



Course Outline

UNIVERSITY STUDIES

EAS 105
The Dynamic Earth Through Time
Winter Semester, 2013

3 Credits
3 Hours Lecture, 3 Hours Lab
Per week

INSTRUCTOR: Neil O'Donnell

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OFFICE NUMBER: S209g

OFFICE HOURS:

Tuesday	1:00 – 2:00 pm
Thursday	1:00 – 2:00 pm; 4:00 – 5:00 pm
Friday	10:00 am – noon

Other times are possible, by appointment.

HOURS OF INSTRUCTION:

Lectures – Mondays, 1:00 – 2:00 pm; Wednesdays, 10:00 am – noon.
Lab – Thursdays, 9:00 am – noon.

COURSE DESCRIPTION:

The objective of this course is to discuss the geological nature of Earth, including its origins, composition, and the history of life. Geological themes introduced in EAS 100 will be addressed in greater detail in EAS 105. We will strive to achieve an appreciation of how the Earth has changed since its origin.

PREREQUISITES:

EAS 100 or EAS 102. Not available to students with credit in EAS 101.

OVERVIEW:

EAS 105 is designed to be an equivalent to EAS 105 at the University of Alberta.

COURSE OUTCOMES:

The successful student will be able to:

- Describe the development and significance of plate-tectonic theory; show real examples of the role of tectonics in shaping the Earth; and relate tectonics to the geology of Canada.
- Properly use maps and examples to show geomorphology of tectonic zones and then calculate spreading / subduction rates.
- Learn the overarching classification scheme for minerals; understand the chemical nature of the main mineral groups; and understand the physical and chemical properties of the main rock-forming minerals.
- Develop basic skills in mineral description by investigating and reporting the physical characteristics of the main rock-forming minerals.
- Understand the role of igneous rocks and processes in the context of the rock cycle; describe and link magmatic processes in the context of plate tectonics; and learn the main igneous rock types and their relationship to plate tectonics.

- Develop basic skills in rock description by investigating and reporting the main igneous rock types.
- Learn and understand the range and style of rock deformation; link tectonics and rock deformation; study the range of deformed rock types and their significance in a paleogeographic context; and learn the main metamorphic rock types and their relationship to plate tectonics
- Understand the role of soil / sediment / sedimentary rocks and sedimentary / geomorphological processes in the context of the rock cycle; describe the main weathering and material transport mechanisms observed on Earth's surface; and learn the main sedimentary rock types and their relationship to plate tectonics.
- Learn and understand the geological time scale; review the general geological characteristics of the geological periods; and interpret relative age relationships from geological maps.
- Develop an appreciation of geological time and the relative apportionments of Earth's geological phases with respect to absolute time; also to memorize aspects of the geological time scale.
- Learn and understand the geological character of Precambrian Earth, the paleontological database of ancient life, craton-configuration components, and examples of various shield rocks.
- Learn and understand the evolution of the Earth's surface during the Phanerozoic eon in the context of plate tectonics, the paleontology of time-scale periods, and continent configuration and life.
- Develop basic skills in fossil description by describing and sketching the typical fauna (from fossil examples) of the different periods.

TEXTBOOKS:

1. Monroe and Wicander: The Changing Earth, 6th edition, Brooks/Cole
2. Geological Highway Map of Alberta, CSPG

TOPICS:

The main topics of this course include (number in brackets indicates approximate contact hours dedicated to the topic):

1. Introduction to the course and course materials.	(2)
2. Earth's lithosphere, plate tectonic processes and rock formation.	(3)
3. Minerals and their atomic structure.	(3)
4. Igneous processes including magmatic intrusions and volcanoes with an introduction to igneous rocks.	(3)
5. Deformation of rocks: structural geology.	(3)
6. Metamorphism, with an introduction to metamorphic rocks.	(3)
7. Surface processes and their products: the geological significance of flowing water, moving ice and blowing air.	(3)
8. Introduction to sedimentary rocks.	(3)
9. Geochronology, the geological timescale.	(2)
10. Precambrian Earth and Precambrian fossils, Canadian Shield.	(3)
11. Paleozoic Earth and Paleozoic fossils.	(3)
12. Mesozoic Earth and Mesozoic fossils.	(3)
13. Cenozoic Earth and Cenozoic fossils.	(3)
Current Topics – earthquakes, tsunamis, etc.	(3)

