



## Ontario Canada Science Standards Alignment with Earth Force Process

### The Ontario Curriculum, Grades 11 and 12: Science, 2008

Overall, the Earth Force Process supports the 3 overarching goals of the Ontario Science Program, the fundamental concept of Sustainability and Stewardship, the application of inquiry and problem-solving skills to the world beyond the classroom, and the involvement of community partners as a learning resource.

Of the five strands in the Science Curriculum for grades 9 and 10, Strand A- Scientific Investigation Skills is the one in which the Earth Force Process has the strongest alignment and support for the Ontario Canada Science Standards. The Process is an inquiry-driven Process throughout, and decisions that students must make along the way are based on their inquiry, research, and analysis of the information gathered. The Process relies on critical thinking and provides opportunities throughout for students to practice and develop their critical thinking skills.

Following are the specific components of the Ontario Science Curriculum for Grades 11 and 12 that can be addressed through the Earth Force Process.

### **BIOLOGY**

#### **Grade 11 University Preparation SBI3U**

#### **A. Scientific Investigation Skills and Career Exploration**

##### *Overall Expectations*

- A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);
  
- A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

##### *Specific Expectations*

#### A1. Scientific Investigation Skills

##### *Initiating and Planning [IP]\**

A1.1

##### *Performing and Recording [PR]*

A1.6, A1.7

*Analysing and Interpreting [AI]\**

A1.8, A1.9, A1.10

*Communicating [C]\**

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

## **B. Diversity of Living Things**

*Overall Expectations*

B1. analyse the effects of various human activities on the diversity of living things;

*Specific Expectations*

B1. Relating Science to Technology, Society, and the Environment

B1.1, B1.2

## **C. Evolution**

*Overall Expectations*

C1. analyse the economic and environmental advantages and disadvantages of an artificial selection technology, and evaluate the impact of environmental changes on natural selection and endangered species;

*Specific Expectations*

C1. Relating Science to Technology, Society, and the Environment

C1.1, C1.2

## **E. Animals: Structure and Function**

*Overall Expectations*

E1. analyse the relationships between changing societal needs, technological advances, and our understanding of internal systems of humans;

*Specific Expectations*

E1. Relating Science to Technology, Society, and the Environment

E1.2

## **F. Plants: Anatomy, Growth, and Function**

*Overall Expectations*

F1. evaluate the importance of sustainable use of plants to Canadian society and other cultures;

*Specific Expectations*

F1. Relating Science to Technology, Society, and the Environment

F1.1, F1.2

### **Grade 11 SBI3C**

#### **A. Scientific Investigation Skills and Career Exploration**

##### *Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

##### *Specific Expectations*

#### A1. Scientific Investigation Skills

##### *Initiating and Planning [IP]\**

A1.3

##### *Performing and Recording [PR]\**

A1.5, A1.7

##### *Analysing and Interpreting [AI]\**

A1.8, A1.9, A1.10

##### *Communicating [C]\**

A1.11, A1.12, A1.13

#### A2. Career Exploration

A2.1 i

### **F. Plants in the Natural Environment**

##### *Overall Expectations*

F1. analyse the roles of plants in ecosystems, and assess the impact of human activities on the balance of plants within those ecosystems;

##### *Specific Expectations*

#### F1. Relating Science to Technology, Society, and the Environment

F1.1, F1.2

### **Grade 12 University Preparation SBI4**

#### **A. Scientific Investigation Skills and Career Exploration**

##### *Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

A1. Scientific Investigation Skills

*Initiating and Planning*

A1.1, A1.3, A1.4

*Performing and Recording*

A1.5, A1.6, A1.7

*Analysing and Interpreting*

A1.8, A1.9, A1.10

*Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

**E. Homeostasis**

*Overall Expectations*

E1. evaluate the impact on the human body of selected chemical substances and of environmental factors related to human activity;

*Specific Expectations*

E1. Relating Science to Technology, Society, and the Environment

E1.2

**F. Population Dynamics**

*Overall Expectations*

F1. analyse the relationships between population growth, personal consumption, technological development, and our ecological footprint, and assess the effectiveness of some Canadian initiatives intended to assist expanding populations;

*Specific Expectations*

F1. Relating Science to Technology, Society, and the Environment

F1.1, F1.2

**CHEMISTRY**

**Grade 11 University Preparation SCH3U**

**A. Scientific Investigation Skills and Career Exploration**

### *Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

### *Specific Expectations*

A1. Scientific Investigation Skills

*Performing and Recording*

A1.5, A1.6, A1.7

*Analysing and Interpreting*

A1.8, A.9, A1.10

*Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

## **B. Matter, Chemical Trends, and Chemical Bonding**

### *Overall Expectations*

B1. analyse the properties of commonly used chemical substances and their effects on human health and the environment, and propose ways to lessen their impact;

