GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: PHYS 2B DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Spring 2023 CURRICULUM APPROVAL DATE: 3/14/2023

SHORT TITLE: GENERAL PHYSICS II

LONG TITLE: General Physics II

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
4	18	Lecture:	3	54
		Lab:	3	54
		Other:	0	0
		Total:	6	108
		Total Learning Hrs:	216	

COURSE DESCRIPTION:

An introduction to the principles of physics using algebra and trigonometry. Topics include electricity and magnetism, light and optics, modern physics, and an introduction to relativity. PREREQUISITE: PHYS 2A with a grade of 'C' or better. High-school level reading and writing skills strongly recommended. (C- ID: PHYS 110) (C-ID: PHYS 100S: PHYS 2A + PHYS 2B)

PREREQUISITES:

Completion of PHYS 2A, as UG, with a grade of C or better.

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

02 - Lecture and/or discussion
03 - Lecture/Laboratory
04 - Laboratory/Studio/Activity
047 - Laboratory - LEH 0.7
05 - Hybrid
71 - Dist. Ed Internet Simultaneous
72 - Dist. Ed Internet Delayed
73 - Dist. Ed Internet Delayed LAB
737 - Dist. Ed Internet LAB-LEH 0.7

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Identify, describe, compare and contrast gravitational, electric and magnetic forces and fields.
2. Identify, describe, compare and contrast gravitational and electrical potential energy and electric potential.
3. Apply conservation of energy and conservation of charge to circuits using Kirchoff's Rules.
4. Identify, describe, compare and contrast reflection, refraction, interference and diffraction.
5. Identify and describe special relativity, time and length contraction, equivalence of mass and energy.
6. Describe wave-particle duality, the photoelectric effect, the wave nature of matter, and the Heisenberg uncertainty principle.

COURSE OBJECTIVES:

By the end of this course, a student should:

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 for 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, diffraction gratings, and wide slits.
7. Explain 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. Relate the results of experimental data to the physical concepts discussed in the lecture portion of the class.
9. Analyze real-world experimental data, including appropriate use of units and significant figures.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 3/14/2023

LECTURE CONTENT:

3 hours Lec

Electric forces and fields.

3 hours Lec

Electric potential energy and electric potential.

6 hours Lec

Electric circuits: circuits in series and parallel, Ohm's Law and Kirchoff's rules, resistors and capacitors in series and

parallel.

6 hours Lec

Magnetic forces and fields: magnetic forces on moving charges, electrostatic forces and gravitational forces, force on a current carrying coil in a magnetic field.

6 hours Lec

Electromagnetic induction: induced current and emf, magnetic flux, Faraday's Law, Lenz's Law, the electric generator, mutual and self inductance, and transformers.

3 hours Lec

Electromagnetic waves, the electromagnetic spectrum, the Doppler effect and polarization.

4 hours Lec

Reflection of light: images formed by reflection from plane, concave and convex spherical mirrors.

6 hours Lec

Refraction of light: images formed by refraction by converging and diverging lenses, total internal reflection, polarization and dispersion.

3 hours Lec

Interference and wave nature of light: the double-slit experiment, single-slit experiment, thin-film interference, and diffraction.

3 hours Lec

Special relativity: inertial reference frames, time dilation, length contraction, and the equivalence of mass and energy.

3 hours Lec

Quantum Mechanics: black-body radiation, the photoelectric effect, the wave nature of matter, and the Heisinberg uncertainty principle.

3 hours Lec

Physics of the atom: models of the atom and Pauli exclusion principle.

3 hours Lec

Nuclear physics: nucleus of an atom, the strong nuclear force, methods of obtaining energy from the nucleus.

2 hours

Final Exam

LAB CONTENT:

The Lab activities for the course will be divided as:

(a) Experimental activities (50%)

(b) Problem-Solving activities using educational simulations (50%)

3 HOURS

LAB: Electrostatics - Coulomb's Law.

3 HOURS

LAB: Electrostatics - Faraday's Ice Pail.

3 HOURS

LAB: Electric field.

3 HOURS

LAB: Ohms Law.

3 HOURS

LAB: DC Circuits with resistors (Parallel and Series)

3 HOURS

LAB: RC Circuits

3 HOURS

LAB: Capacitors

3 HOURS
LAB: DC motor design and construction.
3 HOURS
LAB: Determine the ratio of the electric charge to the mass of the electron (e/m).
3 HOURS
LAB: The magnetic force and field (Earth?s magnetic field)
3 HOURS
LAB: Amperes law
3 HOURS
LAB: Mirrors and Lenses
3 HOURS
LAB: Snell's Law and Optical Instruments
3 HOURS
LAB: Interference and diffraction
3 HOURS
LAB: The Michelson Interferometer
3 HOURS
LAB: Blackbody radiation and Plancks constant
3 HOURS
LAB: The Photo-Electric Effect
3 HOURS
LAB: Radioactive Decay

METHODS OF INSTRUCTION:
Lecture/discussion. Laboratory exercises. Group projects

OUT OF CLASS ASSIGNMENTS:
Required Outside Hours 54
Assignment Description
Regularly assigned homework that requires students to analyze and study pertinent text material, solved examples and lecture notes.

Required Outside Hours 54
Assignment Description
Regularly assigned homework that requires students to apply the principles and skills covered in class by solving related problems

METHODS OF EVALUATION:
Writing assignments
Evaluation Percent 20
Evaluation Description
Lab Reports.

Problem-solving assignments
Evaluation Percent 20
Evaluation Description
Homework, quizzes, projects.

Objective examinations
Evaluation Percent 60
Evaluation Description
In-class written exams.

REPRESENTATIVE TEXTBOOKS:
Urone, Hinrichs, Dirks and Sharma. College Physics. OpenStax, 2022.
ISBN: ISBN-10: 1-947172-01-8
Reading Level of Text, Grade: 12 Verified by: David Argudo

Lab Manual: Wilson, Jerry D.; Hernandez, Cecilia A.; Physics Laboratory Experiments (8th Edition), 2015
ISBN: 9781305360341
Rationale: This is the most current edition.

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

GAV B1, effective 201430

GAV B3, effective 201430

CSU GE:

CSU B1, effective 201430

CSU B3, effective 201430

IGETC:

IGETC 5A, effective 201430

IGETC 5C, effective 201430

CSU TRANSFER:

Transferable CSU, effective 201430

UC TRANSFER:

Transferable UC, effective 201430

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN: PHYS4
CAN Sequence: PHYS SEQ A
CSU Crosswalk Course Department: PHYS
CSU Crosswalk Course Number: 110
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000547066
Sports/Physical Education Course: N
Taxonomy of Program: 190200