

SYLLABUS
Earth Sciences 2240G
Catastrophic Events in Earth History

1. Course Description

Earth Sciences 2240G considers those events so dramatic and catastrophic that they leave evidence in the geologic record and can threaten life on Earth. Included will be violent volcanic eruptions, mega-earthquakes and the tsunami arising from them, rapid climatic changes and associated storms, and impacts from asteroids and comets. As much as possible, we will use the examples of recent events and processes to help interpret what we read in the rock record.

The content of the course incorporates definitions of basic geologic terminology and concepts required to proceed irrespective of background knowledge.

Course Learning Objectives

- The primary goal of this course is to gain an understanding of those (predictable and unpredictable) events that catastrophically punctuate the normal evolution of Earth.
- We will learn what energy sources fuel Earth's processes in rocks, water and atmosphere, and what factors turn ordinary processes into extraordinary ones.
- We will learn the significance of geologic time and we'll learn how to read dates incorporated in ice, sediments and rocks.
- We will learn to write scientific reports; two assigned topics will be researched and presented in scientific format.

2. Prerequisites

Prerequisites: Completion of first year requirements.

Antirequisites: Earth Sciences 240A/B, 241A/B, 2241A/B

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

3. Textbook and course materials

The course is offered *on-line only*. You can access the course material on the UWO OWL Sakai system: <https://owl.uwo.ca/portal>

Course content was primarily developed by Prof. Neil D. MacRae in previous versions of 2240. All course content is mounted on-line; neither texts nor supplemental materials are required.

4. Instructor Information

Instructor: Dr. Sean Shieh

Contact: Please use the course site [message](#) facility to contact me privately.

5. Suggested Weekly Schedule (Based Upon 12 Week Duration)

Part A: Basic Concepts and Processes

Unit 1: Introduction to Natural Processes

Week 1

- **Introduction:** The Scientific Method; Terminology
- **Chapter 1:** Philosophy of Interpretation: Catastrophism vs. Gradualism
- **Chapter 2:** Geological Age Dating

Graded quiz for Unit 1

Unit 2: Processes Driven by Internal Energy

Week 2

- **Introduction:** Earth's Differentiation; Internal Heat Energy
- **Chapter 3:** Plate Tectonics

Graded quiz for Introduction and Plate Tectonics

Weeks 3-4

- **Chapter 4:** Earthquake Basics
- **Chapter 5:** Megathrust Earthquakes and Tsunami
- **Chapter 6:** Transform and Intraplate Earthquakes

Graded quiz for Earthquakes and Tsunami

Weeks 5-6

- **Chapter 7:** Volcano Basics
- **Chapter 8:** Killer Volcanoes
- **Chapter 9:** Flood Basalts

Graded quiz for Volcanoes

Mid-term Exam (2 hours); Covers content to end of Chapter 9

Unit 3: Processes Driven by External Energy

Weeks 7-8

- **Chapter 10:** Physics and Chemistry of Air and Water
- **Chapter 11:** Cyclonic Storms
- **Chapter 12:** Climate Basics
- **Chapter 13:** Climate: Past, Present, Future

Graded quiz for Air, water and Storms

Graded quiz for Climate

Week 9

- **Chapter 14:** Space Impacts Basics
- **Chapter 15:** Space Impacts Case Studies

Graded quiz for Space Impacts

Part B: Global Catastrophes that Caused Extinctions

Unit 4: Mass Extinctions

Weeks 10, 11 and 12

- **Introduction:** The Geological Time Scale; Terminology; Potential Causes of Mass Extinctions
 - **Chapter 16:** Precambrian Time
 - **Chapter 17:** A Trip Through the Phanerozoic
 - **Chapter 18:** End-Permian Mass Extinction: *When Life was Nearly Extinguished*
 - **Chapter 19:** End-Cretaceous Mass Extinction: *Death to the Dinosaurs!*
 - **Chapter 20:** Humans and the Holocene Extinctions
- Graded quiz for Chapter 16 and 17*
Graded quiz for Chapters 18, 19 and 20

Final Exam (2 hours); Content from Chapter 10 to Chapter 20, inclusive.

6. Method of Evaluation

- 25% Mid-Term 2 hour written examination
Midterm Exam is on weekend, TBA.
Time and location(s) to be determined.
This constitutes the final examination of the first half of the course :Unit 1 and Unit 2 inclusive (i.e. to end of Chapter 9)
- 25% End-of-Term 2 hour written examination
Date, time and location to be determined by the Registrar's office
This constitutes the final examination of the second half of the course: Unit 3 and Unit 4 inclusive (i.e. to end of Chapter 20)
- 20% Report 1 (Assigned Research Topic) **Due February 12th**
- 20% Report 2 (Assigned Research Topic) **Due March 30th**
- 10% Graded Quizzes (at intervals during the course; see *Weekly Schedule*)
The quizzes must be completed by **Wednesday April 8th.**

Notes

A. You have approximately 6 weeks to complete and submit Report 1, then a further 5 weeks to complete and submit Report 2. Please be aware of the following conditions:

- The “**Due Dates**” recorded on the assignment pages (*and in the Calendar entry for the course*) are the final dates of submission without penalty.
- For 5 days following those “**Due Dates**” (including weekend days) reports may be submitted, but will be subject to a mark deduction of 10 % per late day. No reports will be accepted after that.

B. Graded quizzes may be attempted/submitted at any time, but **MUST** be submitted by the last day of classes (*NOT the day of exams*). It makes sense to do them as you go, at the end of each section to which they apply.

7. Additional Statements (PLEASE READ)

Accessibility Statement: Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Statement on Use of Electronic Devices: During exams electronic devices (e.g. computers, phones) will not be allowed. You may use a calculator provided it does not connect with the internet (e.g. no calculator apps on your phone).

Statement on Academic Offences: Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Plagiarism is a serious academic offence. The UWO Senate Academic Handbook defines plagiarism as "The act of appropriating the literary composition of another, or parts or passages of his writings, or the ideas or language of the same, and passing them off as the product of one's own mind." Students must write their assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge their debt both by using proper referencing such as citations. For more information see Scholastic Offence Policy in the Western Academic Calendar.

Plagiarism detection software: All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).

Multiple Choice: Computer-marked multiple-choice tests and/or exams may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating

Distress: Students who are in emotional/mental distress should refer to Mental Health@Western for a complete list of options about how to obtain help.

<http://www.uwo.ca/uwocom/mentalhealth/>

SDC's Learning Skills Services: Rm 4100 WSS, <http://www.sdc.uwo.ca/learning>
LS counsellors are ready to help you improve your learning skills. We offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Student's responsibilities in the event of a medical issue:

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. You can learn more about the University Policy on

Accommodation for Medical Illness here: <https://studentservices.uwo.ca/secure/index.cfm>