### *Specific Expectations*

B1 Relating Science to Technology, Society and the Environment

B1.2

## **E. Solutions and Solubility**

### *Overall Expectations*

E1. analyse the origins and effects of water pollution, and a variety of economic, social, and environmental issues related to drinking water;

### *Specific Expectations*

E1. Relating Science to Technology, Society and the Environment

E1.1, E1.2

E2. Developing Skills of Investigation and Communication

E2.8

## **F. Gases and Atmospheric Chemistry**

### *Overall Expectations*

F1. analyse the cumulative effects of human activities and technologies on air quality, and describe some Canadian initiatives to reduce air pollution, including ways to reduce their own carbon footprint;

*Specific Expectations*

F1. Relating Science to Technology, Society and the Environment

F1.1. F1.2

**Grade 12 University Preparation SCH4U**

**A. Scientific Investigation Skills and Career Exploration**

*Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

*Performing and Recording*

A1.5, A1.6, A1.7

*Analysing and Interpreting*

A1.8, A1.9, A1.10

*Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

**B. Organic Chemistry**

*Overall Expectations*

B1. assess the social and environmental impact of organic compounds used in everyday life, and propose a course of action to reduce the use of compounds that are harmful to human health and the environment;

*Specific Expectations*

B1. Relating Science to Technology, Society and the Environment

B1.1, B1.2

**Grade 12 College Preparation SCH4C**

**A. Scientific Investigation Skills and Career Exploration**

*Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

*Initiating and Planning*

A1.1, A1.3, A1.4

*Performing and Recording*

A1.6, A1.7

*Analysing and Interpreting*

A1.8, A1.9, A1.10

*Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

**B. Matter and Qualitative Analysis**

*Overall Expectations*

B1. evaluate the effects of chemical substances on the environment, and analyse practical applications of qualitative analysis of matter;

*Specific Expectations*

B1. Relating Science to Technology, Society and the Environment

B1.1

**C. Organic Chemistry**

*Overall Expectations*

C1. evaluate the impact on society, human health, and the environment of products made using organic compounds;

*Specific Expectations*

C1. Relating Science to Technology, Society and the Environment

C1.1

**F. Chemistry in the Environment**

*Overall Expectations*

F1. evaluate the importance of government regulations, scientific analyses, and individual actions in improving air and water quality, and propose a personal plan of action to support these efforts;

*Specific Expectations*

F1. Relating Science to Technology, Society and the Environment

F1.1, F1.2

**EARTH AND SPACE SCIENCE**

**Grade 12 University Preparation SES4U**

A. Scientific Investigation Skills and Career Exploration

*Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

A1 Scientific Investigation Skills

*Initiating and Planning*

A1.1, A1.3, A1.4

*Performing and Recording*

A1.5, A1.6, A1.7

*Analysing and Interpreting*

A1.8, A1.9, A.10

*Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

**ENVIRONMENTAL SCIENCE**

**Grade11 University Preparation SVN3M**

A. Scientific Investigation Skills and Career Exploration

*Overall Expectations*



A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

A1 Scientific Investigation Skills

*Initiating and Planning*

A1.1, A1.3, A1.4

*Performing and Recording*

A1.5, A1.6, A1.7

*Analysing and Interpreting*

A1.8, A1.9, A1.10

*Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

B. Scientific Solutions to Contemporary Environmental Challenges

*Overall Expectations*

B1. analyse social and economic issues related to an environmental challenge, and how societal needs influence scientific endeavours related to the environment;

B2. investigate a range of perspectives that have contributed to scientific knowledge about the environment, and how scientific knowledge and procedures are applied to address contemporary environmental problems;

B3. demonstrate an understanding of major contemporary environmental challenges and how we acquire knowledge about them.

*Specific Expectations*

B1. Relating Science to Technology, Society, and the Environment

B1.1, B1.2

B2. Developing Skills of Investigation and Communication

B2.1, B2.3, B2.4, B2.5

B3. Understanding Basic Concepts

B3.1, B3.2, B3.4, B3.5

#### C. Human Health and the Environment

##### *Overall Expectations*

C1. analyse initiatives, both governmental and non-governmental, that are intended to reduce the impact of environmental factors on human health;

C2. investigate environmental factors that can affect human health, and analyse related data;

C3. demonstrate an understanding of various environmental factors that can affect human health, and explain how the impact of these factors can be reduced.