LABORATORY WORK

Laboratory work will be conducted weekly starting the first week of classes. Labs will be graded. Completion of the labs and a passing grade on that component of the course are considered mandatory to pass EAS 105.

The labs will run 3 hours per week. Attendance is mandatory. During this time students will receive the lab assignment. Students may hand in completed assignments before the end or at the end of **that** lab session, or no later than one week following, with no penalty. Ordinarily, after one week, a late penalty will be assessed, as outlined below.

RULES FOR LABS, REPORTS, AND ASSIGNMENTS

DUE DATES

- Due Dates usually are set for one week following a lab, video assignment, report, field trip, or presentation.
- Unless specified differently by instructor, labs, reports, and assignments will be submitted electronically via Moodle.
- If submitted on or before the Due Date – full marks; *may be extended another 7 days for reasonable cause approved by instructor.*
- Otherwise, if submitted within one week (7 days) after the Due Date – 50% of regular mark.
- More than one week late – must be handed in, but will not be marked – zero assigned.
- Any changes due to special circumstances will be communicated by instructor via Moodle.

TERM MARK

- Will be determined from all the labs, reports, and assignments.
- Mark will be weighted average of all but one submission.
 - a) If all submissions have been handed in, the lowest mark will be excluded from the calculation.
 - b) If one submission is missing, the calculation will be based on the weighted average of the others. In other words, you can miss one submission without penalty.
 - c) If more than one submission is missing, the calculation will include the zeros for the missing items.
 - d) If 20% or more of submissions are missing, student will not be allowed to write the final exam.

EVALUATION:

1. Two Mid-term Examinations (10% each; total 20% of final mark).
Two 60-minute mid-term examinations will be conducted (Weeks 7 and 14).
Examinations to occur during scheduled class hours.
2. Final Examination (40% of final mark).
A three hour final examination will be conducted during the examination period as scheduled by the Registrar.
3. Lab (40 % of final mark).
See description of lab work, below. Marked labs will be equally weighted.
Note: there will be no final lab exam. However, some labs may have a lecture quiz component, possibly on-line via Moodle.

PLANNED COURSE SCHEDULE**1. Introduction**

- Preamble and introduction to the course; study of the Earth as a heat engine.
- Review rock cycle.

2. Tectonic Framework and the formation of Lithosphere (1 week)

- Plate boundaries and their characteristic processes
- Examples of the products of plate tectonics
- Plate tectonics and the Geology of Canada

3. Minerals (1 week)

- Main groups and classification of minerals
- Chemical composition and structures of major mineral groups
- Physical and chemical properties of rock-forming minerals

4. Igneous processes including intrusive activity and volcanism (1 week)

- Igneous processes and rocks
- Magmatic processes and their relationship to tectonic setting
- Classification and identification of igneous rocks

5. Structural Geology (1 week)

- Deformation processes
- Identification and characteristics of major structures: folds, faults, etc.
- Tectonic interpretation of structures; orogens and orogenic belts

6. Metamorphism and metamorphic rocks (1 week)

- Causes and types of metamorphism
- Plate tectonic context of metamorphism
- Major types of metamorphic rocks and their characteristics

7. Processes at the Earth's surface (2 weeks)

- Weathering and soil
- Flow and transport of sediment by air, water, and ice
- Main types of sediment and sedimentary rock
- Sedimentary environments and their tectonic setting
- Unconformities

