LOCALLY DEVELOPED COURSE OUTLINE

Paleontology (2021)15-3
Paleontology (2021)15-5
Paleontology (2021)25-3
Paleontology (2021)25-5
Paleontology (2021)35-3
Paleontology (2021)35-5

Submitted By:

The Chinook's Edge School Division

Submitted On:

May. 3, 2021

Course Basic Information

Outline Number	Hours	Start Date	End Date	Development Type	Proposal Type	Grades
15-3	62.50	09/01/2021	08/31/2025	Acquired	Authorization	G10
15-5	125.00	09/01/2021	08/31/2025	Acquired	Authorization	G10
25-3	62.50	09/01/2021	08/31/2025	Acquired	Authorization	G10
25-5	125.00	09/01/2021	08/31/2025	Acquired	Authorization	G10
35-3	62.50	09/01/2021	08/31/2025	Acquired	Authorization	G10
35-5	125.00	09/01/2021	08/31/2025	Acquired	Authorization	G10

Course Description

These high school Paleontology courses integrate many disciplines - biology, geology, physics, and chemistry. Students delve into the history of life on Earth and discover the fundamentals of the scientific process. By examining the fossil record, geologic processes, phylogeny, and the study of past life, they gain a greater understanding of the past.

A unique opportunity provided through the course is to participate in several different learning workshops provided by the Royal Tyrrell Museum. Many workshops are available through videoconferencing, however, we encourage schools to take advantage of on-site visits to facilities in and around your community to access incredible resources found in the surrounding area, Museum galleries, and labs.

Course Prerequisites

Paleontology 15 prerequisite: Science 10 or 14
Paleontology 25 prerequisite: Paleontology 15
Paleontology 35 prerequisite: Paleontology 25

Sequence Introduction (formerly: Philosophy)

Paleontology integrates diverse scientific methodologies and technologies to derive important data for establishing hypotheses that answer longstanding questions about the Earth's history and patterns of past life. Equally important is the fact that this course also strengthens the concept of the basic scientific process which is critical for science students at secondary and post secondary levels.

Palaeontological inquiry generally seeks clarity on three main areas: the organization of past biodiversity, the history of Earth and life on it, and the ecological and evolutionary mechanisms that cause often-drastic change in the geological/biological balance on Earth. By learning about these, and about how the fossil record helps establish workable theories about nature's response to change and the physical Earth's response to nature over millions of years, students can relate this to the world today.

Student Need (formerly: Rationale)

Like Science programs, Paleontology 15, 25, and 35 provides opportunities for students to develop the knowledge, skills and attitudes that allow them to become responsible and productive global members of society. Students are able to explore career interests and prepare for post-secondary education. Scientific inquiry is pursued in the Paleontology courses: the development of skills enables students to identify and analyze problems, explore and test decisions, seek, interpret, and critique information in a responsible way. The courses are presented in a meaningful way, through a variety of on-line and field experiences **(recommended)** and interaction with scientists, to enable students to explore science, its applications and implications, and to examine related technological problems and issues. Students become aware of the role of the course in responding to social/cultural change and in meeting needs for a sustainable environment, economy, and society. They are expected to make decisions based on responsibility towards the less privileged, and toward future generations.

Scope and Sequence (formerly: Learner Outcomes)

Through the investigation of the following areas of study, students will seek clarity of the three main areas of Palaeontological inquiry: the organization of past biodiversity, the history of Earth and life on it, and the ecological and evolutionary mechanisms that cause often-drastic change in the geological/biological balance of Earth, students will develop a value to self, society and the subject of Paleontology.

1.Evolution of invertebrates, their diversity and the introduction to basic geological processes and studies

2.Evolution of vertebrates and colonization of the land

3.Age of dinosaurs, evolution, characteristics, diversity and success

4.Amniotes and the rise of mammals, evolution, characteristics, and diversity and success

Evolution of Invertebrates and their Diversity - Evaluate historical problems within a larger integrated context, including stratigraphy, geo-chemistry, geological processes/studies and developmental biology.

· Study introductory geology basics; discover geologic time/timescale; study birth of Paleontology from geology and early history; and examine past reconstruction/field Paleontology.

·Explain how geology and Earth history, geological time, global atmosphere and climatic effects have affected the development of invertebrates.

·Explain how extinction, morphology, and fossil records helped investigation of invertebrates.

