

This document provides information about the science courses being taught at St. Ignatius of Loyola Catholic Secondary School for the 2016-2017 school year.

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## Grade 9 Academic Science SNC1D

- Course description from “The Ontario Curriculum, Grades 9 and 10: Science, 2008 (revised)”, p. 47

[http://www.edu.gov.on.ca/eng/curriculum/secondary/science910\\_2008.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf)

This course enables students to develop their understanding of basic concepts in biology, chemistry, earth and space science, and physics, and to relate science to technology, society, and the environment. Throughout the course, students will develop their skills in the processes of scientific investigation. Students will acquire an understanding of scientific theories and conduct investigations related to sustainable ecosystems; atomic and molecular structures and the properties of elements and compounds; the study of the universe and its properties and components; and the principles of electricity. Prerequisite: None

- Big Ideas

- Biology

- Ecosystems are dynamic and have the ability to respond to change, within limits, while maintaining their ecological balance.
- People have the responsibility to regulate their impact on the sustainability of ecosystems in order to preserve them for future generations.

- Chemistry

- Elements and compounds have specific physical and chemical properties that determine their practical uses.
- The use of elements and compounds has both positive and negative effects on society and the environment.

- Earth and Space Science

- Different types of celestial objects in the solar system and universe have distinct properties that can be investigated and quantified.
- People use observational evidence of the properties of the solar system and the universe to develop theories to explain their formation and evolution.
- Space exploration has generated valuable knowledge but at enormous cost.

- Physics

- Electricity is a form of energy produced from a variety of non-renewable and renewable sources.
- The production and consumption of electrical energy has social, economic, and environmental implications.
- Static and current electricity have distinct properties that determine how they are used.

- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 50% of final evaluation (15% of final mark). The final exam is 50% of final evaluation (15% of final mark).

## Grade 9 Applied Science SNC1P

- Course description from “The Ontario Curriculum, Grades 9 and 10: Science, 2008 (revised)”, p. 59

[http://www.edu.gov.on.ca/eng/curriculum/secondary/science910\\_2008.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf)

This course enables students to develop their understanding of basic concepts in biology, chemistry, earth and space science, and physics, and to apply their knowledge of science to everyday situations. They are also given opportunities to develop practical skills related to scientific investigation. Students will plan and conduct investigations into practical problems and issues related to the impact of human activity on ecosystems; the structure and properties of elements and compounds; space exploration and the components of the universe; and static and current electricity.

Prerequisite: None

- Big Ideas
  - Biology
    - Ecosystems consist of a variety of components, including, in many cases, humans.
    - The sustainability of ecosystems depends on balanced interactions between their components.
    - Human activity can affect the sustainability of aquatic and terrestrial ecosystems.
  - Chemistry
    - Elements and compounds have specific properties that determine their uses.
    - The use of elements and compounds has both positive and negative effects on society and the environment.
  - Earth and Space Science
    - Celestial objects in the solar system and universe have specific properties that can be investigated and understood.
    - Technologies developed for space exploration have practical applications on Earth.
  - Physics
    - Electricity is a form of energy produced from a variety of non-renewable and renewable sources.
    - The production and consumption of electrical energy has social, economic, and environmental implications.
    - Static and current electricity have distinct properties that determine how they are used.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation

(17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).

- The final evaluation is 30% of the final mark. The course culminating activity is 50% of final evaluation (15% of final mark). The final exam is 50% of final evaluation (15% of final mark).

## Grade 9 Locally Developed Science SNC1L

- Course description

This course is a locally developed course.

The areas of study are

- Science in Daily Life
- Staying Alive
- Electrical Circuits
- Properties of Common Materials

- Course evaluation

- The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
- The final evaluation is 30% of the final mark. The course culminating activity is 100% of final evaluation (30% of final mark). There is no final exam in this course.

