Syllabus

PHYS 2120

General Physics II with Calculus

2025

Committee Members:

N/A, Central Community College
Joe Sherwin, Metropolitan Community College
Jared Daily, Mid-Plains Community College
David Heidt, Northeast Community College
Paul Haar, Michael Harrison, & Kent Reinhard, Southeast Community College
Erandi Gunapala & Lorin King, Western Nebraska Community College
N/A, Little Priest Tribal College
N/A, Nebraska Indian Community College

Facilitator: Paul Haar

The Institution agrees to the contents in this syllabus including course prefix, number, course description and other contents of this syllabus.

11/26/2024 Chief Academic Officer, Central Community College		Adopt
Theresa Billiot Chief Academic Officer, Little Priest Tribal College	11/13/2024	Not Offered
Tom McDonnell Chief Academic Officer, Metropolitan Community College	11/13/2024	Decline
Jody Tomanek Chief Academic Officer, Mid-Plains Community College	11/12/2024	Adopt
Kristin Sullivan Chief Academic Officer, Nebraska Indian Community College	12/09/2024	Adopt
Charlene Widener Chief Academic Officer, Northeast Community College	11/14/2024	Adopt
Joel Michaelis Chief Academic Officer, Southeast Community College	11/13/2024	Adopt
Grant Wilson Chief Academic Officer, Western Nebraska Community College	11/12/2024	Adopt

I. CATALOG DESCRIPTION

PHYS2120
General Physics II with Calculus

Prerequisite: PHYS 2110 General Physics I or equivalent

Credit Hours: 5 (Semester) 7.5 (Quarter)
Contact Hours: Lecture 60 Lab 30

Course Description: Detailed calculus-based continuation of General Physics I. Topics covered will include electricity, magnetism, and optics. Additional topics from the areas of oscillations and waves, fluids, thermal physics, and modern physics may also be covered.

II. COURSE OBJECTIVES/COMPETENCIES

The course will:

1. Introduce the concepts and applications of electrostatics.
2. Provide methods of analyzing the electric fields, forces, and potential.
3. Introduce basic information on capacitance including concepts and calculations.
4. Define concepts and techniques for direct-current circuit analysis.
5. Introduce the concepts of magnetism.
6. Provide methods of analyzing magnetic fields and forces.
7. Present concepts and applications of electromagnetic induction.
8. Implement concepts and techniques to analyze alternating current circuits.
9. Employ the basic principles of wave motion and wave interaction, including how they apply to electromagnetic waves.
10. Present concepts and applications of geometric optics.
11. Present techniques for analysis of experimental data.
12. Provide experience communicating experimental results.

III. STUDENT LEARNING OUTCOMES

Students will be able to:

1. Apply the concepts of electrostatics.
2. Analyze electric fields, forces, and potential.
3. Explain the basic concepts and applications of capacitance.
4. Perform analysis of direct-current circuits.
5. Apply the concepts of magnetism.
6. Perform calculations involving magnetic fields and forces.
7. Explain the concepts of electromagnetic induction.
8. Implement concepts and techniques to analyze alternating current circuits.
9. Employ the basic principles of wave motion and wave interaction, including how they apply to electromagnetic waves.
10. Demonstrate the concepts and applications of geometric optics.
11. Use various techniques to collect and analyze experimental data.
12. Communicate experimental results.

13. Employ the basic principles of wave motion and wave interaction as they apply to electromagnetic radiation (light) in various media.

IV. COURSE CONTENT/TOPICAL OUTLINE

(Sequence may vary)

1. Electric Charges and Fields
2. Gauss's Law
3. Electric Potential
4. Capacitance
5. Current and Resistance
6. Direct-Current Circuits
7. Magnetic Forces and Fields
8. Sources of Magnetic Fields
9. Electromagnetic Induction
10. Inductance
11. Alternating-Current Circuits
12. Electromagnetic Waves
13. The Nature of Light
14. Geometric Optics and Image Formation
15. Interference
16. Diffraction

V. INSTRUCTIONAL MATERIALS

SUGGESTED TEXTBOOKS AND/OR MATERIALS

Physics for Scientists and Engineers – Giancolli
OpenStax University Physics or other appropriate Open Educational Resource
College Physics – Serway
Physics for Scientists and Engineers – Knight
University Physics - Sears

VI. METHODS OF PRESENTATION

Methods of presentation may include lecture, small group activities, videos, lab activities, worksheets, quizzes, online exploration, and student presentations.

VII. METHODS OF EVALUATION

1. Unit Tests
2. Comprehensive Final Exam
3. Quizzes
4. Assignments
5. Lab Activities

VIII. INSTITUTIONAL DEFINED SECTION

To be used at the discretion of each community college as deemed necessary.