·Explain how to use scientific investigation methods in researching invertebrates and vertebrates.

·Study systematics which is concerned with the diversification of life on Earth. Biological systematics is the study of the diversification and relationships of living forms, both past and present, and the relationships among all living things through time.

·Examine the science of biogeography and how it explains major events on Earth; outline and summarize major events on Earth with emphasis on extinctions (background and mass).

·Use technology to investigate and/or solve problems.

Evolution of Vertebrates and Colonization of the Land - Explain how vertebrates adapted to the terrestrial environment.

·Explain how environment alterations by organism action affected the colonization of vertebrates.

·Investigate dinosaurs as living animals in detail.

Age of Dinosaurs, Evolution, Characteristics, Diversity and Success - Explain how dinosaurs originated.

·Recognize the relationship among rocks, fossils, and time; learn diversity of major

dinosaur groups; and discover the transition of life from marine to land.

Amniotes and the Rise of Mammals. Evolution, Characteristics, Diversity and Success - Evaluate the origin and evolution of mammals.

·Examine the science of biogeography and how it explains major events on Earth; outline and summarize major events on Earth with emphasis on extinctions (background and mass).

·Explain how the origin and flight of Mesozoic birds gave information about mammal development.

·Explain how the study of vertebrates and invertebrates can have an effect on modern day civilization.

·Identify the process of fossilization and the different ways that life can become fossilized.

·Identify biodiversity and relate dinosaur ancestry.

·Apply the scientific processes.

Practical Component (recommended): Students will participate in interactive programs delivered at the Royal Tyrrell Museum or through distance learning that support and enhance classroom learning.

Guiding Questions (formerly: General Outcomes

1 Evaluate historical problems within a larger integrated context, including stratigraphy, geo-chemistry and developmental biology.

2 Study introductory Geology basics; discover geologic time/timescale; study birth of palaeontology from geology and early history; and examine past reconstruction/field Paleontology.

3 Explain how geology and earth history, geological time, global atmosphere and climatic effects have affected the development of invertebrates.

4 Explain how extinction, morphology, and fossil records helped investigation of invertebrates.

5 Explain how to use scientific investigation methods in researching invertebrates and vertebrates.

6 6 Study systematics which is concerned with the diversification of life on Earth. Biological systematics is the study of the diversification and relationships of living forms, both past and present, and the relationships among all living things through time.

7 Students will examine the science of biogeography and how it explains major events on Earth; outline and summarize major events on Earth with emphasis on extinction (background and mass).

8 Use technology to investigate and/or solve problems.

9 Students will examine evolutionary theory in detail.

10 Explain how vertebrates adapted to the terrestrial environment.

11 Explain how environmental alterations by organism action affected the colonization of vertebrates.

12 Investigate dinosaurs as living animals in detail.

13 Explain how dinosaurs originated.

14 Students will recognize the relationships among rocks, fossils, and time; learn diversity of major dinosaur groups; and discover the transition of life from marine to land.

15 Evaluate the origin and evolution of mammals.

16 Explain how the origin and flight of Mesozoic birds gave information about mammal development.

17 Explain how the study of vertebrates and invertebrates can have an effect on modern day civilization.

18 Students will understand the process of fossilization and the different ways that life can become fossilized.

19 Practical Component: Students will participate in interactive programs delivered at the Royal Tyrrell Museum or through distance learning that support and enhance classroom learning.

20 Identify biodiversity and relate dinosaur ancestry.

21 Apply the scientific processes.

Learning Outcomes (formerly: Specific Outcomes)

1 Evaluate historical problems within a larger integrated context, including stratigraphy, geo-chemistry and developmental biology.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
1.1 Identify major groups of fossilizing organisms from hand samples.					X	X
1.2 Estimate the approximate age of a sequence of rocks from the assemblage of fossils present.					X	X
1.3 Analyze the fossil content of a rock and evaluate the age and depositional environment, assess the uncertainties and use this information to suggest a palaeographic setting.						X
1.4 Synthesize age data to interpret stratigraphic sections.						X
1.5 Interpret standard paleontological charts/plots.					X	X
1.6 Evaluate adequacy of fossil record for tackling a particular question.						X

