

**CUYAMACA COLLEGE**  
**COURSE OUTLINE OF RECORD**

**PHYSICS 110 – INTRODUCTORY PHYSICS**

3 hours lecture, 3 hours laboratory, 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 assignments
- 2) Research projects and reports

**Texts and References**

- 1) Required (representative example): Hewitt, Paul. *Conceptual Physics*. 12th edition. Addison-Wesley, 2014.
- 2) Supplemental: None

**Student Learning Outcomes**

Students will be able to:

- 1) Learn to make basic estimates for physical problems with given information.
- 2) Understand and use the scientific method.
- 3) Evaluate scientific information to make informed decisions.

During the lab students will:

- 4) Set up experiments using the scientific method.
- 5) Use computers to collect, interpret, and analyze numerical data.
- 6) Evaluate the experimental results.