UNIVERSITY OF ALBERTA
DEPARTMENT OF EARTH AND ATMOSPHERIC SCIENCES
EAS 105 Section A1, Fall Term 2011
The Dynamic Earth Through Time

LECTURES: EAS 105 Section A1: Tu/Th, 11:00–12:20, CAB 243
PROFESSOR: Dr. Jeremy Richards (ESB 3-02; Jeremy.Richards@UAlberta.ca)
OFFICE HOURS: Mondays 13:00–14:00 or any time by appointment
REQUIRED TEXTBOOK: *The Changing Earth* (Monroe & Wicander, 4th edn., Thomson)
http://earthscience.brookscole.com/changingearth4e/
RECOMMENDED TEXTBOOKS: *Understanding Earth* (Press and Siever, 4th edn., Freeman)
The Blue Planet (Skinner et al., 2nd edn., Wiley); EAS 100 textbook.
REQUIRED LAB MANUAL AND LAB KIT: *EAS 105 Laboratory Manual*; Simple lab kit.
LECTURE NOTES: PDFs of PowerPoint presentations posted on e-Class.

Calendar Description
The plate tectonic framework of a dynamic Earth as it relates to the origin of major groups of minerals and rocks. Earthquakes, structural geology, and the origin of mountain belts. Surface processes and their sedimentary products. History of life and extinctions. Not available to students with credit in EAS 101, 210, or SCI 100. Prerequisite: EAS 100 or 102.

Course Objectives
The objectives of this course are to understand the geological nature and evolution of Earth, including its origins, composition, and the history of life. Students will gain familiarity with the main rock-forming minerals and rock types that occur in the Earth's crust and mantle, sedimentary, igneous, and metamorphic processes, the deformation of rocks, and the plate tectonic theory. The evolution of life over Earth's history will also be reviewed. Laboratories will provide practice in the identification of common minerals and rocks, and in the use of geological maps. Geological themes introduced in EAS 100 are addressed in greater detail in EAS 105.

EAS 105 Section A1, Fall Term 2011: LECTURE/LABORATORY SCHEDULE

		LECTURE TOPICS (11:00–12:20, CAB 243)	**LABS** (CCIS L1-283)
Th	8 Sept	Introduction to course, logistics; Earth formation	No labs
Tu	13	Review of the rock cycle (ch. 1)	No labs
Th	15	Atoms, compounds, and mineralogy (ch. 3)	
Tu	20	Igneous rocks (ch. 4)	Museum tour; Minerals and their atomic structure
Th	22	Igneous rocks (ch. 4)	
Tu	27	Earth surface processes (parts of chs. 6,11,12,14,15,16)	Igneous rocks and processes
Th	29	Sedimentary environments (as above)	
Tu	4 Oct	Sedimentary rocks (ch. 6)	Sedimentary rocks and processes
Th	6	Metamorphic rocks (ch. 7)	
Tu	11	Metamorphic rocks (ch. 7)	Metamorphic rocks and processes
Th	13	Structural geology (ch. 10)	
Tu	18	Structural geology (ch. 10)	Geological mapping and structural geology
Th	20	**MID-TERM EXAM** (in class)	
Tu	25	Plate tectonics (ch. 2)	Plate tectonics
Th	27	Plate tectonics (ch. 2)	
Tu	1 Nov	Measurement of geological time (ch. 17)	Precambrian Earth and life; Canadian shield
Th	3	Geological timescale; Evolution of life (ch. 17)	
Tu	8	Precambrian Earth and life; Canadian shield (chs. 18,19)	No labs
Th	10	**CLASS BREAK**	
Tu	15	Paleozoic Earth and life (chs. 20,21)	Paleozoic Earth and life
Th	17	Paleozoic Earth and life (chs. 20,21)	
Tu	22	Mesozoic Earth and life (chs. 22,23)	Mesozoic Earth and life
Th	24	Mesozoic Earth and life (chs. 22,23)	
Tu	29	Cenozoic Earth and life (chs. 22,23)	Cenozoic Earth and life
Th	1 Dec	Cenozoic Earth and life (chs. 22,23)	
Tu	6	Review class	No labs
M	12*	**LECTURE FINAL EXAM (9–11 am, location TBA)**	

* Provisional.