2 Study introductory Geology basics; discover geologic time/timescale; study birth of palaeontology from geology and early history; and examine past reconstruction/field Paleontology.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
2.1 Explain introductory geologic processes such as erosion and sedimentation, plate tectonics and earthquakes/volcanism, the rock cycle.	X	X				
2.2 Investigate the significance of the geologic time scale to the temporal distribution to life on Earth.	X	X				
2.3 Investigate the differences between modern ecological relationships and ancient environments.	X	X				
2.4 Identify significant geologists/palaeontologists from the past and present.	X	X				

3 Explain how geology and earth history, geological time, global atmosphere and climatic effects have affected the development of invertebrates.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
3.1 Recognize that every rock is a record of the environment.	X	X	X	X	X	X
3.2 Explore fossil and rock records and apply to organism's survival.			X	X	X	X
3.3 Use the principles of (paleo) ecology to predict what an 'entire' community would have looked like based on preserved fauna.		X		X		X
3.4 Trace and determine the placements of fossils in order of time to determine relationships and origins.			X	X	X	X
3.5 Explain introductory geologic processes such as erosion and sedimentation, plate tectonics and earthquakes/volcanism, the rock cycle and the significance of the geologic time scale.	X	X			X	X
3.6 Research both the positive and negative effects of environmental changes caused by nature weighing scientific, technological, and ecological factors.						X
3.7 Explore the origins and relationships of invertebrates from the Cambrian Period through the Devonian Period.					X	X
3.8 Assess critically how successful invertebrates have been.					X	X

4 Explain how extinction, morphology, and fossil records helped investigation of invertebrates.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
4.1 Investigate the early fossil records of invertebrates and consider the morphology of different groups of organisms.					X	X
4.2 Integrate fossil records, behaviour, biomechanics and cladistics to explain extinction of invertebrates.					X	X

5 Explain how to use scientific investigation methods in researching invertebrates and vertebrates.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
5.1 Explain how to use scientific investigation methods in researching invertebrates and vertebrates.					X	X
5.2 Defend the importance of Paleontology to other realms of knowledge, including biology, other subdisciplines of the geosciences, and climate change.					X	X

5.3 Explain that scientific knowledge and theories develop through hypotheses, the collection of evidence, and the ability to provide explanations.					X	X
5.4 Recognize that the scientific approach is one of the ways of viewing the universe.					X	X
5.5 Insist on evidence before accepting an idea or explanation.					X	X
5.6 Understand the contribution of science and technology to the progress of civilizations.					X	X
5.7 Develop an understanding of the role that paleontology plays in the world today.					X	X

6 6 Study systematics which is concerned with the diversification of life on Earth. Biological systematics is the study of the diversification and relationships of living forms, both past and present, and the relationships among all living things through time.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
6.1 Describe the geologic history of Earth and the fossil record with emphasis on the events leading up to the Triassic Period.			X	X		
6.2 Identify and use systematics to classify organisms, and perform cladistic analysis based on primitive and derived characters of organisms.			X	X		
6.3 Explain how fossil beds reveal the sequence of organism emergence in the historical record.				X		
6.4 Determine the placement of fossils in order of the time that they lived to understand evolutionary history of groups of organisms.			X	X		
6.5 Demonstrate an understanding of the major groups of organisms (invertebrates, plants, vertebrates).			X	X		

7 Students will examine the science of biogeography and how it explains major events on Earth; outline and summarize major events on Earth with emphasis on extinction (background and mass).	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**

7.1 Examine and summarize extinctions on Earth; examine and explain the science of biogeography with emphasis on interpreting the events at the end of the Mesozoic Era, Cretaceous(K)/Tertiary(T) Extinction, speciation, extinction, continental drift, glaciation, isolation of land masses, and available energy resources throughout the geologic timescale.	X X X
7.2 Distinguish between background and mass extinctions.	X
7.3 Examine and explain plate tectonics in terms of biogeography (distribution of biodiversity over space/time).	X X X
7.4 Study pseudoscience and summarize alternate theories to extinction; re-examine and summarize evolution, extinction, systematics, classification, ghost lineages and pseudo extinctions with reference to biogeography.	X
7.5 Explain how distribution of animals aids in learning about evolution and lifestyles, as well as putting them in context of their palaeoenvironment and palaeogeography.	X