8. The geological timescale (1 week)

- Introduce the geological timescale and the main subdivisions of geologic time
- Review methods of stratigraphic correlation and measuring of geologic time

9. Precambrian Earth and life, Canadian Shield (1 week)

- Characteristics of the Precambrian Earth
- Paleontological database of Precambrian life
- Major elements of the Canadian Shield

10. Paleozoic Earth and life (1 week)

- Continental margins of North America in the Paleozoic
- Major groups of fossils from the Paleozoic

11. Mesozoic and Cenozoic Earth and life (1 week)

- History of North America in the Mesozoic and Cenozoic; Rocky Mountains
- Major groups of Mesozoic fossils: dinosaurs, invertebrates
- Major Cenozoic fossils: mammals
- History of Glaciation

Laboratory classes

Week 1. Plate tectonics: Use maps and examples to show geomorphology of tectonic zones and then calculate spreading / subduction rates.

Week 2. Minerals and their atomic structure: Develop basic skills in mineral description by investigating and reporting the physical characteristics of the main rock-forming minerals.

Week 3. Igneous processes and rocks: Learn the scale and morphology of igneous processes through geological map interpretation exercises and air-photo interpretation; also develop basic skills in rock description by investigating and reporting the main igneous rock types.

Week 4. Structural Geology: build structural block diagrams and interpret maps.

Week 5. Metamorphism and metamorphic rocks: Mapping metamorphic zones (e.g. Barrovian sequence); develop basic skills in rock description by investigating and reporting the main metamorphic rock types.

Week 6. Earth Surface Processes: Learn the scale and morphology of sedimentary processes through geological map interpretation exercises and air-photo interpretation; also develop basic skills in rock description by investigating and reporting the main sedimentary rock types.

Week 7. The Geological Time scale: Develop an appreciation of geological time and the relative apportionments of Earth's geological phases with respect to absolute time; also to memorize aspects of the geological time scale.

Week 8. NO LAB. RESERVED FOR READING WEEK

Week 9. Precambrian Earth and life, Canadian Shield: Precambrian fossils, configuration of cratons, examples of shield rocks.

Weeks 10 & 11. Paleozoic Earth and life; the Paleozoic of North America: Develop basic skills in fossil description by describing and sketching the typical fauna (from fossil examples) of the periods.

Weeks 12 & 13. Mesozoic and Cenozoic Earth and life; the Mesozoic and Cenozoic of North America: Develop basic skills in fossil description by describing and sketching the typical fauna (from fossil examples) of the periods.

Week 14. Pleistocene and Holocene Earth and life. Glaciation.

GRADING SYSTEM:

Letter Grade	Description	Grade Points
A+		4
A	Excellent	4
A-		3.7
B+		3.3
B	Good	3
B-		2.7
C+		2.3
C	Satisfactory	2
C-		1.7
D+		1.3
D	Minimal Pass	1
F	Failure	0

Students intending to transfer to other institutions should strive for a 'C-' as a minimum. Transfer information on each course is available at the [Alberta Council on Admission and Transfers](#).

NOTES:

Please dress appropriately for the weather on any field trips! Proper footwear is important. If the weather does not co-operate, the lab schedule will shift. Individual components of the course will be given a numerical mark. The grading system will be applied using a combination of absolute achievement and relative standing in the class.

MISSED TERM EXAM OR LABS:

A student who cannot write a term examination or complete a lab assignment due to incapacitating illness, severe domestic affliction or other compelling reasons can apply to have the weight of the missed midterm transferred to the final. All attempts should be made to make up missed labs. Missed labs with no attempts to complete the work will be assigned a "0". You must notify the instructor of a missed midterm or lab assignment within 48 hours. Deferral of term work is a privilege and not a right; there is no guarantee that a deferral will be granted. Misrepresentation of Facts to gain a deferral is a serious breach of the Code of Student Behaviour.

CELL PHONES: Cell phones and other electronic devices are to be turned off during class times. If you need to use one, leave the room. If you have to text someone, leave the room.

