Lecture Contact Hours: 48-54; Outside-of-Class Hours: 96-108;
Laboratory Contact Hours: 48-54; Outside-of-Class Hours: 0;
Total Student Learning Hours: 192-216

CUYAMACA COLLEGE
COURSE OUTLINE OF RECORD

Physics 110 – Introductory Physics

3 hours lecture, 3 units
3 hours laboratory, 1 unit
Total units: 4 units

Catalog Description
Simple treatment of basic physics principles and phenomena with an emphasis on relating them to events and processes of everyday living. Study of the description and cause of various kinds of motion, conservation laws, hot and cold bodies with heat exchange, sound in music and hearing, light and color perception, electricity and some of its practical uses, observation of atomic particles from radiation sources, and other subjects. There is no math prerequisite; the main emphasis is on understanding the concepts rather than doing many mathematical manipulations.

Prerequisite
None

Course Content
1) Study of motion
2) Newton's laws of motion
3) Energy
4) Momentum
5) Rotational motion
6) Gravitation
7) Atomic nature of matter
8) Solids
9) Liquids
10) Gases and plasmas
11) Temperature and heat
12) Transmission of heat
13) Change of state
14) Vibrations and waves
15) Sound
16) Musical sounds
17) Electricity
18) Electric current
19) Magnetism
20) Electromagnetic interactions
21) Electromagnetic radiation
22) Quantum nature of light
23) Light emission
24) Color
25) Reflection and refraction
26) Lenses
27) Scattering, diffraction, interference and polarization
28) The quantum atom
29) The nucleus and radioactivity

30) Fission and fusion
31) Special theory of relativity
32) General theory of relativity
33) Astrophysics
34) Historical development of physics
35) Application of physics principles to the real world

Course Objectives
Students will be able to:
1) Apply the vocabulary of physics to everyday events.
2) Analyze and explain the linear and rotational motion of an object.
3) Use the concepts of momentum and energy to explain the motion of an object such as a roller coaster.
4) Use the concepts of gravity to explain why the moon does not fall into the earth.
5) Investigate and delineate the states of matter.
6) Use the concepts of heat, thermodynamics and ideal gases to analyze and explain weather, cooking, home heating and cooling, the operation of an automobile engine, and similar phenomena.
7) Investigate and interpret wave behavior: standing waves, the Doppler Effect, reflection, refraction, resonance, interference, etc.
8) Analyze and evaluate the relationships between current, voltage and resistance.
9) Compare and contrast electric and magnetic fields.
10) Compare and contrast motors and generators.
11) Explore and evaluate the optical properties of matter: lenses, color, reflection, interference, polarization, etc.
12) Investigate and delineate the structure of an atom.
13) Explain the particle nature of light and the wave nature of matter.
14) Compare and contrast alpha, beta and gamma radiation.
15) Compare and contrast fission and fusion energy production.
16) Describe and interpret relativity theory.

During the lab students will:
1) Set up experiments using the scientific method.
2) Demonstrate laboratory technique.
3) Collect data using both traditional and computer data acquisition methods.
4) Use computers to interpret and analyze numerical data.
5) Use computers to generate a visual representation of the data.
6) Evaluate the experimental results.

Method of Evaluation
A grading system will be established by the instructor and implemented uniformly. Grades will be based on demonstrated proficiency in the subject matter determined by multiple measurements for evaluation, one of which must be essay exams, skills demonstration or, where appropriate, the symbol system.
1) Quizzes, exams
2) Lab technique
3) Homework, lab reports
4) Research paper
5) Participation
6) Final exam

Special Materials Required of Student
Access to a laptop and lab kits for the online sections.

Minimum Instructional Facilities

Laboratory with blackboard, Smart Cart, appropriate lab/demonstration equipment

Method of Instruction
1) Integrated lecture, demonstration, discussion
2) Small/large group discussions
3) In-class activities and independent homework, research projects
4) Group work in a laboratory situation
5) Auxiliary use of study groups, peer tutoring and/or instructional office hours

Out-of-Class Assignments
1) **Reading**: lecture notes; textbook chapters on motion, energy, and waves; popular-science articles on climate and energy; lab manuals; vetted web content.
2) **Writing**: lab report drafts and final reports; short explanations connecting physics concepts to everyday phenomena; problem-set reflections; discussion posts.
3) **Other**: at-home data collection using phone sensors; field observation of simple harmonic motion (e.g., playground swings); assembling a mini-portfolio of simulation screenshots with brief annotations.

Texts and References
1) Required (representative examples):
   a. Hewitt, Paul. *Conceptual Physics*. 12th edition. Addison-Wesley, 2014.
   b. W. Thomas Griffith and Juliet Brosing. *Physics of Everyday Phenomena*, 10th Edition, 2022.
2) Supplemental: None

Student Learning Outcomes
Upon successful completion of this course, students will be able to:
1) Apply the concept of energy conservation: identify systems, analyze transfers, and justify conclusions with qualitative or quantitative evidence.
2) Use scientific data in decision-making: interpret data displays; evaluate claims; communicate evidence-based recommendations.