Sinclair Community College
444 E. Third St.
Dayton, OH 45402

Master Syllabus

PHY 2203 - Introduction to Modern Physics

Division: Science, Mathematics and Engineering

Department: Physics

Credit Hour Total: 3.0 **Lecture Hrs:** 3.0

Prerequisite(s): PHY 2202AND MAT 2280

Date Revised: March 2017

Course Description:

Introduction to the experimental and theoretical basis of 20th century ideas in physics including relativity, quantum mechanics, atomic, molecular and solid state physics, nuclear structure, particle physics and cosmology. Calculus used extensively.

General Education Outcomes:

- Critical Thinking/Problem Solving Competency

Course Outcomes:

Constancy of the Speed of Light
Discuss the experimental evidence for the rejection of the ether hypothesis and the conclusion that the speed of light is the same in all inertial frames.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Relativistic Kinematics
Transform length, time and velocity measurements from one inertial frame to another in relative motion to the first.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Relativistic Dynamics
Apply relativistic ideas regarding energy transformations to the behavior of real world objects.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Photons
Discuss the experimental basis for the photon concept, and apply the concept to analysis of phenomena such as the photoelectric effect in metals and Compton scattering.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Wave Particle Duality
Cite and discuss examples of phenomena that illustrate the dual nature of light.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Wave Mechanics
Determine and interpret solutions to the one-dimensional Schrodinger equation.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Atomic and Molecular Physics
Compare models of atomic structure and apply wave mechanics to explain atomic and molecular properties (e.g. light spectra).

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

General Relativity
Apply the idea that the measurable effects of a gravitational field are equivalent to the observer being in an accelerated reference frame.

Assessment Method: Locally developed exams

Performance Criteria:

Passing grade: D or higher

Solid State Physics
Apply ideas from wave mechanics to explain the measurable properties (e.g. conductivity) of crystalline solids.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Nuclear Physics
Apply the energy and charge conservation laws towards the analysis of nuclear structure and reactions.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Particle Physics
Describe and classify subatomic particles in terms of mass, charge.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Fundamental Interactions
Describe the four fundamental interactions ("forces") and classify subatomic particles in terms of which interaction(s) affect their behavior.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Cosmology
Contrast and compare models of the evolution of the universe based on ideas from particle physics, general relativity and classical physics.

Assessment Method: Locally developed exams
Performance Criteria:

Passing grade: D or higher

Outline:

Relativity

Introduction to Quantum Physics

Wave Mechanics

Atomic Physics

Molecules and Solids

Nuclear Physics

Subatomic Particles

Cosmology