

Earth Sciences 2240F *Catastrophic Events in Earth History*

1. Instructor Information

Instructor: Sean Shieh B&GS room 1066

Contact: sshieh@uwo.ca

Personal questions should be emailed to the instructor or TAs.

2. Course Description

Earth Sciences 2240F 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

1. 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.
2. We will learn what energy sources fuel Earth's processes in rocks, water and atmosphere, and what factors turn ordinary processes into extraordinary ones.
3. We will learn the significance of geologic time and we'll learn how to read dates incorporated in ice, sediments and rocks.
4. We will learn to write scientific reports; an assigned topic will be researched and presented in scientific format.

3. 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course or written special permission from the Department of Earth Sciences to enroll in it, they may be removed and withdrawn from this course in accordance with university policy. This may be done after the add/drop deadline of the academic term, and the course will be marked as withdrawn (WDN) on their academic record. This decision may not be appealed.

4. Textbook and course materials

The course is offered on-line only. All course material will be posted to OWL Brightspace:

<https://westernu.brightspace.com/d2l/login?target=%2fcontent%2f&sessionExpired=0>

Students are responsible for checking the course OWL Brightspace site regularly for news and updates. This is the primary method by which information will be disseminated to all students in the class.

If students need assistance with the course OWL Brightspace site, they can seek support on the [OWL Brightspace Help](#) page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

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

Technical Requirements

A list of technical requirements for the course (e.g., stable internet connection, computer with working microphone and/or webcam, other hardware or software specifications). Where a specific device or software is required and carries a cost to the student, include the approximate cost here as well.

Suggested Weekly Schedule

- This schedule is based upon a 12 week duration, but the term is 13 weeks.
- The suggested schedule amounts to **18 to 25 pages per week**.
- You will have to follow this schedule closely for the first half of the term in order to read all of the material that will be tested on the midterm in time.
- There is an extra week at the end of term that will allow you to be flexible in your readings in the second half of the term in order to accommodate the writing of your scientific report. If you follow this schedule exactly you will finish the readings one week before the end of term.

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

- **Unit 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

Week 7

- **Unit 3 Introduction**
- **Chapter 10:** Physics and Chemistry of Air and Water

Week 8

- **Chapter 11:** Cyclonic Storms

Graded quiz for Air, water and Storms

- **Chapter 12:** Climate Basics

Week 9

- **Chapter 13:** Climate: Past, Present, Future

Graded quiz for Climate

Week 10

- **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

Week 11

- **Introduction:** The Geological Time Scale; Potential Causes of Mass Extinctions
- **Chapter 16:** Precambrian Time
- **Chapter 17:** A Trip through the Phanerozoic

Graded quiz for Chapter 16 and 17

Week 12

- **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 Chapters 18, 19 and 20

Final Exam (2 hours); Content from the Unit 3 introduction to Chapter 20, inclusive.

5. Method of Evaluation

- ☐ 20% Mid-Term 2 hour written examination

Midterm Exam :

- ☐ **Time and location(s): TBA**

- *This covers the first half of the course :Unit 1 and Unit 2 inclusive (to end of Chapter 9)*
- Make-up midterm will be held at Western Campus ONLY

You can only take the make-up exam with permission from an academic counsellor.

- 30% End-of-Term 2 hour written examination
Date, time and location to be determined by the Registrar's office
 - *This covers the second half of the course: Units 3 & 4 inclusive (to end of Chapter 20)*
 - Make-up final exam: TBA
You can only take the make-up exam with permission from an academic counsellor.
- 40% Scientific Report (Assigned Research Topic) Submitted in 2 parts:
See the Assignment Information provided on OWL
 - 10% Introduction and Reference list **Due October 6th, 1:00 pm**
 - 30% Final report (2500 words) **Due December 7th, 1:00 pm**
- 10% Graded Quizzes (at intervals during the course; see *Weekly Schedule*)
The quizzes must be completed by **the last date of semester.**

Notes

- The “**Due Dates**” recorded on the syllabus (*and in the OWL Calendar*) are the final dates of submission without penalty.
- If you have technical difficulties submitting an assignment contact the instructor immediately.
- Assignments submitted within two hours of the deadline will receive a 2% 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.
- When you submit an assignment you will receive an email receipt from OWL and an email receipt from Turnitin.com. **Keep these for your records.**
- Graded quizzes may be attempted/submitted at any time, but **MUST** be submitted by the last day of classes (*NOT the day of the exam*). It makes sense to do them as you go, at the end of each section to which they apply.