##### *Specific Expectations*

C1. Relating Science to Technology, Society and the Environment

C1.1, C1.2

C2. Developing Skills of Investigation and Communication

C2.1, C2.2, C2.3, C2.4, C2.5

C3. Understanding Basic Concepts

C3.1, C3.2, C3.3, C3.4, C3.5

#### D. Sustainable Agriculture and Forestry

##### *Overall Expectations*

D1. evaluate the impact of agricultural and forestry practices on human health, the economy, and the environment;

D1. Relating Science to Technology, Society, and the Environment

D1.1, D1.2

#### E. Reducing and Managing Waste

##### *Overall Expectations*

E1. analyse economic, political, and environmental considerations affecting waste management strategies;

E2. investigate the effectiveness of various waste management practices;

E1. Relating Science to Technology, Society, and the Environment

E1.1, E1.2

E2. Developing Skills of Investigation and Communication

E2.4, E2.5

E3. Understanding Basic Concepts

E3.1, E3.2, E3.4, E3.5

## F. Conservation of Energy

### *Overall Expectations*

F1. assess the impact on society and the environment of the use of various renewable and non-renewable energy sources, and propose a plan to reduce energy consumption;

F2. investigate various methods of conserving energy and improving energy efficiency;

### *Specific Expectations*

F1. Relating Science to Technology, Society, and the Environment

F1.2, F1.2

F2. Developing Skills of Investigation and Communication

F2.1, F2.2, F2.3, F2.4, F2.5

F3. Understanding the Basic Concepts

F3.1, F3.2, F3.3

## **Grade 11 Workplace Preparation SVN3E**

A. Scientific Investigation Skills and Career Exploration

### *Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

### *Specific Expectations*

A1 Scientific Investigation Skills

#### *Initiating and Planning*

A1.1, A1.3, A1.4

#### *Performing and Recording*

A1.5, A1.6, A1.7

#### *Analysing and Interpreting*

A1.8, A1.9, A1.10

#### *Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

## A2.1

### B. Human Impact on the Environment

#### *Overall Expectations*

B1. analyse selected current environmental problems in terms of the role human activities have played in creating or perpetuating them, and propose possible solutions to one such problem;

B2. investigate air, soil, and water quality in natural and disturbed environments, using appropriate technology;

B3. demonstrate an understanding of some of the ways in which human activities affect the environment and how the impact of those activities is measured and monitored.

#### *Specific Expectations*

### B. Scientific Solutions to Contemporary Environmental Challenges

#### *Overall Expectations*

B1. analyse social and economic issues related to an environmental challenge, and how societal needs influence scientific endeavours related to the environment;

B2. investigate a range of perspectives that have contributed to scientific knowledge about the environment, and how scientific knowledge and procedures are applied to address contemporary environmental problems;

B3. demonstrate an understanding of major contemporary environmental challenges and how we acquire knowledge about them.

#### *Specific Expectations*

### B1. Relating Science to Technology, Society, and the Environment

B1.1, B1.2

### B2. Developing Skills of Investigation and Communication

B2.1, B2.3, B2.4, B2.5

### B3. Understanding Basic Concepts

B3.1, B3.3, B3.4, B3.5, B3.6

### C. Human Health and the Environment

#### *Overall Expectations*

C1. analyse initiatives, both governmental and non-governmental, that are intended to reduce the impact of environmental factors on human health;

C2. investigate environmental factors that can affect human health, and analyse related data;

C3. demonstrate an understanding of various environmental factors that can affect human health, and explain how the impact of these factors can be reduced.

*Specific Expectations*

C1. Relating Science to Technology, Society and the Environment

C1.1, C1.2

C2. Developing Skills of Investigation and Communication

C2.1, C2.2

C3. Understanding Basic Concepts

C3.1, C3.2, C3.3

D. Energy Conservation

*Overall Expectations*

D1. evaluate initiatives and technological innovations related to energy consumption and conservation, and assess their impact on personal lifestyles, social attitudes, and the environment;

D2 . investigate various methods of conserving energy and improving energy efficiency;

*Specific Expectations*

D1. Relating Science to Technology, Society and the Environment

D1.1, D1.2

D2. Developing Skills of Investigation and Communication

D2.1, D2.2, D2.3, D2.4

D3. Understanding Basic Concepts

D3.2, D3.3

**PHYSICS**

**Grade 11 University Preparation SPH3U**

A. Scientific Investigation Skills and Career Exploration

*Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

A1 Scientific Investigation Skills

*Initiating and Planning*

A1.1, A1.3,

*Performing and Recording*

A1.5, A1.6, A1.7

*Analysing and Interpreting*

A1.8, A1.9, A.10

*Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

D. Energy and Society

*Overall Expectations*

D1. analyse technologies that apply principles of and concepts related to energy transformations, and assess the technologies' social and environmental impact;

