



# SPH4U – Physics 12

## Course Profile & Evaluation

### Course Description / Rationale / Overview

This course enables students to deepen their understanding of physics concepts and theories. Students will continue their exploration of energy transformations and the forces that affect motion, and will investigate electrical, gravitational, and magnetic fields and electromagnetic radiation. Students will also explore the wave nature of light, quantum mechanics, and special relativity. They will further develop their scientific investigation skills, learning, for example, how to analyze, qualitatively and quantitatively, data related to a variety of physics concepts and principles. Students will also consider the impact of technological applications of physics on society and the environment.

**Prerequisite:** Physics 11, University Preparation (SPH3U)

### Class Requirements

#### Student Responsibility

Students must seek assistance from the teacher for all work missed due to absence and must make arrangements to complete missed work.

### Course Requirements/Department Policies

#### Attendance requirement

Students are required to log in at least once per week on course activity. Students are expected to spend approximately 7 hours per week for both online and offline learning activities. Students are required to keep a Student Learning Log for each course documenting online and offline activities.

#### What is considered an Absence?

If a student fails to login in two consecutive weeks, it will be considered as one absence. When a student has 2 absences, the school will issue a warning letter.

### Evaluation

Assignments, projects, lab reports, conversations, quizzes, presentations, unit tests and final examination

### Curriculum Strands

1. Dynamics
2. Energy & Momentum
3. Gravitational, Electric & Magnetic Fields
4. The Wave Nature of Light
5. Revolution of Modern Physics

### Achievement Categories

- Knowledge & Understanding 30%
- Thinking & Inquiry 20%
- Communication 20%
- Application 30%

### Learning Skills

- Initiative
- Work Habits / Homework
- Organization
- Works Independently
- Teamwork

### Evaluation

Assignments & Lab Reports	20 %	<b>FINAL MARK</b>	
Quizzes	15%	Term Work:	70%
Unit Tests	20%	Final Examination	30%
Midterm	15 %		
Final Evaluation	30 %		

### Resources

**Textbook:** Nelson Physics 12; DiGiuseppe, M., & Stewart, C. (2012). *Physics 12*. Toronto, Ont.: Nelson Education.

## **Course Outline:**

### **Dynamics**

1. Forces affect motion in predictable and quantifiable ways
2. Forces acting on an object will determine the motion of that object
3. Many technologies that utilize the principles of dynamics have societal and environmental implications

### **Energy and Momentum**

1. Energy and momentum are conserved in all interactions
2. Interactions involving the laws of conservation of energy and conservation of momentum can be analyzed mathematically
3. Technological applications that involve energy and momentum can affect society and the environment in positive and negative ways

### **Gravitational, Electric, and Magnetic Fields**

1. Gravitational, electric, and magnetic forces act on matter from a distance
2. Gravitational, electric, and magnetic fields share many similar properties
3. The behaviour of matter in gravitational, electric, and magnetic fields can be described mathematically
4. Technological systems that involve gravitational, electric and magnetic fields can have an effect on society and the environment

### **The Wave Nature of Light**

1. Light has properties that are similar to the properties of mechanical waves
2. The behaviour of light as a wave can be described mathematically
3. Technologies that use the principles of the wave nature of light can have societal and environmental implications

### **Revolution of Modern Physics**

1. Investigate special relativity and quantum mechanics, and solve related problems
2. Examining Einstein's theory of special relativity, photoelectric effect, and particle physics
3. Introduction of new conceptual models influence and change scientific thought, and leading to the development of new technologies