## Grade 10 Academic Science SNC2D

- Course description from “The Ontario Curriculum, Grades 9 and 10: Science, 2008 (revised)”, p. 71

[http://www.edu.gov.on.ca/eng/curriculum/secondary/science910\\_2008.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf)

This course enables students to enhance their understanding of concepts in biology, chemistry, earth and space science, and physics, and of the interrelationships between science, technology, society, and the environment. Students are also given opportunities to further develop their scientific investigation skills. Students will plan and conduct investigations and develop their understanding of scientific theories related to the connections between cells and systems in animals and plants; chemical reactions, with a particular focus on acid–base reactions; forces that affect climate and climate change; and the interaction of light and matter.

Prerequisite: Science, Grade 9, Academic or Applied

- Big Ideas
  - Biology
    - Plants and animals, including humans, are made of specialized cells, tissues, and organs that are organized into systems.
    - Developments in medicine and medical technology can have social and ethical implications.
  - Chemistry
    - Chemicals react with each other in predictable ways.
    - Chemical reactions may have a negative impact on the environment, but they can also be used to address environmental challenges.
  - Earth and Space Science
    - Earth’s climate is dynamic and is the result of interacting systems and processes.
    - Global climate change is influenced by both natural and human factors.
    - Climate change affects living things and natural systems in a variety of ways.
    - People have the responsibility to assess their impact on climate change and to identify effective courses of action to reduce this impact.
  - Physics
    - Light has characteristics and properties that can be manipulated with mirrors and lenses for a range of uses.
    - Society has benefited from the development of a range of optical devices and technologies.
- Course evaluation

Science Department Course Information 2016-2017 January 30, 2017

- The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
- The final evaluation is 30% of the final mark. The course culminating activity is 50% of final evaluation (15% of final mark). The final exam is 50% of final evaluation (15% of final mark).



## Grade 10 Applied Science SNC2P

- Course description from “The Ontario Curriculum, Grades 9 and 10: Science, 2008 (revised)”, p. 83

[http://www.edu.gov.on.ca/eng/curriculum/secondary/science910\\_2008.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf)

This course enables students to develop a deeper understanding of concepts in biology, chemistry, earth and space science, and physics, and to apply their knowledge of science in real-world situations. Students are given opportunities to develop further practical skills in scientific investigation. Students will plan and conduct investigations into everyday problems and issues related to human cells and body systems; chemical reactions; factors affecting climate change; and the interaction of light and matter.

Prerequisite: Science, Grade 9, Academic or Applied

- Big Ideas
  - Biology
    - All animals are made of specialized cells, tissues, and organs that are organized into systems.
    - Although technology and chemicals can be used to improve human health, they can also constitute a health hazard.
  - Chemistry
    - Chemicals react with one another in predictable ways.
    - Chemical reactions are a necessary component of chemical products and processes used in the home and workplace.
  - Earth and Space Science
    - Global climate change is affected by both natural and human factors.
    - Climate change affects living things and natural systems in a variety of ways.
  - Physics
    - A wide range of technologies utilize the properties of light and colour.
    - The behaviour of light depends on the materials with which it interacts.
    - Light is a form of energy, produced from a variety of sources, and can be transformed into other useful forms of energy.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).

Science Department Course Information 2016-2017 January 30, 2017

- The final evaluation is 30% of the final mark. The course culminating activity is 50% of final evaluation (15% of final mark). The final exam is 50% of final evaluation (15% of final mark).

## Grade 10 Locally Developed Science SNC2L

- Course description

This course is a locally developed course.

The areas of study are

- A Daily Dose of Chemistry
- Using Electric Energy
- Living Together
- Science and Media

- Course evaluation

- The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
- The final evaluation is 30% of the final mark. The course culminating activity is 100% of final evaluation (30% of final mark). There is no final exam in this course.

