LOCALLY DEVELOPED COURSE OUTLINE

Paleontology15-3
Paleontology15-5
Paleontology25-3
Paleontology25-5
Paleontology35-3
Paleontology35-5

Submitted By:

Chinook's Edge School Division No. 73

Submitted On:

May. 6, 2015

Course Basic Information

Outline Number	Hours	Start Date	End Date	Development Type	Proposal Type	Grades
15-3	75.00	09/01/2015	08/31/2020	Acquired	Reauthorization	G10 G11
15-5	75.00	09/01/2015	08/31/2020	Acquired	Reauthorization	G11 G12
25-3	75.00	09/01/2015	08/31/2020	Acquired	Reauthorization	G11 G12
25-5	125.00	09/01/2015	08/31/2020	Acquired	Reauthorization	G11 G12
35-3	75.00	09/01/2015	08/31/2020	Acquired	Reauthorization	G12
35-5	125.00	09/01/2015	08/31/2020	Acquired	Reauthorization	G12

Course Description

Palaeontology 15 is an introductory science course providing a foundation for Palaeontology 25 and 35. Course topics are: the organization of past biodiversity; Earth history and life on Earth; and the ecological/evolutionary mechanisms that change the geological/biological balance on Earth. This course includes a field component provided by the ATCO Learning Centre at the Royal Tyrrell Museum in Drumheller.

Course Prerequisites

Science 10 is the prerequisite for this course. It may be taken concurrently with Palaeontology 15.

Sequence Introduction (formerly: Philosophy)

Palaeontology is rich in its integration of diverse scientific methodologies and technologies to derive important data which helps to establish hypotheses and answer longstanding questions about the Earth's history and patterns of past life. Palaeontological inquiry generally seeks clarity in 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)

Palaeontology 15 will be the foundation for two upper-level secondary courses. Palaeontology 25 and 35, offered as part of the Alberta Learning Science Program. The curriculum for Palaeontology 15 proposes topics that are closely integrated with the Program Outcomes for Science 10/20/30, Biology 20/30, and more peripherally, Chemistry 20/30. This course also builds on concepts delivered in junior high Science. 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.

Scope and Sequence (formerly: Learner Outcomes)

Palaeontology 15 is a 3 credit course based on:

• 70 hours of online/class instruction

• 5 hours of practical on-site and videoconference workshops

The practical workshop/field component will take advantage of the ATCO Learning Centre at the Royal Tyrrell Museum. The practical phase will complement classroom objectives by having students travel to the Museum to gain firsthand experience. The hands-on aspect of the course is integral to emphasizing for students that palaeontology is historically and contemporarily grounded in physical findings – that it is a science understood much like the dinosaur bones of the badlands, as each piece of the puzzle is revealed.

Guiding Questions (formerly: General Outcomes

1 Unit I: Evolution of Invertebrates and their Diversity - Evaluate historical problems within a larger integrated context, including stratigraphy, geo chemistry, developmental biology.

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

3 Students will examine systematics that have been used to study the diversification of life on Earth; name and describe organisms; classify organisms using data and a key; and consider environmental adaptations of organisms and investigate their evolutionary histories to create phylogenetic trees.

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

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

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

7 Students will 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.

8 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 extinctions (background and mass).

9 Use technology to investigate and/or solve problems.

10 Students will examine evolutionary theory in detail.

11 Unit 2: Evolution of Vertebrates and Colonization of the Land - Explain how vertebrates adapted to the terrestrial environment.

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

13 Students will investigate dinosaurs as living animals in detail.

14 Unit 3: Age of Dinosaurs, Evolution, Characteristics, Diversity and Success - Explain how dinosaurs originated.

15 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.

16 Unit 4: Amniotes and the Rise of Mammals. Evolution, Characteristics, Diversity and Success - Evaluate the origin and evolution of mammals.

17 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 extinctions (background and mass).

