# Erindale College

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| **Assessment Period:** | **2022 S1** |
| **Course:** | **EARTH & ENVIRONMENTAL SCIENCE** |
| **Unit:** | **Unit 3: Living on Earth (1.0)** |
| **Accreditation:** | **A** |
| **Year:** | **12** |

## Specific Unit Goals

This unit should enable students to:

- understand the difference between renewable and non-renewable Earth resources and how their extraction, use, consumption and disposal impact Earth systems
- understand how renewable resources can be sustainably extracted, used and consumed at local, regional and global scales
- understand how models and theories have developed over time; and the ways in which Earth and environmental science knowledge interacts with social, economic, cultural and ethical considerations in a range of contexts
- use science inquiry skills to collect, analyse and communicate primary and secondary data on resource extraction and related impacts on Earth systems
- assess claims about resource extraction and related impacts on Earth systems and justify evaluations
- communicate Earth and environmental understanding using qualitative representations in appropriate modes and genres

## Content Descriptions

### Science Inquiry Skills

- identify, research and construct questions for investigation; propose basic hypotheses; and predict possible outcomes
- conduct investigations including the procedure/s to be followed, the information required and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics
- conduct investigations, including map and field location techniques and environmental sampling procedures, safely, competently and methodically for the collection of valid and reliable data
- represent data in meaningful and useful ways; organise and analyse data to identify trends, patterns and relationships. qualitatively describe sources of measured error in data and use evidence to make and justify conclusions
- interpret a range of scientific and media texts and evaluate processes, claims and conclusions by considering the quality of available evidence; use reasoning to construct scientific arguments
- select, construct and use appropriate representations, including maps and other spatial representations, diagrams and flow charts, to communicate understanding
- communicate to specific audiences and for specific purposes using appropriate language, genres and modes, including compilations of field data and research reports

### Science as a Human Endeavour

- ICT and other technologies have dramatically increased the size, accuracy and geographic and temporal scope of data sets with which scientists work
- models and theories are contested and refined or replaced when new evidence challenges them, or

when a new model or theory has greater explanatory power

- the acceptance of scientific knowledge can be influenced by the social, economic and cultural context in which it is considered
- people can use scientific knowledge to inform the monitoring, assessment and evaluation of risk
- science can be limited in its ability to provide definitive answers to public debate; there may be insufficient reliable data available, or interpretation of the data may be open to question )
- international collaboration is often required when investing in large-scale science projects or addressing issues for the Asia-Pacific region (
- scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability

## Science Understanding

- non-renewable mineral and energy resources are formed over geological time scales so are not readily replenished
- the location of non-renewable mineral and energy resources, including fossil fuels, iron ore and gold, is related to their geological setting (for example, sedimentary basins, igneous terrains)
- mineral and energy resources are discovered using a variety of remote sensing techniques (for example, satellite images, aerial photographs and geophysical datasets) and direct sampling techniques (for example, drilling, core sampling, soil and rock sampling) to identify the spatial extent of the deposit and quality of the resource
- the type, volume and location of mineral and energy resources influences the methods of extraction (for example, underground, open pit, onshore and offshore drilling and completion)
- extraction of mineral and energy resources influences interactions between the abiotic and biotic components of ecosystems, including hydrologic systems (
- renewable resources are those that are typically replenished at time scales of years to decades and include harvestable resources (for example, water, biota and some energy resources) and services (for example, ecosystem services)
- ecosystems provide a range of renewable resources, including provisioning services (for example, food, water, pharmaceuticals), regulating services (for example, carbon sequestration, climate control), supporting services (for example, soil formation, nutrient and water cycling, air and water purification) and cultural services (for example, aesthetics, knowledge systems)
- the abundance of a renewable resource and how readily it can be replenished influence the rate at which it can be sustainably used at local, regional and global scales
- the cost-effective use of renewable energy resources is constrained by the efficiency of available technologies to collect, store and transfer the energy
- the availability and quality of fresh water can be influenced by human activities (for example, urbanisation, over-extraction, pollution) and natural processes (for example, siltation, drought, algal blooms) at local and regional scales
- any human activities that affect ecosystems (for example, species removal, habitat destruction, pest introduction, dryland salinity) can directly or indirectly reduce populations to beneath the threshold of population viability at local, regional and global scales and impact ecosystem services
- overharvesting can directly reduce populations of biota to beneath the threshold of population viability; the concept of maximum sustainable yield aims to enable sustainable harvesting
- producing, harvesting, transporting and processing of resources for consumption, and assimilating the associated wastes, involves the use of resources; the concept of an ‘ecological footprint’ is used to measure the magnitude of this demand (EESA27)

## Assessment Tasks

| Name | Due Date | Weighting |
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| Assignment 1 | Due Week 6 Friday: 14 February - 4 March | 25% |
| Exam 1 | 29 March - 1 April | 25% |
| Assignment 2 | Due Week 5 Friday: 2 May - 20 May | 25% |
| Exam 2 | 14 June - 17 June | 25% |

## School Assessment Information

### For penalties for late and non-submission of work

See BSSS Policy and Procedure Manual 4.3.10 for further information.