## Grade 11 College Biology SBI3C

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 60

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

This course focuses on the processes that occur in biological systems. Students will learn concepts and theories as they conduct investigations in the areas of cellular biology, microbiology, genetics, the anatomy of mammals, and the structure of plants and their role in the natural environment. Emphasis will be placed on the practical application of concepts, and on the skills needed for further study in various branches of the life sciences and related fields.

Prerequisite: Science, Grade 10, Academic or Applied

- Big Ideas
  - Cellular Biology
    - Life processes are determined by the structures and functions of biochemical compounds, cell organelles, and body systems.
    - Technological devices that support cellular functions and processes can be used to improve human health.
    - Substances that are present in our everyday lives can affect cellular functions and processes in positive and negative ways.
  - Microbiology
    - Groups of microorganisms have common characteristics, and these characteristics enable them to interact with other organisms in the environment
    - Microorganisms can have both positive and negative effects on the environment.
    - The technological use of microorganisms raises many ethical issues.
  - Genetics
    - Genetic research and biotechnology have social, environmental, and ethical implications.
    - Variability and diversity of living organisms result from the distribution of genetic materials during the process of meiosis.
  - Anatomy of Mammals
    - Groups of organs with specific structures and functions work together as systems, which interact with other systems in the body.
    - Technologies that are used to maintain human health have social and economic benefits and costs.
    - Environmental factors, including natural factors and those resulting from human activity, can have a wide range of effects on human health.

- Plants in the Natural Environment
  - Plants have specialized structures with distinct functions that enable them to respond and adapt to their environment.
  - Plants are critical to the survival of ecosystems.
  - Humans affect the sustainability of ecosystems when they alter the balance of plants within those ecosystems.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 50% of final evaluation (15% of final mark). The final exam is 50% of final evaluation (15% of final mark).

## Grade 11 University Biology SBI3U

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 46

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

This course furthers students' understanding of the processes that occur in biological systems. Students will study theory and conduct investigations in the areas of biodiversity; evolution; genetic processes; the structure and function of animals; and the anatomy, growth, and function of plants. The course focuses on the theoretical aspects of the topics under study, and helps students refine skills related to scientific investigation.

Prerequisite: Science, Grade 10, Academic

- Big Ideas
  - Diversity of Living Things
    - All living things can be classified according to their anatomical and physiological characteristics.
    - Human activities affect the diversity of living things in ecosystems.
  - Evolution
    - Evolution is the process of biological change over time based on the relationships between species and their environments.
    - The theory of evolution is a scientific explanation based on a large accumulation of evidence.
    - Technology that enables humans to manipulate the development of species has economic and environmental implications.
  - Genetic Processes
    - Genetic and genomic research can have social and environmental implications.
    - Variability and diversity of living organisms result from the distribution of genetic materials during the process of meiosis.
  - Animals: Structure and Function
    - Groups of organs with specific structures and functions work together as systems, which interact with other systems in the body.
    - The development and uses of technology to maintain human health are based, in part, on the changing needs of society.
  - Plants: Anatomy, Growth, and Function
    - Plants have specialized structures with distinct functions that enable them to respond and adapt to their environment.
    - Plant variety is critical to the survival and sustainability of ecosystems.

- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 33% of final evaluation (10% of final mark). The final exam is 67% of final evaluation (20% of final mark).

## Grade 12 University Biology SBI4U

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 74

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

This course provides students with the opportunity for in-depth study of the concepts and processes that occur in biological systems. Students will study theory and conduct investigations in the areas of biochemistry, metabolic processes, molecular genetics, homeostasis, and population dynamics. Emphasis will be placed on the achievement of detailed knowledge and the refinement of skills needed for further study in various branches of the life sciences and related fields.