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

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

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

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

22 Students will identify biodiversity and relate dinosaur ancestry.

23 Students will apply the scientific processes.

Learning Outcomes (formerly: Specific Outcomes)

1 Unit l: Evolution of Invertebrates and their Diversity - Evaluate historical problems within a larger integrated context, including stratigraphy, geo chemistry, 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 Students will study introductory Geology basics; discover geologic time/timescale; study birth of palaeontology from geology and early history; and examine past reconstruction/field palaeontology.	**15-3 15-5 25-3 25-5 35-3 35-5**
2.1 Students will explain introductory geologic processes such as erosion and sedimentation, plate tectonics and earth quakes/volcanism, the rock cycle and significance of the geologic time scale.	X X
2.2 Students will investigate the differences between modern ecological relationships and ancient environments.	X X
2.3 Students will identify significant geologists/palaeontologists from the past and present.	X

3 Students will examine systematics that have been used to study the diversification of life on Earth; name and describe organisms; classify organisms using data and a key; and consider environmental adaptations of organisms and investigate their evolutionary histories to create phylogenetic trees.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
3.1 Students will describe the geologic history of Earth and the fossil record with emphasis on the events leading up to the Triassic Period.				X		
3.2 Students will identify and use systematics to classify organisms, and perform cladistic analysis based on primitive and derived characters of organisms.				X		
3.3 Students will explain how fossil beds reveal the sequence of organism emergence in the historical record.				X		
3.4 Students will determine the placement of fossils in order of the time that they lived to understand evolutionary history of groups of organisms.				X		
3.5 Students will demonstrate an understanding of the major groups of organisms (invertebrates, plants, vertebrates).				X		

4 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**
4.1 Recognize that every rock is a record of environment.					X	X
4.2 Explore fossil and rock records and apply to organism's survival.					X	X
4.3 Use the principles of (paleo) ecology to predict what an 'entire' community would have looked like based on preserved fauna.						X
4.4 Trace and determine the placements of fossils in order of time to determine relationships and origins.					X	X
4.5 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
4.6 Research both the positive and negative effects of environmental changes caused by nature weighing scientific, technological, and ecological factors.						X

4.7 Explore the origins and relationships of invertebrates from the Cambrian Period through the Devonian Period.	X X
4.8 Assess critically how successful invertebrates have been.	X X

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

6 Explain how to use scientific investigation methods in researching invertebrates and vertebrates.	**15-3 15-5 25-3 25-5 35-3 35-5**
6.1 Demonstrate the connections between Palaeontology, geology, and biology, as they relate to the different units of study.	X X
6.2 Defend the importance of palaeontology to other realms of knowledge, including biology, other sub disciplines of the geo sciences, and climate change.	X X
6.3 Explain that scientific knowledge and theories develop through hypotheses, the collection of evidence, and the ability to provide explanations.	X X
6.4 Recognize that the scientific approach is one of the ways of viewing the universe.	X X
6.5 Insist on evidence before accepting an idea or explanation.	X X
6.6 Understand the contribution of science and technology to the progress of civilizations.	X X
6.7 Develop an understanding of the role that paleontology plays in the world today.	X X

7 Students will 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**

7.1 Students will describe the geologic history of Earth and the fossil record with emphasis on the events leading up to the Triassic Period.	X
7.2 Students will identify and use systematics to classify organisms, and perform cladistic analysis based on primitive and derived characters of organisms.	X
7.3 Students will explain how fossil beds reveal the sequence of organism emergence in the historical record.	X
7.4 Students will determine the placement of fossils in order of the time that they lived to understand evolutionary history of groups of organisms.	X
7.5 Students will demonstrate an understanding of the major groups of organisms (invertebrates, plants, vertebrates).	X

8 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 extinctions (background and mass).	**15-3 15-5 25-3 25-5 35-3 35-5**
8.1 Students will 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
8.2 Students will distinguish between background and mass extinctions.	X
8.3 Students will examine and explain plate tectonics in terms of biogeography (distribution of biodiversity over space/time).	X
8.4 Students will 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
8.5 Students will 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