LABORATORY WORK
Laboratory work will be conducted weekly in your lab section, starting in the third week of classes. You must attend the lab section you registered in. Attendance is mandatory. Bring your lab manual to every lab. Read the introductory material at the beginning of your lab manual for more information on labs.

The lab will run for 3 hours per week at the time and place designated for your lab section. The lab assignment for each week must be handed in before or at the end of that lab session.

An eClass site will be used to post this course outline, PDFs of lecture notes, TA introductory PowerPoint presentations, lab grades, and links to websites with additional study material.

The lab component is worth 40% of your course grade.

Lab issues: The Lab Coordinator is **David Chesterman** (780-492-8494, David.Chesterman@ualberta.ca). He is familiar with all aspects of the lab, and you should deal with him **first** as far as any lab issues are concerned, if they cannot be resolved with your TA. If you must miss a lab period, or need to make arrangements for SSDS accommodation, contact David to discuss alternatives. TAs cannot provide students with excused absences or make arrangements for students to attend other lab sections.

COURSE MARK-WEIGHT DISTRIBUTION AND GRADING:

Mid-term exam	20%	50-minute exam conducted in class on Thursday, October 20.
Labs	40%	See procedures above, and descriptions below. Marked labs will be equally weighted. There is no lab exam.
Final exam	40%	2-hour exam scheduled per university exam schedule. Final exam will be cumulative (i.e., will cover the full term).

Distribution of Grades and Grade Assignment: A letter grade will be assigned for your efforts and achievement in the course. Grades will be based upon your earned percentage of cumulative marks and the overall grade distribution. Your final mark will thus reflect a combination of absolute achievement and relative standing in the class. The GFC-recommended grade distribution (GFC Policy Manual §61.3) is used as a guideline only, and the actual grade distribution will vary from year to year depending on cohort performance.

FINAL EXAM
Provisional: Monday 12 December, from 0900–1100 hours; location TBA.
Note that the date of the final exam given here is tentative. The Registrar's Office publishes a final exam schedule later in the term, and it is your responsibility to ensure that you confirm the times and places of all your exams.

DEFERRED EXAM POLICY (See Calendar §23.3 and §23.5.6 for details)
Term Exams:
A student who cannot write a term examination due to incapacitating illness, severe domestic affliction, or other compelling reasons (which exclude simple inconvenience) can apply in writing to the Instructor for an excused absence. Such an application must be made "to the instructor within two working days following the scheduled date of the term work or term exam

missed, or as soon as the student is able, having regard to the circumstances underlying the absence" and must be supported by a Statutory Declaration (*in lieu* of a medical statement form) or other appropriate documentation (Calendar §23.3.1). The Instructor may decide either to allow the student to sit a deferred exam (on dates shown below), or to waive the exam and adjust the weighting of the remaining work to 100%.

Deferral of term work is a priviledge 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*.

Final Exams:

A student who cannot write a final examination due to incapacitating illness, severe domestic affliction, or other compelling reasons (which exclude simple inconvenience) can apply in writing to sit a deferred exam on dates shown below. Such an application must be made to the student's Faculty office "within two working days following the scheduled date of the exam missed, or as soon as the student is able, having regard to the circumstances underlying the absence" and must be supported by a Statutory Declaration (*in lieu* of a medical statement form) or other appropriate documentation (Calendar §23.3.2).

Deferral of final exams 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*.

Students who are granted permission to sit a *deferred mid-term exam* must do that exam on:
Saturday, November 5, 2011, from 1000–1200 hours, in CCIS L1-283.

Students who are granted permission to sit a *deferred final exam* must do that on:
Saturday, January 14, 2012, from 1000–1200 hours, in CCIS L1-283.

PAST (OR REPRESENTATIVE) EVALUATIVE MATERIAL

Examples of previous exam questions will be posted on the course website, and will be discussed in class prior to the exams. Students may not have copies of previously graded lab assignments because this puts the student in violation of the Code of Student Behaviour (§30.3.2(2)a).

TEXTBOOK AND LABORATORY MATERIALS

Required textbook: *The Changing Earth* (Monroe & Wicander, 5th edn., Thomson)
($150.95 + GST; EAS section of University Bookstore, lower floor).

Required Lab Kit: Same as for EAS 100.
$22.60 + GST; University Bookstore, upper floor).

Additional materials: Notepaper, pens, pencils, erasers, a metric ruler and a protractor should be taken to labs.

