

MISSOURI WESTERN STATE UNIVERSITY

COLLEGE OF LIBERAL ARTS AND SCIENCES

DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS, AND PHYSICS

COURSE NUMBER: PHY 111

COURSE NAME: College Physics II

COURSE DESCRIPTION:

Electricity, magnetism, optics, relativity, atomic physics, and nuclear physics. Three hours lecture, three hours lab. Offered spring semester.

PREREQUISITE:

PHY 110 or PHY 210. Not open to students with credit in PHY 211.

TEXT:

College Physics: Strat.Appr.-Mod.Access, Knight, Edition 3rd 15, Pearson
ISBN 9780321943798

College Physics, V2 w/access (Component), Knight, Edition 3rd, Pearson
ISBN 9780134201948

COURSE OBJECTIVES:

The primary objective of this course is to provide the student with an understanding of the fundamental laws and principles of electromagnetism, optics, and modern physics, and for the student to be able to apply these laws and principles in homework and laboratory situations. In order to meet this objective, the student will learn how to:

1. Utilize Ampere's law, Faraday's law, and Lenz's law in magnetic applications (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).
2. Utilize wave properties of reflection, refraction, diffraction, interference, and polarization in optics applications (*I G, VII A, VII B, VII C, VIII A, VIII B, VIII C*).
3. Utilize the principles of time dilation, length contraction, and mass-energy equivalence in relativistic applications (*I G, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*)

4. Utilize the Bohr and de Broglie atomic models in elementary spectral analysis (*I G, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*)
5. Utilize wave properties of matter and the uncertainty principle in elementary applications (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).
6. Utilize principles of radioactivity, fission, fusion, and nuclear binding energy in problems (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

STUDENT COMPETENCIES:

In order to meet the above objectives, successful students must demonstrate:

1. An ability to understand and explain in writing the fundamental laws and principles of the course (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).
2. An ability to analyze given information in the physics problem and identify the principles that apply (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).
3. An ability to formulate the laws and principles physics in mathematical form (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).
4. An ability to utilize algebra and elementary trigonometry in the solutions of physics problems (*I G, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).
5. An ability to formulate a laboratory procedure, gather relevant data, process the data, and use graphical skills to test relationships (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).
6. An ability to write a well organized laboratory report that includes a hypothesis, procedures, gathered data, calculations, results, and conclusions (*I G, II A, II B, II C, III A, III B, III C, III E, III F, VII A, VII B, VII E, VIII A, VIII B, VIII C*).

COURSE OUTLINE:

- I. Optics
 - A. Wave Optics
 - B. Ray Optics
 - C. Optical Instruments

- II. Electricity and Magnetism
 - A. Deformation of Solids
 - B. Electric Potential
 - C. Current and Resistance
 - D. Circuits
 - E. Magnetic Fields and Forces
 - F. Electromagnetic Induction and Electromagnetic Waves
 - G. AC Electricity

- III. Modern Physics
 - A. Relativity
 - B. Quantum Physics
 - C. Atoms and Molecules
 - D. Nuclear Physics

ASSESSMENT:

The stated course objectives and student competencies are assessed through the evaluation of homework exercises, worksheets, quizzes, exams, and in-class participation as determined by the instructor. (Note: The state-level goal and instructional competencies addressed by each course objective and student competency are identified in italics.)

LEGEND

I. Communicating

Students will demonstrate the ability to . . .

- A. make formal written and oral presentations employing correct diction, syntax, usage, grammar, and mechanics.
- B. focus on a purpose (e.g., explaining, problem solving, argument) and vary approaches to writing and speaking based on that purpose.
- C. communicate effectively in groups by listening, reflecting, and responding appropriately and in context.
- D. use mathematical, statistical, standard quantitative, or various graphical methods to present information with clarity, accuracy, and precision.

II. Higher-Order Thinking

Students will demonstrate the ability to . . .

- A. recognize the problematic elements of presentations of information and argument.
- B. formulate questions for clarifying issues and solving problems.
- C. use linguistic, mathematical, or other symbolic approaches to describe problems, identify alternative solutions, and make reasoned choices among those solutions.
- D. analyze and synthesize information from a variety of relevant sources and use the results to address complex situations and problems.
- E. defend conclusions using relevant evidence and reasoned argument.
- F. reflect on and evaluate their critical-thinking processes.

III. **Managing Information**

Students will demonstrate the ability to . . .

- A. assess and/or generate information from a variety of sources, including the most contemporary technological information services.
- B. evaluate information for its currency, usefulness, truthfulness, and accuracy.
- C. organize, store, and retrieve information efficiently.
- D. reorganize information for an intended purpose, such as research projects.
- E. present information clearly and concisely, using traditional and contemporary technologies.

IV. **Valuing**

Students will demonstrate the ability to . . .

- A. recognize the ramifications of ones' value decisions on self and others.
- B. recognize conflicts within and between value systems.

V. **Social and Behavioral Sciences**

- A. explain social institutions, structures, and processes across a range of historical period.

VI. **Mathematics**

Students will demonstrate the ability to . . .

- A. recognize and use connections within mathematics and between mathematics and other disciplines.
- B. read, interpret, analyze, and synthesize quantitative data (e.g., graphs, tables, statistics, and survey data) and make reasoned estimates.
- C. formulate and use generalizations based upon pattern recognition.
- D. apply and use mathematical models (e.g., algebraic, geometric, statistical) to solve problems.

VII. **Life and Physical Sciences**

Students will demonstrate the ability to . . .

- A. explain how to use the scientific method and how to develop and test hypotheses
- B. evaluate scientific evidence and argument.
- C. describe the basic principles of the physical universe.
- D. describe concepts of the nature, organization, and evolution of natural systems.

E. explain the effect of human interactions with natural systems.