Prerequisite: Biology, Grade 11, University Preparation

- Big Ideas
  - Biochemistry
    - Technological applications that affect biological processes and cellular functions are used in the food, pharmaceutical, and medical industries.
    - Biological molecules and their chemical properties affect cellular processes and biochemical reactions.
    - Biochemical compounds play important structural and functional roles in cells of all living organisms.
  - Metabolic Processes
    - All metabolic processes involve chemical changes and energy conversions.
    - An understanding of metabolic processes enables people to make informed choices with respect to a range of personal, societal, and environmental issues.
  - Molecular Genetics
    - DNA contains all the genetic information for any living organism.
    - Proteins control a wide variety of cellular processes.
    - Genetic research and biotechnology have social, legal, and ethical implications.
  - Homeostasis
    - Organisms have strict limits on the internal conditions that they can tolerate.
    - Systems that maintain homeostasis rely on feedback mechanisms.
    - Environmental factors can affect homeostasis.
  - Population Dynamics
    - Population growth follows predictable patterns.



- The increased consumption of resources and production of waste associated with population growth result in specific stresses that affect Earth's sustainability.
- Technological developments can contribute to or help offset the ecological footprint associated with population growth and the consumption of natural resources.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 33% of final evaluation (10% of final mark). The final exam is 67% of final evaluation (20% of final mark).

## Grade 11 University Chemistry SCH3U

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 90

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

This course enables students to deepen their understanding of chemistry through the study of the properties of chemicals and chemical bonds; chemical reactions and quantitative relationships in those reactions; solutions and solubility; and atmospheric chemistry and the behaviour of gases. Students will further develop their analytical skills and investigate the qualitative and quantitative properties of matter, as well as the impact of some common chemical reactions on society and the environment.

Prerequisite: Science, Grade 10, Academic

- Big Ideas
  - Matter, Chemical Trends, and Chemical Bonding
    - Every element has predictable chemical and physical properties determined by its structure.
    - The type of chemical bond in a compound determines the physical and chemical properties of that compound.
    - It is important to use chemicals properly to minimize the risks to human health and the environment.
  - Chemical Reactions
    - Chemicals react in predictable ways.
    - Chemical reactions and their applications have significant implications for society and the environment.
  - Quantities in Chemical Reactions
    - Relationships in chemical reactions can be described quantitatively.
    - The efficiency of chemical reactions can be determined and optimized by applying an understanding of quantitative relationships in such reactions.
  - Solutions and Solubility
    - Properties of solutions can be described qualitatively and quantitatively, and can be predicted.
    - Living things depend for their survival on the unique physical and chemical properties of water.
    - People have a responsibility to protect the integrity of Earth’s water resources.
  - Gases and Atmospheric Chemistry
    - Properties of gases can be described qualitatively and quantitatively, and can be predicted.
    - Air quality can be affected by human activities and technology.

- People have a responsibility to protect the integrity of Earth's atmosphere.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 33% of final evaluation (10% of final mark). The final exam is 67% of final evaluation (20% of final mark).

## Grade 12 College Chemistry SCH4C

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 118

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

This course enables students to develop an understanding of chemistry through the study of matter and qualitative analysis, organic chemistry, electrochemistry, chemical calculations, and chemistry as it relates to the quality of the environment. Students will use a variety of laboratory techniques, develop skills in data collection and scientific analysis, and communicate scientific information using appropriate terminology.

Emphasis will be placed on the role of chemistry in daily life and the effects of technological applications and processes on society and the environment.

Prerequisite: Science, Grade 10, Academic or Applied

- Big Ideas
  - Matter and Qualitative Analysis
    - The properties of matter can be predicted and analysed qualitatively.
    - Substances can be identified based on their distinct properties.
    - Qualitative analysis of matter is used in many different fields of endeavour.
  - Organic Chemistry
    - Organic compounds have predictable chemical and physical properties determined by their respective structures.
    - Organic compounds can be synthesized by living things or through artificial processes.
    - Organic chemical reactions and their applications have significant implications for society, human health, and the environment.
  - Electrochemistry
    - Oxidation and reduction are paired chemical reactions in which electrons are transferred from one substance to another in a predictable way.
    - The control and applications of oxidation and reduction reactions have significant implications for society and the environment.
  - Chemical Calculations
    - Relationships in chemical reactions can be described quantitatively.
    - Quantitative relationships of chemical reactions have applications in the home, workplace, and the environment.
  - Chemistry in the Environment

- Air and water quality can be affected by both natural processes and human activities.
- Quantitative relationships of chemical reactions can be used to assess air and water quality.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 50% of final evaluation (15% of final mark). The final exam is 50% of final evaluation (15% of final mark).