8 Use technology to investigate and/or solve problems.	**15-3 15-5 25-3 25-5 35-3 35-5**
8.1 Consult a wide variety of sources that reflect varied viewpoints on causes of extinction of the dinosaurs and other topics.	X X
8.2 Evaluate palaeontological research articles and analyze both strong and weak aspects.	X
8.3 Critically evaluate paleontological analyses in the technical literature.	X
8.4 Manipulate data by using charting and graphing technologies to test inferences and probabilities.	X
8.5 Use technology in an ethical manner; respect ownership and integrity of information; acknowledge sources of information and cite sources accurately.	X X
8.6 Identify safety regulations specific to the technology being used; use the Internet safely.	X X

9 Students will examine evolutionary theory in detail.	**15-3 15-5 25-3 25-5 35-3 35-5**

9.1 Outline and describe evolutionary theory, Darwin's theory of natural selection and other related scientific theories in detail; demonstrate understanding of the diversity of species and origin of species by natural selection.			X	X		
9.2 Describe evidence for evolution by natural selection using fossils, biogeography, embryology, and homologous and vestigial structures.			X	X		
9.3 Analyze the evidence provided by the fossil record of change in the environment and life forms.			X	X		
9.4 Study and explain alternative approaches to data interpretation.				X		
9.5 Recognize and describe mechanisms and patterns of evolution, phyletic gradualism vs. punctuated equilibrium; stasis vs. rapid change periods.				X		
9.6 Summarize and describe lines of evidence to support the evolution of modern species from ancestral forms.			X	X		
9.7 Speculate about limiting species diversity (evolutionary constraints).				X		

10 Explain how vertebrates adapted to the terrestrial environment.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
10.1 Investigate how adaptation to terrestrial environment and alterations by organisms affected vertebrate evolution.					X	X
10.2 Consider the impact the evolution of plants had on vertebrate organisms.					X	X
10.3 Use the principles of (paleo) ecology to predict what an 'entire' community would have looked like based on preserved fauna.						X
10.4 Interpret patterns and trends of life on land of vertebrate groups: Dipnoi, Tetrapoda, Basal Tetrapods, Lissamphibia.					X	X

11 Explain how environmental alterations by organism action affected the colonization of vertebrates.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**

11.1 Identify and compare the physical differences and developmental differences between invertebrates and vertebrates.			X	X	X	
11.2 Analyze early vertebrate origins from fish to primates.				X	X	
11.3 Criticize arguments based on vertebrate origins and differentiate skeletal types, Chordates, and early vertebrates through Gnathostomata.				X	X	
11.4 Distinguish the physical and developmental differences within the various vertebrate groups, and expend time and effort to make valid inferences.					X	
11.5 Assess the success of vertebrate groups in colonization.					X	

12 Investigate dinosaurs as living animals in detail.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
12.1 Examine and summarize the major innovations in evolution in relation to dinosaurs (and other ancient creatures) and their environment.	X	X		X		
12.2 Explore and summarize dinosaur physiology (endothermic vs. exothermic) based on research by palaeontologists.			X	X		
12.3 Investigate and explain the evolution of flight which has occurred independently three times in vertebrates (pterosaurs, bats and dinosaurs/birds); summarize the discoveries of feathered dinosaurs by palaeontologists.			X	X		
12.4 Study and describe gigantism in fossil animals (what the basic structures are that led to the evolution of large dinosaurs and large marine reptiles).				X		
12.5 Describe coevolution of plants and dinosaurs (arms race).				X		
12.6 Analyze and summarize the evidence of dinosaur social behavior.				X		
12.7 Use current research in Paleontology related to topics that explore the innovations in the evolution of dinosaurs or other ancient creatures and present their findings in report form.				X		

13 Explain how dinosaurs originated.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**

13.1 Analyze experimental evidence regarding the Archosaurs and account for eventual appearance of dinosaurs.	X
13.2 Compare and analyze data for the characteristics, diversity, and success of the Orthnithischian, and Saurischia dinosaurs.	X X

14 Students will recognize the relationships among rocks, fossils, and time; learn diversity of major dinosaur groups; and discover the transition of life from marine to land.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
14.1 Speculate about differences between modern ecological relationships and ancient environments.	X	X	X	X		
14.2 Explain the significance of geographic isolation, homologous vs. analogous structures, convergent vs. divergent evolution, and major evolutionary events.	X	X	X	X		
14.3 Identify natural selection as the process through which evolution occurs.	X	X	X	X		
14.4 Identify the major physiological differences between the two main orders of dinosaurs.	X	X				

