

Canterbury High School

Ottawa-Carleton District School Board

Science Department

Semester I – 2010 / 11 – Course Outline

Course Title: Grade 12 Physics, University Prep

Course Code: SPH4U

Prerequisite: SPH3U

Grade Level: 12

Credit Value: 1.0

Teachers: Mr. Moore

Course Overview: 110 hours

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.

Strands:

Course Expectations

Dynamics

Overall Expectations

By the end of this course, students will:

- analyse technological devices that apply the principles of the dynamics of motion, and assess the technologies' social and environmental impact;
- investigate, in qualitative and quantitative terms, forces involved in uniform circular motion and motion in a plane, and solve related problems;
- demonstrate an understanding of the forces involved in uniform circular motion and motion in a plane.

Energy and Momentum

Overall Expectations

By the end of this course, students will:

- analyse, and propose ways to improve, technologies or procedures that apply principles related to energy and momentum, and assess the social and environmental impact of these technologies or procedures;

- investigate, in qualitative and quantitative terms, through laboratory inquiry or computer simulation, the relationship between the laws of conservation of energy and conservation of momentum, and solve related problems;
- demonstrate an understanding of work, energy, momentum, and the laws of conservation of energy and conservation of momentum, in one and two dimensions

Gravitational, Electrical, and Magnetic Fields

Overall Expectations

By the end of this course, students will:

- analyse the operation of technologies that use gravitational, electric, or magnetic fields, and assess the technologies' social and environmental impact;
- investigate, in qualitative and quantitative terms, gravitational, electric, and magnetic fields, and solve related problems;
- demonstrate an understanding of the concepts, properties, principles, and laws related to gravitational, electric, and magnetic fields and their interactions with matter.

The Wave Nature of Light

Overall Expectations

By the end of this course, students will:

- analyse technologies that use the wave nature of light, and assess their impact on society and the environment;
- investigate, in qualitative and quantitative terms, the properties of waves and light, and solve related problems;
- demonstrate an understanding of the properties of waves and light in relation to diffraction, refraction, interference, and polarization.

Quantum Mechanics and Special Relativity

Overall Expectations

By the end of this course, students will:

- analyse, with reference to quantum mechanics and relativity, how the introduction of new conceptual models and theories can influence and/or change scientific thought and lead to the development of new technologies;
- investigate special relativity and quantum mechanics, and solve related problems;

- demonstrate an understanding of the evidence that supports the basic concepts of quantum mechanics and Einstein’s theory of special relativity.

Units of Study

In science, each strand covered will be a unit of study. The units of study are:

- **Dynamics**
- **Energy and Momentum**
- **Gravitational, Electrical, and Magnetic Fields**
- **The Wave Nature of Light**
- **Quantum Mechanics and Special Relativity**

See above section for more details.

Teaching Strategies

teacher demonstrations	small group work
laboratory experiments	student-teacher conferencing
multimedia	written assignments
investigative research	hands-on activities

Assessment and Evaluation Strategies

written tests	rubrics
lab reports	group presentations
observation (formal and informal)	discussion
homework checks and quizzes	research projects
summative assignment	exam

Evaluation Summary

Knowledge and Understanding	25 %
Thinking, Inquiry & Problem Solving	25 %
Communication	10 %
Making Connections	10 %
Summative Evaluation	10 %
Final Examination	20 %

Please refer to the achievement chart for science in the ministry curriculum documents for more information.

References

http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf

Student Resources / Texts

Nelson Physics 12, replacement cost \$99.95 + tax and shipping