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

10 Students will examine evolutionary theory in detail.	15-3	15-5	25-3	25-5	35-3	35-5
10.1 Students will 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			
10.2 Students will describe evidence for evolution by natural selection using fossils, biogeography, embryology, and homologous and vestigial structures.			X			
10.3 Students will analyze the evidence provided by the fossil record of change in the environment and life forms.			X			
10.4 Students will study and explain alternative approaches to data interpretation.			X			
10.5 Students will recognize and describe mechanisms and patterns of evolution, phyletic gradualism vs. punctuated equilibrium; stasis vs. rapid change periods.			X			
10.6 Students will summarize and describe lines of evidence to support the evolution of modern species from ancestral forms.			X			
10.7 Students will speculate about limiting species diversity (evolutionary constraints).			X			

11 Unit 2: Evolution of Vertebrates and Colonization of the Land - Explain how vertebrates adapted to the terrestrial environment.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
11.1 Investigate how adaptation to terrestrial environment and alterations by organisms affected vertebrate evolution.					X	X
11.2 Consider the impact the evolution of plants had on vertebrate organisms.					X	X
11.3 Use the principles of (paleo) ecology to predict what an 'entire' community would have looked like based on preserved fauna.						X
11.4 Interpret patterns and trends of life on land of vertebrate groups: Dipnoi, Tetrapoda, Basal Tetrapods, Lissamphibia.					X	X

12 Explain how environment alterations by organism action affected the colonization of vertebrates.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
12.1 Identify anad compare the physical differences and developmental differences between invertebrates and vertebrates.					X	X
12.2 Analyze early verebrate origins from fish to primates.					X	X
12.3 Criticize arguments based on vertebrate origins and differentiate skeletal types, Chordates, and early vertebrates through Gnathostomata.						X
12.4 Distinguish the physical and developmental differences within the various vertebrate groups, and expend time and effort to make valid interences.						X
12.5 Assess the success of vertebrate groups in colonization.					X	X

13 Students will investigate dinosaurs as living animals in detail.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
13.1 Students will examine and summarize the major innovations in evolution in relation to dinosaurs (and other ancient creatures) and their environment.				X		

13.2 Students will explore and summarize dinosaur physiology (endothermic vs. exothermic) based on research by palaeontologists.	X
13.3 Students will 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
13.4 Students will 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
13.5 Students will describe co-evolution of plants and dinosaurs (arms race).	X
13.6 Students will analyze and summarize the evidence of dinosaur social behavior.	X
13.7 Students will use current research in palaeontology related to topics that explore the innovations in the evolution of dinosaurs or other ancient creatures and present their findings in report form.	X

14 Unit 3: Age of Dinosaurs, Evolution, Characteristics, Diversity and Success - Explain how dinosaurs originated.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
14.1 Analyze experimental evidence regarding the Archosaurs and account for eventual appearance of dinosaurs.						X
14.2 Compare and analyze data for the characteristics, diversity, and success of the Orthnithischian, and Saurischia dinosaurs.					X	X

15 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**
15.1 Students will speculate about differences between modern ecological relationships and ancient environments.	X	X				
15.2 Students will explain the significance of geographic isolation, homologous vs. analogous structures, convergent vs. divergent evolution, and major evolutionary events.	X	X				
15.3 Students will identify natural selection as the process through which evolution occurs.	X	X				

16 Unit 4: Amniotes and the Rise of Mammals. Evolution, Characteristics, Diversity and Success - Evaluate the origin and evolution of mammals.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
16.1 Justify the origin of mammals and their evolutionary changes through the Cenzoic Era.					X	X
16.2 Conduct investigations into causes/theories of extinction of Pleistocene mammals.					X	X
16.3 Trace the processes that have made mammal populations successful.					X	X
16.4 Assess the impact of the first two waves of human evolution.					X	X
16.5 Assess critically several actions taken to alleviate recent extinctions, and continental extinctions of mammals.					X	X
16.6 Reconstruct biological traits of extinct organisms.						X
16.7 Interpret modes of life of fossil organisms.						X
16.8 Create several steps, based on your research, which could be taken to improve upon recent extinction results.						X

