws. Applications of the Schrödinger equation to various systems, including the hydrogen atom. Implications of quantum mechanics in systems with many particles (statistical or thermodynamic properties).
3. Chapters 9–13. We briefly introduce the application of quantum mechanics to various fields in modern physics. Only selected topics in each chapter will be covered. Some results from the theory of relativity will be used.

Grading

Three keys to success are: a) reading the textbook ahead of class, b) actively participating in class, and c) working significant problem sets. The grading system is designed to encourage each of these.

Homework problem sets are due each Friday at the end of the day except for the week of an exam. Students are encouraged to work together on problem sets, but each person must turn in their own independent solution. No credit will be given for past due assignments. Students are encouraged to take advantage of the Physics Resource Room and the instructor's office hours.

There will be three 1-hour in-class exams as listed in the schedule. You are responsible for all of the material in the sections covered in the textbook. Only official university excused absences will be eligible for a make-up exam. A comprehensive final exam will be written on **Wednesday, May 5, 2010 10:30 AM–12:30 PM** in the lecture classroom. All exams are closed book, but a summary sheet of formulas will be provided ahead of time.

grade breakdown		letter grade	
homework	30%	A	80–100%
in-class exams	3×15%	B	65–79%
final exam	25%	C	50–64%
TOTAL	100%	E	00–39%

Additional **bonus** credit of 1% will be awarded for completion of the online course evaluation, and **bonus** credit of 0.5% will be awarded per unpublished error discovered in the textbook up to a maximum of 2.5%. Only one person will receive credit for each error reported. Class participation will be considered for scores just shy of the next higher letter grade.

Students with a certified disability should provide this information to the instructor no later than the last day for adding a class so that beneficial arrangements can be made (see <http://www.uky.edu/StudentAffairs/DisabilityResourceCenter>).

Course evaluation

Course evaluations are an important (and mandatory!) component of our Department's instructional program. An on-line course evaluation system was developed to allow each student ample time to evaluate each component of the course and instructor, thus providing the Department with meaningful numerical scores and detailed commentary while minimizing the loss of instructional time in the classroom. The evaluation window for Spring 2010 will open on Monday, April 12 and close on Wednesday, April 28. To access the system during this time, simply go the Department of Physics Web page (<http://www.pa.uky.edu>) and click on the link for Course Evaluations; then follow the instructions. You will need to use your student ID# to log into the system, and this will also allow us to monitor who has filled out evaluations. However, when you log-in you will be assigned a random number that will keep all your comments and scores anonymous.

Schedule

Date	Section	HW
Jan. 13	3-1	
Jan. 15	8-1	
Jan. 18	MLK day	
Jan. 20	3-2	(add)
Jan. 22	3-3	HW1
Jan. 25	3-4	
Jan. 27	4-1	
Jan. 29	4-2	HW2
Feb. 01	4-3	
Feb. 03	4-4,5	(drop)
Feb. 05	5-1,2	HW3
Feb. 08	review	
Feb. 10	(3-1...5-2)	Exam 1
Feb. 12	5-3	
Feb. 15	5-4	
Feb. 17	5-5,6	
Feb. 19	6-1	HW4
Feb. 22	6-2	
Feb. 24	6-3	
Feb. 26	6-4	HW5
Mar. 01	6-5,6	
Mar. 03	7-1	
Mar. 05	7-2	HW6

Date	Section	HW
Mar. 08	review	(midterm)
Mar. 10	(5-3...7-2)	Exam 2
Mar. 12	7-3	(midgrades)
Mar. 15	Spring Break	
Mar. 17	Spring Break	
Mar. 19	Spring Break	
Mar. 22	7-4	
Mar. 24	7-5	
Mar. 26	7-6,7	HW7
Mar. 29	8-1,2	
Apr. 00	8-3	
Apr. 02	8-4	HW8 (withdraw)
Apr. 05	9-1	
Apr. 07	9-2	
Apr. 09	9-5	HW9
Apr. 12	review	(eval
Apr. 14	(7-3...9-5)	Exam 3
Apr. 16	10-3,4	
Apr. 19	10-6,8	
Apr. 21	10-9	
Apr. 23	11-4,8	HW10
Apr. 26	12-1,2	
Apr. 28	12-3,4	eval)
Apr. 30	review	
May 05	10:30 am–12:30 pm	Final Exam