### For academic integrity

See BSSS Policy and Procedure Manual 4.3.12 for further information.

### For appeals processes

See BSSS Policy and Procedure Manual 7.2 for further information.

### For moderation procedures (internal and external)

See BSSS Policy and Procedure Manual 5 for further information.

# Achievement Standards for EARTH & ENVIRONMENTAL SCIENCE A - Year 12

| | *A student who achieves an **A** grade typically* | *A student who achieves a **B** grade typically* | *A student who achieves a **C** grade typically* | *A student who achieves a **D** grade typically* | *A student who achieves an **E** grade typically* |
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| **Concepts, Models & Applications** | ● analyses the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales<br>● analyse the nature, functions, limitations and applications of theories and models using evidence, in unfamiliar contexts<br>● assesses evidence with reference to models and/or theories, and develops evidence-based conclusions and evaluates limitations | ● explains the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales<br>● explains the nature, functions, limitations and applications of theories and models using evidence, in familiar contexts<br>● explains evidence with reference to models and/or theories, and develops evidence-based conclusions and discusses limitations | ● describes the fundamental properties and functions of system components, processes and interactions, and the effects of factors across a range of scales<br>● describes the nature, functions, limitations and applications of theories and models using evidence, in familiar contexts<br>● describes evidence with reference to models and/or theories, and develops evidence-based conclusions and identifies limitations | ● describes the fundamental properties and functions of system components, processes and interactions, and the effects of one or more factors<br>● describes the nature, functions, limitations and applications of theories and models with supporting evidence<br>● describes evidence, and develops conclusions with some reference to models and/or theories | ● identifies the fundamental properties and functions of system components, processes and interactions, and the effects of factors<br>● identifies the nature, functions, applications, and some limitations of theories and models with some evidence<br>● identifies evidence, and asserts conclusions with little or no reference to models and/or theories |
| **Contexts** | ● analyses epistemology, role of peer review, collaboration and technology in developing knowledge<br>● analyses the influence of social, economic, ethical and cultural factors on Science | ● explains epistemology, role of peer review and technology in developing knowledge<br>● explains the influence of social, economic, ethical and cultural factors on Science | ● describes epistemology, role of peer review and technology in developing knowledge<br>● describes the influence of social, economic, ethical and cultural factors on Science | ● describes role of peer review and technology in developing knowledge<br>● describes the influence of social, economic, ethical and cultural factors on Science | ● identifies that scientific knowledge has changed over time<br>● identifies the influence of social, economic, ethical and cultural factors on Science |
| **Inquiry Skills** | ● designs, conducts and improves safe, ethical and original inquiries individually and collaboratively, that collect valid, reliable data in response to a complex question<br>● analyses causal and correlational relationships, anomalies, reliability and validity of data and representations, and analyses errors<br>● analyses processes and claims, and provides a critique based on evidence, and analyses alternatives<br>● reflects with insight on own thinking and that of others and, evaluates planning, time management and use of appropriate independent and collaborative work strategies<br>● communicates concisely, effectively and accurately, demonstrating scientific literacy in a range of modes, styles, representations, and genres for specific audiences and purposes, with appropriate evidence and accurate referencing | ● designs, conducts and improves safe, ethical inquiries individually and collaboratively, that collect valid, reliable data in response to a question<br>● analyses causal and correlational relationships, anomalies, reliability and validity of data and representations, and discusses errors<br>● explains processes and claims, and provides a critique with reference to evidence, and proposes alternatives<br>● reflects on their own thinking and analyses planning, time management, and use of appropriate independent and collaborative work strategies<br>● communicates clearly and accurately, demonstrating scientific literacy in a range of modes, styles, representations and genres for specific audiences and purposes, with appropriate evidence and accurate referencing | ● plans and conducts safe, ethical inquiries individually and collaboratively, that collect valid data in response to a familiar question<br>● describes causal and correlational relationships, anomalies, reliability and validity of data and representations, and cites common errors<br>● describes processes and claims, and identifies alternatives with reference to reliable evidence<br>● reflects on their own thinking and explains planning, time management, and use of appropriate independent and collaborative work strategies<br>● communicates accurately demonstrating scientific literacy, in a range of modes, styles, representations, and genres for specific purposes, with appropriate evidence and mostly consistent referencing | ● follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data in response to a simple question with varying success<br>● describes trends, relationships and anomalies in data, identifies anomalies, and some possible sources of error<br>● describes processes and claims, and identifies the need for improvements with some reference to evidence<br>● reflects on their own thinking, with reference to planning and the use of appropriate independent and collaborative work strategies<br>● communicates demonstrating some scientific literacy, in a range of modes, representations, and genres with some evidence and inconsistent referencing | ● follows a procedure to conduct safe, ethical inquiries individually and collaboratively, to collect data with little or no connection to a question<br>● identifies trends and relationships in data, with little or no reference to sources of error<br>● identifies processes and the need for some improvements, with little or no reference to evidence<br>● reflects on their own thinking with little or no reference to planning, time management, and use of appropriate independent and collaborative work strategies<br>● communicates demonstrating limited scientific literacy, in a range of modes and representations, with inconsistent and inaccurate referencing |