Essential Learning Requirements

When a student has not demonstrated proficiency in an essential learning requirement listed above, and when the shortfall results from a granted Academic Consideration, they will be withdrawn (WDN) from the course. The student may appeal to the Associate Dean (Academic) for reinstatement with an Incomplete (INC) standing. Where an appeal for INC is granted, their maximum course load may be reduced during the term in which they complete the outstanding course requirements.

Special Examination

Per university policy, Academic Consideration requests with supporting documentation are required for the final examinations scheduled during official examination periods by the Registrar's Office.

If the student has been approved by the Academic Advising Office to write a Special Examination (SPC) and the final exam is their only outstanding course component, an SPC will be assigned to them and scheduled by the instructor per university policy.

If the student misses their SPC exam and is approved for Academic Consideration, they will be withdrawn from the course without academic penalty. If they experienced extenuating circumstances such as prolonged illness, they may appeal to the Associate Dean (Academic), on a case-by-case basis, for the opportunity to write the final exam the next time the course is offered. An outstanding SPC will reduce their course load for the term in which the exam is deferred, as outlined in the [Definitions of Types of Examinations](#) policy.

If the student misses their SPC exam and Academic Consideration is not approved, or was not requested, they will receive a grade of zero on the exam.

Information about Missed Coursework

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs*, posted on the Academic Calendar:

https://uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person. The policy also does not apply to students experiencing longer-term impacts on their academic responsibilities. These students should consult [Accessible Education](#).

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar's webpage:

https://registrar.uwo.ca/academics/academic_considerations/

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

Midterms and Tests

This course's final exam is non-cumulative. It covers only [*from the Unit 3 introduction to Chapter 20, inclusive*], while the midterm covers [*content to end of Chapter 9*]. Because of this, a makeup midterm is available if a student experiences an extenuating circumstance (provide date if known). To request one, submit an Academic Consideration request through the Student Absence Portal (SAP). If it is granted, the student will write the makeup midterm. Per university policy, this is the one assessment designated as **always requiring documentation**.

A student is entitled to **one** makeup midterm. If a student misses the makeup midterm and is approved for Academic Consideration, they will be withdrawn from the course without academic penalty, following the same process that applies to a missed Special Examination (see Special Examination, below). A student may appeal to the Associate Dean (Academic), on a case-by-case basis, for the opportunity to write the midterm the

next time the course is offered. If a student misses the makeup midterm and Academic Consideration is not approved, or was not requested, they will receive a grade of zero on the makeup midterm.

Quizzes

This course has 9 quizzes. Students are expected to complete 7 to receive full credit for this component. If a student completes fewer than 7 of the total, the missing items will be recorded as a zero and included in their grade for this component.

Special Examination

Per university policy, Academic Consideration requests with supporting documentation are required for the final examinations scheduled during official examination periods by the Registrar's Office.

If the student has been approved by the Academic Advising Office to write a Special Examination (SPC) and the final exam is their only outstanding course component, an SPC will be assigned to them and scheduled by the instructor per university policy. If the student misses their SPC exam and is approved for Academic Consideration, they will be withdrawn from the course without academic penalty. If they experienced extenuating circumstances such as prolonged illness, they may appeal to the Associate Dean (Academic), on a case-by-case basis, for the opportunity to write the final exam the next time the course is offered. An outstanding SPC will reduce their course load for the term in which the exam is deferred, as outlined in the [Definitions of Types of Examinations](#) policy.

If the student misses their SPC exam and Academic Consideration is not approved, or was not requested, they will receive a grade of zero on the exam.

6. Additional Statements (PLEASE READ)

6.1 Religious Accommodation

When a recognized religious holiday either requires a student to be absent from the University, or requires or prohibits an activity that makes it impossible for them to complete an academic requirement scheduled that day, they are entitled to accommodation. No student will be penalized for an absence for religious reasons, and an alternative means of satisfying the requirement will be arranged. This accommodation is provided in accordance with the University's policy on Accommodation for Religious Holidays:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

The student should submit their requests through the Student Absence Portal (SAP), identifying the conflict and the specific course component(s) affected (e.g., test, midterm, exam).