15 Evaluate the origin and evolution of mammals.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
15.1 Justify the origin of mammals and their evolutionary changes through the Cenzoic Era.					X	X
15.2 Conduct investigations into causes/theories of extinction of Pleistocene mammals.					X	X
15.3 Trace the processes that have made mammal populations successful.					X	X
15.4 Assess the impact of the first two waves of human evolution.					X	X
15.5 Assess critically several actions taken to alleviate recent extinctions, and continental extinctions of mammals.					X	X
15.6 Reconstruct biological traits of extinct organisms.						X
15.7 Interpret modes of life of fossil organisms.						X
15.8 Create several steps, based on your research, which could be taken to improve upon recent extinction results.						X

16 Explain how the origin and flight of Mesozoic birds gave information about mammal development.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
16.1 Explain how the origin and flight of Mesozoic birds gave information about mammal development.					X	X
16.2 Propose and defend a hypothesis about the evolution of distinct traits, using the integration of fossil records, behaviour, biochemics and cladistics, i.e. bird flight, to determine relationships within an ecosystem between organisms.						X

17 Explain how the study of vertebrates and invertebrates can have an effect on modern day civilization.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
17.1 Speculate about differences between modern ecological relationships and ancient environments.					X	X
17.2 Identify significant geologists/palaeontologists from the past and present.					X	X

18 Students will understand the process of fossilization and the different ways that life can become fossilized.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
18.1 Identify fossil types.	X	X				
18.2 Demonstrate an understanding of the role of chemistry to Paleontology in relation to radioactive dating and chemical change during fossilization.	X	X				
18.3 Outline what conditions are required for fossilization and explain why only some parts of an organism could become a fossil.	X	X				
18.4 Explain a basic vertebrate body plan and distinguish it from an invertebrate body plan.		X			X	X

19 Practical Component: Students will participate in interactive programs delivered at the Royal Tyrrell Museum or through distance learning that support and enhance classroom learning.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
19.1 Discover how palaeontologists study ancient life; through fossil records and the use of different techniques and technologies.					X	X

19.2 Investigate the different areas of study in Paleontology (palaeobotany, paleoecology, palaeobiology, taphonomy).					X	X
19.3 Discover how palaeontologists choose site locations by reading landscapes and sediments.					X	X
19.4 Analyze why palaeontologists choose particular lines of evidence (i.e. how do they choose what to look for?)					X	X
19.5 Through participation in field trips or connections via distance learning, students will understand the practical applications of the scientific method.					X	X
19.6 Use techniques of screening field samples for fossils; techniques of tool usage to properly fracture rocks to release fossils, mould, and cast making.					X	X

20 Identify biodiversity and relate dinosaur ancestry.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
20.1 Use fossils to determine relationships within an ecosystem between organisms. An understanding of trophic relationships leads to speculation about animal behavior.	X	X				
20.2 Demonstrate a basic understanding of dinosaur taxonomy and be able to outline their evolutionary 'tree'.	X	X				
20.3 Identify possible causes of extinction events and be able to identify more than one major extinction event in the Earth's history.	X	X				

21 Apply the scientific processes.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
21.1 Use the scientific process to investigate a question.		X		X	X	X
21.2 Demonstrate their knowledge of basic field techniques such as prospecting, excavation, and fossil preparation.					X	X

Facilities or Equipment

Facility

School Environments
Students can do a portion of the field study through virtual video conferencing sessions at their school.
All workshops are available through videoconferencing, however, we encourage schools to take advantage of on-site visits to facilities in and around your community to access incredible resources found in the surrounding areas, Museum galleries, and labs.

Facilities:

Equipment

Active Board or SmartBoard for computer access during classroom instruction.
Students will need to use the Internet for many of the course activities.
Paleontology tools (molds, casting, etc. if not visiting an off-site facility).

Learning and Teaching Resources

Paleontology 15-25-35 makes use of many resources, both printed material and Onl
content. The numerous online sites embedded into the lessons adequately cover the
of the course so it is not necessary to purchase a class set of text resources. Howev
would recommend any of the following supplementary resources for this course:

1. Evolution: The Story of Life, Douglas Palmer, University of California Press, 2
ISBN-10: 0520255119.
2. Prehistoric Life: The Definitive Visual History of Life on Earth, DK Publishing,
2009, ISBN-10: 0756655730.
3. Evolution: What the Fossils Say and Why it Matters, Donald R. Prothero, 200
ISBN-10: 0231139624.
4. Dinosaurs – The Textbook, Spencer Lucas, McGraw-Hill Companies, 5th edi
2007, ISBN –139780072826951.
5. Dinosaurs – The Science Behind the Stories, American Geological Institute, 2
ISBN 0-922152-62-4.
6. The Evolution and Extinction of the Dinosaurs, David Fastovsky and David Weishampel, 2nd edition, 2005, ISBN 0-521-81172-4.

