Syllabus

PHY 253 Modern Physics

General Information

Date

December 7th, 2018

Author

Trevor Johnson-Steigelman

Department

Science and Technology

Course Prefix

PHY

Course Number

253

Course Title

Modern Physics

Course Information

Credit Hours

4

Lecture Contact Hours

3

Lab Contact Hours

2

Other Contact Hours

1

Catalog Description

The continuation of the University Physics sequence. Topics include relativity, photons, matter waves, introduction to quantum mechanics, atomic and nuclear physics, and other selected topics in modern physics.

Key Assessment

This course does not contain a Key Assessment for any programs

Prerequisites

PHY 152 and MAT 273

Co-requisites

MAT 274

Grading Scheme

Letter

First Year Experience/Capstone Designation

This course DOES NOT satisfy the outcomes applicable for status as a FYE or Capstone.

SUNY General Education

This course is designated as satisfying a requirement in the following SUNY Gen Ed category

None

FLCC Values

Institutional Learning Outcomes Addressed by the Course

Mathematics
Computer Literacy

Course Learning Outcomes

Course Learning Outcomes

1. Demonstrate ability to model problems related to Relativity and Quantum Physics
2. Demonstrate proficiency in problem solving methodology
3. Demonstrate proficiency in teamwork, including assessment of learning process
4. Demonstrate an ability to relate mathematics to physical reality and vice a versa
5. Estimate margins of errors in measurements and calculations
6. Assess limitations of what they know, and know how to seek further knowledge pertinent to the subject matter

Program Affiliation

This course is not required as a core course in a program

Outline of Topics Covered

Relativity:

Lorentz Transformation

Length Contraction and Time Dilation

Addition of Velocities

Momentum, Kinetic Energy and The Rest Mass Energy

Photons and Matter Waves:

Black Body Radiation and Planck's Hypothesis

Photoelectric Effect

Compton Scattering

Bohr's Theory

de Broglie's Hypothesis

Introduction to Quantum Mechanics:

Heisenberg's Uncertainty Principle

Schrodinger's Equation

Particle in a "Box": Infinite Potential Well

Particle in a Finite Potential Well

Quantum Tunneling

The Harmonic Oscillator

Atomic and Nuclear Physics:

Hydrogen Atom

Rotational and Vibrational Spectra of Molecules

Electron Spin

Atomic Spectra and X-rays

Lasers

Nuclei

Radioactive Decay

Nuclear Reactions

Fission and Fusion

Medical Applications

Selected topics in:

Interference and Diffraction

Coordinate Transformations for Linear and Rotational Displacement

Fractals & Chaos

Self-organization

Cellular Automata

Superconductivity

Band Theory

The p-n junction diode

Particle Physics

Cosmology