## Grade 12 University Chemistry SCH4U

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 104

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

This course enables students to deepen their understanding of chemistry through the study of organic chemistry, the structure and properties of matter, energy changes and rates of reaction, equilibrium in chemical systems, and electrochemistry. Students will further develop their problem-solving and investigation skills as they investigate chemical processes, and will refine their ability to communicate scientific information. Emphasis will be placed on the importance of chemistry in everyday life and on evaluating the impact of chemical technology on the environment.

Prerequisite: Chemistry, Grade 11, University Preparation

- Big Ideas
  - Organic Chemistry
    - Organic compounds have predictable chemical and physical properties determined by their respective structures.
    - Organic chemical reactions and their applications have significant implications for society, human health, and the environment.
  - Structure and Properties of Matter
    - The nature of the attractive forces that exist between particles in a substance determines the properties and limits the uses of that substance.
    - Technological devices that are based on the principles of atomic and molecular structures can have societal benefits and costs.
  - Energy Changes and Rates of Reaction
    - Energy changes and rates of chemical reactions can be described quantitatively.
    - Efficiency of chemical reactions can be improved by applying optimal conditions.
    - Technologies that transform energy can have societal and environmental costs and benefits.
  - Chemical Systems and Equilibrium
    - Chemical systems are dynamic and respond to changing conditions in predictable ways.
    - Applications of chemical systems at equilibrium have significant implications for nature and industry.
  - Electrochemistry
    - Oxidation and reduction are paired chemical reactions in which electrons are transferred from one substance to another in a predictable way.

- The control and applications of oxidation and reduction reactions have significant implications for industry, health and safety, and the environment.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 33% of final evaluation (10% of final mark). The final exam is 67% of final evaluation (20% of final mark).

## Grade 11 University Physics SPH3U

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 180

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

This course develops students’ understanding of the basic concepts of physics. Students will explore kinematics, with an emphasis on linear motion; different kinds of forces; energy transformations; the properties of mechanical waves and sound; and electricity and magnetism. They will enhance their scientific investigation skills as they test laws of physics. In addition, they will analyse the interrelationships between physics and technology, and consider the impact of technological applications of physics on society and the environment.

Prerequisite: Science, Grade 10, Academic

- Big Ideas
  - Kinematics
    - Motion involves a change in the position of an object over time.
    - Motion can be described using mathematical relationships.
    - Many technologies that apply concepts related to kinematics have societal and environmental implications.
  - Forces
    - Forces can change the motion of an object.
    - Applications of Newton’s laws of motion have led to technological developments that affect society and the environment.
  - Energy and Society
    - Energy can be transformed from one type to another.
    - Energy transformation systems often involve thermal energy losses and are never 100% efficient.
    - Although technological applications that involve energy transformations can affect society and the environment in positive ways, they can also have negative effects, and therefore must be used responsibly.
  - Waves and Sound
    - Mechanical waves have specific characteristics and predictable properties.
    - Sound is a mechanical wave.
    - Mechanical waves can affect structures, society, and the environment in positive and negative ways.
  - Electricity and Magnetism
    - Relationships between electricity and magnetism are predictable.



- Electricity and magnetism have many technological applications.
- Technological applications that involve electromagnetism and energy transformations can affect society and the environment in positive and negative ways.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 33% of final evaluation (10% of final mark). The final exam is 67% of final evaluation (20% of final mark).