17 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 extinctions (background and mass).	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
17.1 Students will 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			
17.2 Students will distinguish between background and mass extinctions.			X			
17.3 Students will examine and explain plate tectonics in terms of biogeography (distribution of biodiversity over space/time).			X			

17.4 Students will 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
17.5 Students will 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

18 Explain how origin and flight of Mesozoic birds gave information about mammal development.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
18.1 Infer the role of the amniote egg and amniote diversity in the rise and evolution of mammals.					X	X
18.2 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

19 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**
19.1 Speculate about differences between modern ecological relationships and ancient environments.					X	X
19.2 identify significant geologists/palaeontologists from the past and present.					X	X

20 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**
20.1 Students will identify fossil types.	X	X				
20.2 Students will demonstrate an understanding of the role of chemistry to palaeontology in relation to radioactive dating and chemical change during fossilization.	X	X				
20.3 Students will outline what conditions are required for fossilization and explain why only some parts of an organism could become a fossil.	X	X				
20.4 Students will explain a basic vertebrate body plan and distinguish from an invertebrate body plan.		X				

21 Practical Component: Students will participate in interactive programs delivered at the Royal Tyrell Museum or through distance learning that support and enhance classroom learning.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
21.1 Discover how palaeontologists study ancient life; through fossil records and the use of different techniques and technologies.					X	X
21.2 Investigate the different areas of study in palaeontology (palaeobotany, paleoecology, palaeobiology, taphonomy).					X	X
21.3 Discover how palaeontologists choose site locations by reading landscapes and sediments.					X	X
21.4 Analyze why palaeontologists choose particular lines of evidence (i.e. how do they choose what to look for?)						X
21.5 Through participation in field trips or connections via distance learning, students will understand the practical applications of the scientific method.					X	X
21.6 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

22 Students will identify biodiversity and relate dinosaur ancestry.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
22.1 Students will use fossils to determine relationships within an ecosystem between organisms. An understanding of trophic relationships leads to speculation about animal behavior.	X	X				
22.2 Students will demonstrate a basic understanding of dinosaur taxonomy and be able to outline their evolutionary 'tree'.	X	X				
22.3 Students will identify possible causes of extinction events and be able to identify more than one major extinction event in the Earth's history.	X	X				

23 Students will apply the scientific processes.	**15-3**	**15-5**	**25-3**	**25-5**	**35-3**	**35-5**
23.1 Students will use the scientific process to investigate a question.	X	X				

23.2 Students will demonstrate their knowledge of basic field techniques such as prospecting, excavation, and fossil preparation.	X

Facilities or Equipment

Facility

A standard high school science lab / science classroom is a suitable area in which to implement this course.

Facilities:

Equipment

There is no special equipment recommended or required in addition to that which can generally be found in a standard high school science lab / science classroom.

Learning and Teaching Resources

Palaeontology 15 makes use of many resources, printed text and online. The numer
sites embedded into the lessons **adequately** cover the content of the course so it is
necessary to purchase class sets of text resources. The recommended text resource
course are:

• *Reading the Rocks – A Biography of Ancient Alberta*, by Monique Kieran. Royal T
Museum of Palaeontology, 2003, ISBN: 0-88995-283-3

• *The Scientific American Book of Dinosaurs*, by Gregory Paul. St. Martin's Press, 2
ISBN: 0-312-31008-0

• *Dinosaurs – The Science Behind the Stories*, by Judith G. Scotchmoor, Dale A. Sp
Brent H. Breithaupt, and Anthony R. Fiorillo. American Geological Institute, 2002, ISI
0-922152-62-4