*Specific Expectations*

D1. Relating Science to Technology, Society, and the Environment

D1.2, D1.2

**Grade12 University Preparation SPH4U**

A. Scientific Investigation Skills and Career Exploration

*Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

A1 Scientific Investigation Skills

*Initiating and Planning*

A1.1, A1.3, A1.4

*Performing and Recording*

A1.5, A1.6, A1.7

*Analysing and Interpreting*  
A1.8, A1.9, A.10

*Communicating*  
A1.11, A1.12, A1.13

A2. Career Exploration  
A2.1

## **Grade 12 College Preparation SPH4C**

A. Scientific Investigation Skills and Career Exploration

*Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

A1 Scientific Investigation Skills

*Initiating and Planning*  
A1.1, A1.3, A1.4

*Performing and Recording*  
A1.5, A1.6, A1.7

*Analysing and Interpreting*  
A1.8, A1.9, A.10

*Communicating*  
A1.11, A1.12, A1.13

A2. Career Exploration  
A2.1

## **SCIENCE**

### **Grade 12 University/College Preparation SNC4M**

A. Scientific Investigation Skills and Career Exploration

*Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

*Specific Expectations*

A1 Scientific Investigation Skills

*Initiating and Planning*

A1.1, A1.3, A1.4

*Performing and Recording*

A1.5, A1.6, A1.7

*Analysing and Interpreting*

A1.8, A1.9, A1.10

*Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

D. Nutritional Science

*Overall Expectations*

D1. assess how personal and societal factors affect eating behaviours, and evaluate the social and economic impact of the use of non-nutrient food additives;

*Specific Expectations*

D1. Relating Science to Technology, Society, and the Environment

D1.1, D1.2

E. Science and Public Health Issues

*Overall Expectations*

E1. assess the impact of scientific research, technological advances, and government initiatives on public health;

E2. investigate various strategies related to contemporary public health issues;

*Specific Expectations*

E1. Relating Science to Technology, Society and the Environment

E1.1, E1.2



## E2. Developing Skills of Investigation and Communication

E2.1, E2.2, E2.3, E2.4

## E3. Understanding Basic Concepts

E3.4, E3.5

## F. Biotechnology

### *Overall Expectations*

F1. analyse a variety of social, ethical, and legal issues related to applications of biotechnology in the health, agricultural, or environmental sector;

F2. investigate various techniques used in biotechnology and how they are applied in the food industry and the health and agricultural sectors;

### *Specific Expectations*

F1. Relating Science to Technology, Society and the Environment

F1.1, F1.2

F2. Developing Skills of Investigation and Communication

F2.2

## **Grade 12 Workplace Preparation SNC4E**

### A. Scientific Investigation Skills and Career Exploration

#### *Overall Expectations*

A1. demonstrate scientific investigation skills (related to both inquiry and research) in the four areas of skills (initiating and planning, performing and recording, analysing and interpreting, and communicating);

A2. identify and describe careers related to the fields of science under study, and describe the contributions of scientists, including Canadians, to those fields

#### *Specific Expectations*

A1 Scientific Investigation Skills

##### *Initiating and Planning*

A1.1, A1.3,

##### *Performing and Recording*

A1.5, A1.6, A1.7

##### *Analysing and Interpreting*

A1.8, A1.9, A.10

##### *Communicating*

A1.11, A1.12, A1.13

A2. Career Exploration

A2.1

C. Chemicals in Consumer Products

*Overall Expectations*

C1. analyse chemical products used in the home and workplace, and issues related to their safe and environmentally responsible use and disposal;

*Specific Expectations*

C1. Relating Science to Technology, Society, and the Environment

C1.2, C1.3

C2. Developing Skills of Investigation and Communication

C2.6

D. Disease and Its Prevention

*Overall Expectations*

D1. evaluate the impact of public policy initiatives and technological advances intended to control the spread of disease, taking into consideration the failure of some people to follow public health regulations or recommendations;

*Specific Expectations*

D1. Relating Science to Technology, Society and the Environment

D1.1, D1.2

E. Electricity at Home and Work

*Overall Expectations*

E1. assess electrical hazards in the home and workplace, and the social and environmental impact of electrical technologies;

E2. investigate common electrical devices, including their energy transformations and consumption;

*Specific Expectations*

E1. Relating Science to Technology, Society and the Environment

E1.1

E2. Developing Skills of Investigation and Communication

E2.4, E2.5