STUDENTS WITH DISABILITIES: Students who require accommodation in this course due to a disability are advised to discuss their needs with counsellors in the Registrar's office. Please ensure that the required forms for exams are submitted to the instructor **one week** before the date of midterms or **by the last lecture class** for the final exam.

SKILL CENTRE: Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Keyano College Skill Centre.

Disclaimer: Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar.

Note: Recording is permitted only with the prior written consent of the instructor or if recording is part of an approved accommodation plan.

Students should consult pp.30-31 on

[http://keyano.ca/sites/default/files/a_files/calendars/keyano.calendar.credit\(2012-2013\).pdf](http://keyano.ca/sites/default/files/a_files/calendars/keyano.calendar.credit(2012-2013).pdf)

IMPORTANT DATES:

January 7, 2013	First day of classes
January 18, 2013	Courses dropped after this date will be designated "W". (A withdrawal (W) is not reflected in your GPA.
February 25 – March 1, 2013	Reading Week
March 8, 2013	Courses dropped after this date will be designated "WF". (A withdrawal failure (WF) counts as a 0 in your GPA).
April 19, 2013	Last day of classes
April 22-30, 2013	Final Exams

COLLEGE POLICIES

Equality, Equity and Respect

The Keyano College is committed to providing an environment of equality, equity and respect for all people within the College community. All members of this community are considered partners in developing teaching and learning contexts that are welcoming to all. Faculty, staff, and students are encouraged to use inclusive language to create a classroom atmosphere in which students' experiences and views are treated with equal respect and valued in relation to their gender, ethnic and cultural background, and sexual orientation.

Students should consult:

http://www.keyano.ca/Committees/IRA/Individual_Rights_Policy.asp

Plagiarism and Cheating

Every student expects to be treated and evaluated fairly in a course. Plagiarism and cheating robs everyone of this right.

No student may submit words, ideas or data of another student or person as his or her own in any writing, project, assignment, quiz, electronic presentation, exam etc. Any work used that is not the student's own must be clearly cited as belonging to someone else. There are penalties for using other's work and not citing it. The Student's Rights & Responsibilities document clearly outlines these penalties and the appeal process.

- No learner can obtain information from another student during an exam.
- No learner can bring unauthorized information (paper or electronic) into an exam or quiz.
- No student can submit work done in another course for grading in this course without the written prior approval of the course instructor.
- No student can submit copyright protected or commercially produced materials as part or all of an assignment without proper citation & permission.

Student Rights & Responsibilities

Students should consult the Keyano College Credit Calendar or online at:

<http://www.keyano.ca/Media/Collections/Calendars/Keyano.Calendar1112-10-full.pdf>

Specialized Supports and Duty to Accommodate

Disability Support Services: Learner Assistance Program

If you have a documented disability or you think that you would benefit from some assistance from a Disabilities Counsellor, please call or visit the Disability Supports Office 780-792-5608 to book an appointment (across from the library). Services and accommodations are intended to assist you in your program of study, while maintaining the academic standards of Keyano College. We can be of assistance to you in disclosing your disability to your instructor, providing accommodations, and supporting your overall success at Keyano College.

Specialized Supports and Duty to Accommodate

Specialized Support and Duty to Accommodate are aligned with the office of Disability Support Services: Learner Assistance Program (LAP) guided by federal and provincial human rights legislation, and defined by a number of Keyano College policies. Keyano College is obligated by legislation to provide disability-related accommodations to students with identified disabilities to the point of undue hardship.



Course Outline

UNIVERSITY STUDIES

EAS 105
The Dynamic Earth Through Time
Winter Semester, 2013

3 Credits
3 Hours Lecture, 3 Hours Lab
Per week

Neil O'Donnell, Instructor

Date

Reviewed and approved by:

Louis Dingley, Chairperson

Date

Guy Harmer, Dean

Date