SPH4U Earl of March Secondary School
Course Outline

Course description and evaluation

Course : Physics, Grade 12, University Preparation (SPH4U)

Instructors: Mr. R. Gemmell and Mr. S. Amini

Text book

Nelson Physics 12; Al Hirsch, David Martindale, Maurice Barry, Charles Stewart; Nelson Thomson Learning, 2003

Course Overview

This course enables students to deepen their understanding of the concepts and theories of physics. Students will explore further the laws of dynamics and energy transformations, and will investigate electrical, gravitational, and magnetic fields; electromagnetic radiation; and the interface between energy and matter. They will further develop inquiry skills, learning, for example, how the interpretation of experimental data can provide indirect evidence to support the development of a scientific model. Students will also consider the impact on society and the environment of technological applications of physics.

Units of Study	Key Learning Expectations
Forces and Motion: Dynamics	*By the end of this course, students will:* • analyze the motion of objects in horizontal, vertical, and inclined planes, and predict and explain the motion with reference to the forces acting on the objects; • investigate motion in a plane, through experiments or simulations, and analyze and solve problems involving the forces acting on an object in linear, projectile, and circular motion, with the aid of vectors, graphs, and free-body diagrams; • analyze ways in which an understanding of the dynamics of motion relates to the development and use of technological devices, including terrestrial and space vehicles, and the enhancement of recreational activities and sports equipment.
Energy and Momentum	*By the end of this course, students will:* • demonstrate an understanding of the concepts of work, energy, momentum, and the laws of conservation of energy and of momentum for objects moving in two dimensions, and explain them in qualitative and quantitative terms; • investigate the laws of conservation of momentum and of energy (including elastic and inelastic collisions) through experiments or simulations, and analyze and solve problems involving these laws with the aid of vectors, graphs, and free-body diagrams; • analyze and describe the application of the concepts of energy and momentum to the design and development of a wide range of collision and impact-absorbing devices used in everyday life.
Electric, Gravitational and Magnetic Fields	*By the end of this course, students will:* • demonstrate an understanding of the concepts, principles, and laws related to electric, gravitational, and magnetic forces and fields, and explain them in qualitative and quantitative terms; • conduct investigations and analyze and solve problems related to electric, gravitational, and magnetic fields; • explain the roles of evidence and theories in the development of scientific knowledge related to electric, gravitational, and magnetic fields, and evaluate and describe the social and economic impact of technological developments related to the concept of fields.
The Wave Nature of Light	*By the end of this course, students will:* • demonstrate an understanding of the wave model of electromagnetic radiation, and describe how it explains diffraction patterns, interference, and polarization; • perform experiments relating the wave model of light and technical applications of electromagnetic radiation (e.g., lasers and fibre optics) to the phenomena of refraction, diffraction, interference, and polarization; • analyze phenomena involving light and colour, explain them in terms of the wave model of light, and explain how this model provides a basis for developing technological devices. underlying their production, transmission, interaction, and reception.

Matter-Energy Interface	*By the end of this course, students will:* • demonstrate an understanding of the basic concepts of Einstein's special theory of relativity and of the development of models of matter, based on classical and early quantum mechanics, that involve an interface between matter and energy; • interpret data to support scientific models of matter, and conduct thought experiments as a way of exploring abstract scientific ideas; • describe how the introduction of new conceptual models and theories can influence and change scientific thought and lead to the development of new technologies.

Absences

If a student is aware that he/she will be away for a class in advance, the student should inform the teacher and make arrangements to keep up with the class.

Learning Skills

The Student will be assessed on the following learning skills: homework, organization, teamwork, initiative, and ability to work independently. These learning skills will be assessed on a regular basis and will be reported separately on the report card.

Assessment and Evaluation

- 70% of the grade will be based upon evaluations conducted throughout the course. This portion of the grade will reflect the student's most consistent level of achievement throughout the course, although special consideration will be given to more recent evidence of achievement
- 30% of the grade will be based on a final exam and a course summative administered at the end of the course.