## Grade 12 College Physics SPH4C

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 208

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

This course develops students’ understanding of the basic concepts of physics. Students will explore these concepts with respect to motion; mechanical, electrical, electromagnetic, energy transformation, hydraulic, and pneumatic systems; and the operation of commonly used tools and machines. They will develop their scientific investigation skills as they test laws of physics and solve both assigned problems and those emerging from their investigations. Students will also consider the impact of technological applications of physics on society and the environment.

Prerequisite: Science, Grade 10, Academic or Applied

- Big Ideas
  - Motion and Its Applications
    - All motion involves a change in the position of an object over time.
    - Motion can be described using mathematical relationships.
    - Many technologies that utilize the principles of motion have societal and environmental implications.
  - Mechanical Systems
    - Mechanical systems use force to do work.
    - The operation of mechanical systems can be described using mathematical relationships.
    - Friction is a force that influences the design, use, and effectiveness of mechanical systems.
    - Mechanical systems can be used to address social and environmental challenges.
  - Electricity and Magnetism
    - Relationships between electricity and magnetism are predictable.
    - Electricity and magnetism have many technological applications.
    - Technological applications that use electricity and magnetism can affect society and the environment in positive and negative ways.
  - Energy Transformations
    - Energy can be transformed from one type to another.
    - Systems that involve energy transformations are never 100% efficient.
    - Although technological applications that involve energy transformations can affect society and the environment in

positive ways, they can also have negative effects, and therefore must be used responsibly.

- Hydraulic and Pneumatic Systems
  - Fluids under pressure can be used to do work.
  - Fluids under pressure have predictable properties and many technological applications.
  - The uses of hydraulic and pneumatic systems can have social and economic consequences.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 50% of final evaluation (15% of final mark). The final exam is 50% of final evaluation (15% of final mark).

## Grade 12 University Physics SPH4U

- Course description from “The Ontario Curriculum, Grades 11 and 12: Science, 2008 (revised)”, p. 180

[http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11\\_12.pdf](http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf)

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 analyse, 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, Grade 11, University Preparation

- Big Ideas
  - Dynamics
    - Forces affect motion in predictable and quantifiable ways.
    - Forces acting on an object will determine the motion of that object.
    - Many technologies that utilize the principles of dynamics have societal and environmental implications.
  - Energy and Momentum
    - Energy and momentum are conserved in all interactions.
    - Interactions involving the laws of conservation of energy and conservation of momentum can be analysed mathematically.
    - Technological applications that involve energy and momentum can affect society and the environment in positive and negative ways.
  - Gravitational, Electric, and Magnetic Fields
    - Gravitational, electric, and magnetic forces act on matter from a distance.
    - Gravitational, electric, and magnetic fields share many similar properties.
    - The behaviour of matter in gravitational, electric, and magnetic fields can be described mathematically.
    - Technological systems that involve gravitational, electric, and magnetic fields can have an effect on society and the environment.
  - The Wave Nature of Light
    - Light has properties that are similar to the properties of mechanical waves.

- The behaviour of light as a wave can be described mathematically.
  - Technologies that use the principles of the wave nature of light can have societal and environmental implications.
- Revolutions in Modern Physics: Quantum Mechanics and Special Relativity
  - Light can show particle-like and wave-like behaviour, and particles can show wavelike behaviour.
  - The behaviour of light as a particle and the behaviour of particles as waves can be described mathematically.
- Course evaluation
  - The term evaluation is 70% of the final mark. This 70% is evenly weighted among the four categories – Knowledge and Understanding 25% of term evaluation (17.5% of final mark); Thinking and Inquiry 25% of term evaluation (17.5% of final mark); Communication 25% of term evaluation (17.5% of final mark); Application 25% of term evaluation (17.5% of final mark).
  - The final evaluation is 30% of the final mark. The course culminating activity is 33% of final evaluation (10% of final mark). The final exam is 67% of final evaluation (20% of final mark)