

SYLLABUS
PHYSICS FOR THE LIFE SCIENCES 2: PHY U147
INSTRUCTOR: Professor Mark C. Williams

1. Educational Goals

To learn the basic concepts of physics and apply them to a wide range of examples and applications.

2. Lectures

Lectures Monday, Wednesday, and Thursday, 1:35-2:40 in room 125 DK.

3. Instructor Information

Office: 118 Dana

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Office Hours: Mon. 2:40-4:10, Wed. 2:40-4:10

4. Required Text

Physics: Principles with Applications, by Douglas C. Giancoli. Fifth Edition (1998) Prentice Hall.
ISBN 0-13-611971-9.

Note: There is a sixth edition of the text, but most of the students in this class used the fifth edition last year, so we will continue with that edition. DO NOT BUY THE SIXTH EDITION.

5. Homework, Exams, and Grading

Homework

The assigned reading and homework should be completed before the last lecture of the week.

Quizzes (20% of final grade)

There will be nine 20-minute quizzes based on the homework assignments from the current and previous week. The Quiz will be given at the end of the lecture on Thursday.

One one-hour midterm exam (20% of the final grade)

One two-hour final exam (40% of the final grade)

PHY U148 laboratory (20% of the final grade)

You must register for and attend the laboratory portion of this class. Information about the introductory physics laboratories can be found at <http://www.atsweb.neu.edu/physics/ipl/>

The schedule on the following page gives approximate information on the topics covered in the course.

PHY U147: LIFE SCIENCES 2: APPROXIMATE SCHEDULE

Week 1 (8-10 Sept)	Electric Charge and Electric Field Chapter 16, sections 1,2,3,4,5,6. Electric charge, Coulomb's Law. Problems 2,5,12,13,14.
Week 2 (13-17 Sept) Expt. 31: DC Electrical Measurements Quiz 1	Electric Field (continued) Chapter 16, sections 7,8. Electric Field. Problems 26,29 Electric Potential Chapter 17, sections 1,2,3,4,5,7,8,9,10. Electric potential, capacitance, dielectrics, energy storage, electrocardiogram, cathode ray tube. Problems 5,9,23,35,39,47.
Week 3 (20-24 Sept) Expt. 31: DC Electrical Measurements Quiz 2	Electric Currents Chapter 18, sections 1,2,3,4,6,7,10. Batteries, electric current, Ohm's Law, resistors, resistivity, electric power, nervous system. Problems 1,5,9,13,23,27,28,34 DC Circuits Chapter 19, sections 1,2 Resistors in series and parallel. Problems 1,2, 8,15.
Week 4 (27 Sept - 1 Oct) Expt 33: RC Circuits Quiz 3	DC Circuits (continued) Chapter 19, sections 3,4,5,6,7,8. Kirchoff's Rules, capacitors in series and in parallel, RC circuits, pacemakers. Problems 30,31,71,75.
Week 5 (4 - 8 Oct) Expt 33: RC Circuits Quiz 4	Vibrations and Waves Chapter 11, sections 1,2,3,4,5,6 Simple harmonic motion, simple pendulum. Problems 1,3,8,23,34,36,53,61
Week 6 (11 - 15 Oct) Expt. 37: Standing Waves	MIDTERM EXAM Vibrations and Waves (continued) Chapter 11, sections 7,8,9. Wave motion, types of waves. Problems 36, 41,45.
Week 7 (18 - 22 Oct) Expt. 37: Standing Waves Quiz 5	Sound Chapter 12, sections 1,2,4,5,7. Characteristics, the ear, sources, Doppler effect, shock waves, ultrasound. Problems 9,10,14,17,29,30,42.
Week 8 (25 - 29 Oct) Expt. 17: Simple Pendulum Quiz 6	Optics Chapter 23, sections 1,2,3,4,5. Reflection, mirrors, refraction. Problems 4,15,27,35,37.
Week 9 (1 - 5 Nov) Expt. 17: Simple Pendulum Quiz 7	Optics (continued) Chapter 23, sections 6,7,8,9,10. Total internal reflection, fiber optics, lenses. Problems 40,43,51,53,60,65.
Week 10 (8 - 12 Nov) Expt. 23: Geometric Optics Quiz 8	Optical Instruments Chapter 25, sections 1,2,3,4,5. Camera, the eye, magnifying glass, telescope, microscope. Problems 2,9,11,25,33,43
Week 11 (15 - 19 Nov) Expt. 23: Geometric Optics Quiz 9	Nuclear Physics and Radioactivity Chapter 30, sections 1,3,4,5,6,7,8. Atomic nucleus, radioactivity, conservation of nucleons, half-life. Problems 4,5,20,25,30,35.
Week 12 (22 Nov) Makeup Experiments	Nuclear Physics and Radioactivity (continued) Chapter 30, sections 10,11,13. Decay series, radioactive dating, detectors.
Week 13 (29 Nov - 3 Dec) Expt. 40: Radioactive Decay	Effects and Uses of Radiation Chapter 31, sections 1,2,3,4,5,6,7,8,9. Nuclear reaction, fission, fusion, radiation damage, dosimetry, radiation therapy, tracers, PET, MRI.
Week 14 (6 - 8 Dec) Expt. 40: Radioactive Decay	Review
Week 15 (13 - 17 Dec)	FINAL EXAM