

# LISGAR COLLEGIATE INSTITUTE



**DEPARTMENT:** Science

**COURSE NAME:** Physics, Grade 12, University Preparation

**COURSE CODE:** SPH 4U and SPH 4UG

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## 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.

## COURSE CONTENT

Forces and Motion: Dynamics

Energy and Momentum

Electrical, Gravitational, and Magnetic Fields

The Wave Nature of Light

Matter-Energy Interface

## OVERALL CURRICULUM EXPECTATIONS

By the end of this course, students will:

- analyse 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 analyse 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;
- analyse 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.
- 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 analyse and solve problems involving these laws with the aid of vectors, graphs, and free-body diagrams;
- analyse 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.
- 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 analyse 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.
- 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;
- analyse 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.
- 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.

## **LEARNING SKILLS**

The development of sound learning skills is essential to the success of our students. Teachers and students will work together to understand and further the development of student learning skills in the areas of initiative, work habits, organization, team work, and independent work. Teachers report on learning skills on the midterm and final report cards.

## **ASSESSMENT METHODS**

Students' understanding of the course material will be assessed and evaluated using unit tests, quizzes, in-class and take-home assignments, lab activities and reports, a summative project, and a final exam. Marks from the various assignments will be broken down and recorded in the following categories. Please refer to the Lisgar Assessment and Evaluation Policy.

## **EVALUATION**

### **Course Work (70%)**

1. Application	10 %
2. Knowledge/Understanding	15 %
3. Communication	10 %
4. Thinking/Inquiry/Problem Solving	35 %

### **Summative (10%)**

Summative Due Date(s):            week of January 5, 2009

### **Exam (20%)**

The final exam will cover the entire course.

## ATTENDANCE

If you are absent from class, you are expected to catch up what you missed and complete any relevant homework. When you return to class, you must show your teacher an Absence Verification Form.

If you know in advance that you will be absent for a test, please see your teacher **before** the scheduled test date to arrange an alternate time to write it.

If you are unexpectedly absent for a valid reason on the day of a scheduled test, please let your teacher know why. When you return to class, remember to show an Absence Verification Form from your homeroom teacher and a note from your parents indicating that they are aware you missed the test. An **unjustified absence** for a test may result in a **mark of zero**.

## SUPPLEMENTARY NOTES

Text: Nelson Physics 12 (Thomson Nelson)

Each Student will be assigned a textbook. If it is lost or damaged, the replacement cost is \$114.92.

Texts are to be covered with sturdy paper.

Prerequisite: Physics, Grade 11, University Preparation

Homework:

The importance of regular completion of homework cannot be overemphasized.

\* Record homework assignments in your agenda at the end of each class.

\*Homework must be completed before the end of next day's class.

Extra help: See your teacher about arranging a mutually convenient time for extra help.

Please see page 25 in the Lisgar Student Planner under the heading "Extra help In A Subject".