If budget is limited, teachers may decide the quantity of those texts to be purchased

Supplementary text resources include:

• *The Riddle of the Dinosaur*, by J. N. Wilford. Alfred A. Knopf Inc, 1986, ISBN: 0-39

• *The Illustrated Encyclopedia of Dinosaurs*, by Dr. David Norman. Random House
Publishing, 1985, ISBN: 0-517-14238-4

• *The Land Before Us: The Making of Ancient Alberta*, Royal Tyrrell Museum of
Palaeontology, Red Deer Press, 1998, ISBN: 0889951233

• *Earth: An Introduction to Physical Geology*, by Edward J. Tarbuck and Frederick K
Lutgens. Prentice-Hall, 1999, ISBN: 0-13-974122-4

• *Dawn of the Dinosaurs: Life in the Triassic (Life of the Past)*, by Nicholas Fraser a
Douglas Henderson. Indiana University Press, 2006, ISBN: 0253346525

• *Marine Reptiles*, by Jack M. Callaway and Elizabeth L. Nicholls. Academic Press,
ISBN: 0-12-155210-1

• *The Complete Dinosaur*, by James O. Farlow and M. K. Brett-Surman. Indiana Un
Press, 1997, ISBN: 0-253-33349-0

• *Dinosaur Hunters*, by David Spalding. Key Porter Books, 1993, ISBN: 1-55958-33

• Gillette, D. D. 1997. Hunting for dinosaur bones. In Farlow, J. O., and Brett-Surma
(editors), *The Complete Dinosaur*. Indiana University Press, Bloomington, Indiana: 6

The above books could be purchased for the school library if funds permitted.

Sensitive or Controversial Content

It is expected that all issues and texts that may be controversial or sensitive be discussed with the school administration prior to their coverage in class.

Issue Management Strategy

Health and Safety

All Chinook's Edge School Division No. 73 procedures will be followed if students are taken off campus (re: planning, parental permission, risk assessment, etc.).

・Chinook's Edge School Division No. 73 **Administrative Procedure 2-09** *Field Trips and Excursions*

Risk Management Strategy

Statement of Overlap with Existing Programs

Palaeontology 15 builds upon the following units in Junior High Science:

- Science 7, Unit A: Interactions and Ecosystems
- Science 7, Unit C: Geology
- Science 9, Unit A: Biological Diversity

Palaeontology 15 is related to the following Senior High Science topics:

- Science 10 – Matter and Chemical Change
- Science 10 – Energy Flow in Global Systems *
- Biology 20 – Cycling of Matter and Energy
- Biology 20 – Natural Selection and Evolution

***NOTE:** Science 10 may be offered concurrent with Palaeontology 15. However, Science 10, Unit D: Energy Flow in Global Systems, provides the best grounding for students' understanding of the relationships between climatic change, biomes, and biogeochemistry. It is expected that Science 10 would be taken as a prerequisite for the Palaeontology 15 course, while Science 14 would **not** be considered a prerequisite.

Student Assessment

Student assessment will be based on submitted work as well as their performance during the practical component of the course at the Royal Tyrrell Museum. The student mark will be broken down as follows:

The **overall** mark will be based on:

• Course Mark – 70%

• Final Mark - 30%

NOTE: The course mark will be based on:

Assignments: 25%

Unit Exams: 30%

Quizzes: 15%

Practicum: 30% *****

***** The Practicum mark is based on student performance during the practical component of the course with the Museum.

Course Approval Implementation and Evaluation

The Associate Superintendent, Learning Services, in collaboration with the school Principal, will evaluate and monitor the course(s) to ensure that all requirements (by Alberta Education, by the developing school board, and by Chinook's Edge School Division No. 73) are met. The school Principal will supervise the course implementation at the school level.

Course pre-requisites, copyright privileges, and conditions listed by the developing board will be adhered to.