

**PHYS 22 - College Physics II****Catalog Description****Transfer Status:** CSU/UC**Prerequisite:** PHYS 21**Unit(s):** 4.00**Lecture:** 51.00 Contact hours/102.00 Out of class hours/153.00 Total hours/3.00 Unit(s)**Lab:** 51.00 Contact hours/0.00 Out of class hours/51.00 Total hours/1.00 Unit(s)**Total:** 102.00 Contact hours/102.00 Out of class hours/204.00 Total hours/4.00 Unit(s)

**Course Description:** This course is intended for students not majoring in physics or engineering but needing a one-year course in physics as a requirement for their major program. The course is the second part of a two-semester sequence beginning with PHYS 21. Core topics include: electrostatics, magnetism, DC circuits, optics and modern physics. Graded only. (C-ID PHYS 110) (C-ID PHYS 100S = PHYS 21 and PHYS 22).

**Objectives**

Upon successful completion of this course, the student should be able to:

1. Analyze simple static charge distributions and calculate the resulting electric field and electric potential.
2. Analyze simple current distributions and calculate the resulting magnetic field.
3. Predict the trajectory of charged particles in uniform electric and magnetic fields.
4. Analyze DC circuits in terms of current, potential difference and power dissipation of each element.
5. Analyze basic situations involving reflection and refraction, and use this analysis to predict the path of a light ray.
6. Analyze situations involving interference and diffraction of light waves, and apply these to situations including double slits, diffractions gratings and wide slits.
7. Understand the limitations of classical physics and begin to develop an awareness of the importance of modern physics (i.e. quantum theory and special relativity) in the natural world.
8. Analyze real-world experimental data, including appropriate use of units and significant figures. (Lab)
9. Relate the results of experimental data to the physical concepts discussed in the lecture portion of the class. (Lab)

**Course Content****Topic Titles / Suggested Time Topic****Lecture**

<b><u>Topics</u></b>	<b><u>Lec Hrs</u></b>
Nuclear Physics	3.00
Atomic Physics	3.00
Quantum Mechanics	3.00
Special Relativity	3.00
Wave Optics/Physical Optics	3.00
Lenses, Mirrors and Optical Instruments	3.00
Geometric Optics	3.00
Ampere's Law	3.00
Faraday's and Lenz's Laws	3.00
Magnetism	3.00
Resistivity	3.00
Capacitors	3.00
DC Circuits	3.00
Potentials	4.00
Fields	4.00
Electrostatics	4.00

**Total Hours: 51.00****Lab**

<b><u>Topics</u></b>	<b><u>Lab Hrs</u></b>
Electrolysis	3.00
Electric Fields	3.00

<b>Topics</b>	<b>Lab Hrs</b>
Charge to Mass Ratio of the Electron	3.00
Capacitors	3.00
Ohm's and Kirchoffs Laws	3.00
Tangent Galvanometer	3.00
Current Balance	3.00
Oscilloscopes and Signal Generators	3.00
AC Circuits	3.00
Lenses and Mirrors	3.00
Optics of the Eye	3.00
Laser Optics	3.00
Optical Instruments	3.00
Photoelectric Effect	3.00
Atomic Spectra	3.00
Radioactivity	3.00
Speed of light	3.00
<b>Total Hours:</b>	<b>51.00</b>

### Methods of Instruction

- A. Homework: Students are required to complete two hours of outside-of-class homework for each hour of lecture
- B. Instructor Demonstrations
- C. Laboratory Experiments
- D. Lecture
- E. Problem-Solving Sessions
- F. Reading Assignments

### Methods of Evaluation

- A. Exams/Tests
- B. Homework
- C. Lab Projects
- D. Final Examination
- E. The 1500 word writing requirement will be satisfied by the writing of 15 formal laboratory reports.

### Examples of Assignments

#### Reading Assignments

1. Read the chapter on Faraday's Law and be prepared to discuss the principle of a hydroelectric dam.
2. Read through the example problem in the text regarding computing the electrostatic potential energy of a 4 charge system. Be prepared to take a quiz on a similar problem.

#### Writing Assignments

1. Write a 3 page laboratory report about the earth's magnetic field activity including an introduction, an overview of the procedure, discussion of error analysis and overall conclusions.
2. Produce an example worked problem involving magnetic induction similar in style to those provided in the text but in your own words.

#### Out-of-Class Assignments

1. Research the power output characteristics of the 3 nearest power plants. Use your monthly PG&E usage statistics to determine how many houses like yours these 3 power plants can supply.
2. Find and take pictures of effective diffraction gratings you find outside of an academic environment. Be prepared to share with the class.

### Recommended Materials of Instruction

Raymond A Serway, Chris Vuille. (2018). College Physics. *Brooks Cole, 11th.* 9781305952300.  
 Young, H., Adams. (2020). College Physics. *Sears and Zemansky, 11th.* 9780136874300.

#### Other Learning Materials

Eggert S. and Trento J., Physics 22 Lab manual  
 Online Homework  
 Scientific calculator (or equivalent)

### Minimum Qualifications

Physics/Astronomy (Masters Required)

Engineering (Masters Required)

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**Created/Revised by:** Trento, Jason

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