COURSE OUTLINE

Course Number	Course Title	Credits
PHY 111	Physical Science Concepts	3
Hours: 2 lectures/2 laboratory	**Co- or Pre-requisite** Take ENG-024 and ENG-034 Minimum Grade C - Must be completed prior to taking this course. Take MAT-037 or MAT-042 Minimum grade C - Must be completed prior to taking this course.	**Implementation sem/year** Spring 2022

Catalog description:
Survey of fundamental concepts in the physical sciences for students not majoring in science or engineering. Covers a broad range of topics in the fields of chemistry, physics, and astronomy such as measurement, motion, forces (gravitational, electromagnetic, nuclear), light, sound, atomic structure, molecular structure, crystal structure, nuclear structure, and various technological applications. Lab exercises support and supplement the lectures topics.

General Education Category:
Goal 3: Science

Course coordinator:
Michael Dorneman, ext 3369, dornemam@mccc.edu

Required texts & Other materials:
"PHY 111 Course and Laboratory Manual"
"On Giants Shoulders" Melvyn Bragg

Course Student Learning Outcomes (SLO):

Upon successful completion of this course, the student will be able to:
Analyze, explain, solve problems with, perform laboratory experiments investigating, and answer questions about:

1. The nature of science, measuring and measurements, motion, the Gravitational Force, and Astronomy

2. Electromagnetic interactions, spectrum radiation, visible light, and atomic structure

3. Bonding and molecules, heat, temperature, and states of matter, nuclear structure, reactions, and nuclear energy and the nucleus.

Course-specific Institutional Learning Goals (ILG):

Institutional Learning Goal 3. Science. Students will use the scientific method of inquiry, through the acquisition of scientific knowledge.
Institutional Learning Goal 11. Critical Thinking: Students will use critical thinking skills understand, analyze, or apply information or solve problems.

Units of study in detail – Unit Student Learning Outcomes:

I. **Measurements in the Physical Sciences:**
The Student will evidence a knowledge and understanding of natural science, measurements, measured quantities, scientific communication, and other topics generally important to scientific understanding and the evolution of our understanding of these concepts by laboratory participation, written discussions, answering questions, and solving problems (SLO 1)

II. **Motion:**
The Student will evidence a knowledge and understanding of motion and related concepts, Newton's laws of motion, force, and the evolution of our understanding of these concepts by, written discussions, answering questions, and solving problems. (SLO 1)

III. **Gravitational Interactions:**
The Student will evidence a knowledge and understanding of Gravity and related concepts, and the evolution of our understanding of these concepts, by laboratory participation, discussions, answering questions, and solving problems. (SLO 1)

IV. **Astronomy:**
The Student will evidence a knowledge and understanding of Astronomy, the Solar System, stars, the Universe, and related concepts, and the evolution of our understanding of these concepts, by, answering questions, and solving problems. (SLO 1)

V. **Electromagnetic Interactions:**
From an essentially non-mathematical treatment which depends heavily on laboratory experiences, the student will evidence a knowledge and understanding of Magnetism, electromagnetism, electricity, and related concepts, and the evolution of our understanding of these concepts, by their laboratory participation, discussions, answering questions, and solving problems. (SLO 2)

VI. **Electromagnetic Radiation and the Nature of Light:**
From a historical perspective and through a series of six laboratory investigations, the student will evidence a knowledge and understanding of, Electromagnetic Radiation, the Nature of Light, optics and optical instruments, and related concepts, and the evolution of our understanding of these concepts by their laboratory participation, discussions, answering questions, and solving problems. (SLO 2)

VII. **Atomic Structure:**
The Student will evidence a knowledge and understanding of the atomic nature of the universe, atomic structure, the Periodic Table, related concepts, and the evolution of our understanding of these concepts by their laboratory participation, discussions, answering questions, and solving problems. (SLO 2)

VIII. **Bonding and Molecules:**
The Student will evidence a knowledge and understanding of chemical bonds, compound formation, the Periodic Table, chemical properties of elements, organic

chemistry and organic molecules, related concepts, and the evolution of our understanding of these concepts by their laboratory participation, discussing, answering questions, and solving problems. (SLO 3)

IX. Heat, Temperature, and the States of Matter:
The Student will evidence a knowledge and understanding of temperature, heat, energy, states of matter, and related concepts by, answering questions, and solving problems. (SLO 3)

X. Nuclear Structure, Reactions, and Energy:
The Student will evidence a knowledge and understanding of the nucleus, the nuclear force, nuclear reactions, nuclear energy, radioactivity, related concepts, and the evolution of our understanding of these concepts by their laboratory participation, discussions, answering questions, and solving problems. (SLO 3)

Evaluation of student learning:
Students are graded by quizzes, exams, homework, laboratory participation, and laboratory report forms.

Weekly quizzes are given, focused on each laboratory. Homework is evaluated several times each semester.

Three major multiple choice exams are given, one exam for each course competency, one is also a comprehensive final exam.

Laboratory participation is evaluated by attendance and behavior in each lab, in addition to a laboratory report form submitted each week by the student. Laboratory report forms include mathematical problems, written explanations, evaluations, and conclusions about each lab.