PHYS G110: CONCEPTUAL PHYSICS

Item	Value
Curriculum Committee Approval Date	05/02/2023
Top Code	190200 - Physics, General
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Local General Education (GE)	• Area 5 Natural Sciences (GB1)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5A Physical Science (5A)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5A Physical Science (5A)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B1 Physical Science (B1)

Course Description

This course is designed for non-science majors and considers the everyday applications of physics. It covers the subjects of motion, energy, waves, music, electromagnetism, relativity, and nuclear energy. It takes a non-mathematical approach to these basic physics concepts. Transfer Credit: CSU; UC: Credit Limitation: No credit for PHYS G110, PHYS G111 if taken after PHYS G120 or PHYS G185.

Course Level Student Learning Outcome(s)

1. Course Outcomes
2. Apply Newton’s Laws to the motion of objects.
3. Distinguish between the various types of energy and their applications.
4. Recall the various types of waves and their connection to music.
5. Use Coulomb's and Faraday's Laws to solve electromagnetism problems.
6. Examine nuclear physics.

Course Objectives

- 1. Apply Newton's Laws to answer questions about motion.
- 2. Use conservation of momentum to answer conceptual questions about motion.
- 3. Define work and apply the relationship between work and energy to answer questions.
- 4. Describe various types of energy and apply conservation of energy to solve conceptual questions.
- 5. Describe the various types of mechanical waves.
- 6. Describe a standing wave and its application to music.
- 7. Explain the role of interference in the formation of a standing wave.
- 8. Explain the use of Fourier analysis in digital music.
- 9. Use Coulomb?s Law to answer conceptual questions about electrical force.
- 10. Explain the difference between electrical potential energy and electric potential.
- 11. Explain the relationship between voltage, resistance, and current in both series and parallel circuits.
- 12. Apply Faraday's Law to answer questions about electrical generation.
- 13. Explain the operation of an electrical transformer.
- 14. List the postulates of special relativity and describe the changes in matter that occur as velocity increases.
- 15. Describe the three main nuclear emission types.
- 16. Explain the role of fission in both a nuclear bomb and a nuclear reactor.
- 17. Explain the role of fusion in a nuclear bomb.
- 18. Describe the two main areas of research in fusion reactor design.

Lecture Content

Motion Inertia Net force The equilibrium rule Friction Speed and velocity Acceleration Newton's First Law of Motion Newton’s Second Law of Motion Newton's Third Law of Motion Vectors Energy and Momentum Momentum Impulse Conservation of momentum Collisions Energy Work Potential and kinetic energies Conservation of energy Gravity, Projectiles, and Satellites The Universal Law of Gravity The Universal Gravitation Constant Gravity and distance Weight Projectile motion Circular satellite orbits Elliptical satellite orbits Escape speed Waves, Sound, Music Vibrations and waves Wave motion Transverse and longitudinal waves Sound waves Reflection and refraction of sound Interference, beats, and standing waves Doppler Effect Music sounds Electromagnetism and Circuits Electric force and charge Coulomb's Law Electric field Electric potential Voltage sources Electric current Direct and alternating currents Electrical resistance Ohm's Law Circuits Series Parallel Magnetic poles Magnetic fields Electric currents and magnetic fields Magnetic forces on moving charges Faraday's Law Power production Transformers Special Relativity Einstein's postulates Simultaneity and time dilation Length contraction Nuclear Energy Radioactivity Alpha, beta, and gamm a rays Environmental radiation The atomic nucleus and the strong force Radioactive half-life Transmutation of the elements Fission Fusion

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Reading Assignments

Weekly reading of the textbook. Periodic reading of supplemental materials to reinforce key concepts.

Writing Assignments

Essays and researched reports might be assigned.

Out-of-class Assignments

Homework assignments to reinforce key concepts and develop critical thinking.

Demonstration of Critical Thinking

Applying two or more physics concepts to conceptually solve problems.

Required Writing, Problem Solving, Skills Demonstration

Writing definitions of physics concepts. Explaining physics concepts in writing. Solving physics problems using simple arithmetic.

Textbooks Resources

1. Required Hewitt, P. Conceptual Physics, 13th ed. Addison-Wesley Longman, 2021 Rationale: -