Sensitive or Controversial Content

Students may have different points of view about evolution.

Issue Management Strategy

Health and Safety

If traveling offsite students should be given adequate information regarding field trip clothing, footwear, and any other information specific to the facility or area they are visiting.

Risk Management Strategy

Statement of Overlap with Existing Programs

Provincial Courses with Overlap and/or Similar

- Science 10 - Matter and Chemical Change

Identified Overlap/Similarity

- Focusing Questions: How has knowledge of the structure of matter led to other scientific advancements?How do elements combine? Can these combinations be classified and the products be predicted and quantified?Why do scientists classify chemical change, follow guidelines for nomenclature and represent chemical change with equations?

Reasoning as to why Locally Developed Course (LDC) is Necessary

- Paleontology will provide students with practical examples of applications of chemistry in other sciences.Ex. The role of isotopes and radioactive decay in absolute dating.

Provincial Courses with Overlap and/or Similar

- The overlapping concepts provide students with appreciation for climatic systems and their influence on biodiversity, adaptations and speciation and extinction.

Provincial Courses with Overlap and/or Similar

- Science 10 - Energy Flow in Global Systems

Identified Overlap/Similarity

- Key Concepts
    - ○climate zones, transfer of thermal energy by the hydrosphere and the atmosphere
    - ○Hydrologic cycle and phase change

Reasoning as to why Locally Developed Course (LDC) is Necessary

- Science 14 - Investigating Matter and Energy in Living Systems

Identified Overlap/Similarity

- Focusing Questions - How do cells, which are microscopic and invisible to the naked eye, work together in organs and organ systems to carry out life functions?

Reasoning as to why Locally Developed Course (LDC) is Necessary

- Using knowledge of the motor and skeletal system students are challenged to infer relationships between muscle distribution, size, and Biomechanical performance.Ex. Top speed or ability to jump.

Provincial Courses with Overlap and/or Similar

- Science 14 - Investigating Matter and Energy in the Environment

Identified Overlap/Similarity

- Key Concepts
    - ○Role of living organisms in cycling matter
    - ○Flow of energy through the biosphere
    - ○Food chains, food webs and energy pyramids
    - ○Maintaining equilibrium, in the biosphere

Reasoning as to why Locally Developed Course (LDC) is Necessary

・Students are provided with the opportunity to apply and deepen their understanding of ecosystems and energy transfer between trophic levels using mesozoic models.

Provincial Courses with Overlap and/or Similar

・Students are provided with the opportunity to apply and deepen their understanding of ecosystems and energy transfer between trophic levels using mesozoic models.

Provincial Courses with Overlap and/or Similar

・Biology 20 - Energy and Matter Exchange in the Biosphere

Identified Overlap/Similarity

・Focusing Questions - How are corbon, oxygen, nitrogen and phosphorus cycled in the biosphere?How is the flow of energy balanced in the biosphere?How have human activities and technological advances affected the balance of energy and matter in the biosphere?

・○Cycling of matter

・○Energy transfer through food chains and webs

・○Trophic relationships

Reasoning as to why Locally Developed Course (LDC) is Necessary

・Biology 20 - Ecosystems and Population change

Identified Overlap/Similarity

・Focusing Questions - What mechanism are involved in the change of populations over time?

Reasoning as to why Locally Developed Course (LDC) is Necessary

・Students have the opportunity to build upon evolutionary concepts in Biology 20 to investigate detailed relationships between species through time, visually representing evolutionary patterns with cladograms and phylogenetic trees.

Provincial Courses with Overlap and/or Similar

・Biology 20 - Human Systems

Identified Overlap/Similarity

・Focusing Questions - How do specialized structures function in the overall biochemical balance of the living system?

Reasoning as to why Locally Developed Course (LDC) is Necessary

・Using knowledge of the motor and skeletal system students are challenged to infer relationships between muscle distribution, size and biomechanical performance.Ex.Top speed or ability to jump.

Student Assessment

No unique assessment required for this course.

Course Approval Implementation and Evaluation