FORMAL NOTICES

GFC POLICY ON COURSE OUTLINES
"*Policy about course outlines can be found in Section 23.4(2) of the University Calendar*" (GFC 29 SEP 2003). The General Faculties Council, in approving these guidelines, expects a common sense approach to their application and understands that circumstances might develop, during a term, where a change to the course outline as set out in Section 61.6(a) of the GFC Policy Manual, makes sense to all concerned. Such changes shall only occur with fair warning or general class consent.

ACADEMIC STANDARDS
"*The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at* www.ualberta.ca/secretariat/appeals.htm*) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University*." (Section 23.4(2) of the University Calendar; GFC 29 SEP 2003.)

All forms of dishonesty are unacceptable at the University. Any offense will be reported to the Senior Associate Dean of Science who will determine the disciplinary action to be taken. Cheating, plagiarism, and misrepresentation of facts are serious offenses. Anyone who engages in these practices will receive at minimum a grade of zero for the exam or paper in question and no opportunity will be given to replace the grade or redistribute the weights. As well, in the Faculty of Science the sanction for **cheating** on any examination will include **a disciplinary failing grade** (no exceptions) and senior students should expect a period of suspension or expulsion from the University of Alberta.

See www.ualberta.ca/tie for more information on Academic Standards. Remember that it is the student's responsibility to be aware of the contents of the Code of Student Behaviour. Ask the Instructor or Lab Coordinator if you have questions about acceptable collaborations, cheating, etc.

EXAMS
Your student photo I.D. is required at exams to verify your identity. Students will not be allowed to begin an examination after it has been in progress for 30 minutes. Students must remain in the exam room until at least 30 minutes has elapsed. Electronic equipment cannot be brought into examination rooms.

CELL PHONES
Cell phones are to be turned off during lectures, labs, and seminars. Cell phones are not to be brought to exams.

RECORDING
Recording is not permitted except as part of an approved accommodation plan, which requires the prior written consent of the Instructor.

SPECIALIZED SUPPORT AND DISABILITY SERVICES
Students who require accommodations in this course due to a disability affecting mobility, vision, hearing, learning, or mental or physical health are advised to discuss their needs with Specialized Support and Disability Services, 2-800 Students' Union Building, 492-3381 (phone) or 492-7269 (TTY).

Remember to provide the Instructor and Lab Coordinator with copies of your Letter of Introduction early in the term so that your exam needs can be met come exam time.

ACADEMIC SUPPORT CENTRE
Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Academic Support Centre (2-703 Students' Union Building).

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 and takes precedence over the final examination date reported in this syllabus.

ABOUT YOUR INSTRUCTOR:

Jeremy Richards
My office is at the west end of the 3rd floor of the Earth Sciences Building (room ESB 3-02) — if my door is open, feel free to stop by with any questions you may have, in or out of "office hours"; or you can make a specific appointment by phone (780-492-3430) or e-mail (Jeremy.Richards@UAlberta.ca).

My research interests focus on the origin of mineral deposits, especially of metals such as copper and gold, and sustainable development as it relates to the minerals industry. These interests take me and my graduate students all over the world, including various parts of Canada (Canada is one of the world's top suppliers of minerals). On the way we see some spectacular geology, and I hope to be able to impart some of the excitement of the geological world to you during the course of our lectures.

PROVISIONAL LECTURE SCHEDULE BY TOPIC

1. Introduction

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

2. Minerals

- Main groups and classification of minerals
- Physical and chemical properties of rock-forming minerals

3. Igneous processes including intrusive activity and volcanism

- Igneous processes and rocks
- Classification and identification of igneous rocks

4. Processes at the Earth's surface and sedimentary rocks

- 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

5. Metamorphism and metamorphic rocks

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

6. Structural Geology

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

7. Tectonic Framework and the formation of Lithosphere

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

8. The geological timescale

- Introduce the geological timescale and the main subdivisions of geologic time
- Review methods of stratigraphic correlation and measuring of geologic time
- Introduction to the concepts of evolution.

9. Precambrian Earth and life, Canadian Shield

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

10. Paleozoic Earth and life

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

11. Mesozoic Earth and life

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

12. Cenozoic Earth and life

- History of North America in the Cenozoic; Rocky Mountains
- Major Cenozoic fossils: mammals
- History of Glaciation