Midterms and Tests: If a religious observance conflicts with a midterm test, they must submit their request no later than **one week** before the test. Their instructor will arrange an early sitting of the test. As set out above, no makeup test is offered for any other reason; this early sitting is available specifically for this accommodation.

Final Examinations: If a religious observance conflicts with the final exam, the student must submit their request no later than **two weeks** before the exam. Their instructor will arrange a Special Examination to take place no later than one month after the end of the examination period.

Students are responsible for finding out what was covered in any class they miss due to a religious observance, and for taking the appropriate steps to keep up with the course.

If a suitable arrangement cannot be reached between a student and their instructor, they should consult the Undergraduate Chair of the department offering the course, and if necessary, the Associate Dean (Academic) of the Faculty of Science.

For a list of recognized religious observances, please visit the calendars posted on the Equity, Diversity & Inclusion website - <https://www.edi.uwo.ca> (About Us – Resources – Additional Resources – Calendars).

6.2 Academic Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

[https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic Accommodation_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf).

6.3 General Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

Use of @uwo.ca email: In accordance with policy, https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf, the centrally administered e-mail account provided to students will be considered the individual's official university email address. It is the responsibility of the account holder to ensure that emails received from the University at their official university address are attended to in a timely manner.

Requests for Relief (formally known as “appeals”)

Policy on Request for Relief from Academic Decision:

https://uwo.ca/univsec/pdf/academic_policies/appeals/requests_for_relief_from_academic_decisions.pdf

Procedures on Request for Relief from Academic Decision (Undergraduate):

https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_requests_for_relief_procedure.pdf

6.4 Scholastic Offences

Policy on Scholastic Offences:

https://uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_offences.pdf

Procedures on Scholastic Offences (Undergraduate):

https://uwo.ca/univsec/pdf/academic_policies/appeals/undergrad_scholastic_offence_procedure.pdf

Use of Electronic Devices During Assessments

In courses offered by the Faculty of Science, the **possession** of unauthorized electronic devices during any in-person assessment (such as tests, midterms, and final examinations) is strictly prohibited. This includes, but is not limited to: mobile phones, smart watches, smart glasses, hidden cameras and wireless earbuds.

Unless explicitly stated otherwise in advance by the instructor, the presence of any such device at a student's desk, on their person, or within reach during an assessment will be treated as a scholastic offence, **even if the device is not in use**.

Effective September 2026, the typical penalty for this offence is a failing grade in the course AND a 12-month prohibition on retaking the course.

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is their responsibility to review and comply with these expectations.

Use of Generative AI Tools

Unless otherwise stated, the use of generative AI tools (e.g., ChatGPT, Microsoft Copilot, Google Gemini, or similar platforms) is **not permitted** in the completion of any course assessments, including but not limited to: assignments, lab reports, presentations, tests, and final examinations.

Using such tools for content generation, code writing, problem solving, translation, or summarization—when not explicitly allowed—will be treated as a **scholastic offence**.

If the use of generative AI is permitted for a particular assessment, the conditions of use will be specified by the instructor in advance. If no such permission is granted, students must assume that use is prohibited. It is the student's responsibility to seek clarification before using any AI tools in academic work.

Use of Software for Assessments

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>).

Tests and examinations in this course will be conducted using a **remote proctoring** service. By taking this course, students are consenting to the use of this software and acknowledge that they will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require them to have a reliable internet connection and a device that meets the technical

requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

<https://remoteproctoring.uwo.ca>.

6.5 Support Services

Academic Advising. Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, requests for relief, exam conflicts, and many other academic-related matters: <https://www.uwo.ca/sci/advising/>.

Mental Health Support. Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Gender-Based and Sexual Violence. Western is committed to reducing incidents of gender-based and sexual violence (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If a student has experienced GBSV (either recently or in the past), they can find information about support services for survivors, including emergency contacts, at:

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Accessibility for Coursework. A student may contact the course instructor if they require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to them. If they have any questions regarding accommodations, they may also contact Accessible Education at http://academicsupport.uwo.ca/accessible_education/index.html

Learning Development and Success. Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help students improve their learning skills. The facility offers 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 Councils.

Student-run support services are offered by the University Students' Council (<https://westernusc.ca>) and the Science Students' Council (<https://www.westernssc.ca>).