ES 1023a / ES 2123f
Planet Earth: Shaken and Stirred / The Dynamic Earth
Fall 2025

1. COURSE INFORMATION

Location: In Person Delivery

Time Zone: All times given are **Eastern Standard Time (EST)**

Lectures (1023a + 2123f):

Labs :
Half of the labs will be delivered *in person* (a lab schedule is available on the OWL course site) and the other half will be delivered entirely *on-line synchronously* using Zoom. For on-line labs, all lab sections for that lab will be online. Please see Technical Requirements below for the on-line labs.

1023a labs: Section 002
Section 003

2123f Labs: Section 002
Section 003

You are required to carry out the lab exercises during your scheduled lab time – **attendance is mandatory for both in-person and on-line labs (TAs will take attendance)**. TAs will be available during your scheduled lab period (either in person or Zoom, depending on the lab) to answer any questions that you have. TAs will have Help Hours and more lab details are available on the OWL course site under Resources.

Technical Requirements

In order to access the course materials (course-related information files, lecture files, lab materials including all on-line labs using Zoom) and respond in a timely manner when required, a stable internet connection is required. For any Zoom meeting that may be required, computer with working microphone and webcam is required.

2. INSTRUCTOR INFORMATION

Instructor: Prof. Rick Secco
Office: B&GS Building Room 0178
Email: secco@uwo.ca
Phone: 519-661-4079
Office Hours: Email me to set up an appointment or come to my office. A Zoom meeting, with video on, may be set up. The Zoom meeting will be recorded.

TAs: TBD

TA office hours will be posted on the OWL course site.

Students ***must*** use their Western (@uwo.ca) email addresses when contacting their instructors (course instructor and TAs) and to sign into any Zoom meeting.

3. COURSE SYLLABUS

Course Calendar Description for ES 1023a/b:

An overview of the origin and development of Earth and Solar System; constitution and active processes of Earth interior; how these processes have shaped Earth evolution in the past and how they continue to control surface phenomena such as earthquake and volcanic activity. Labs will introduce the main resource exploration techniques.

Prerequisites - None; Antirequisites – ES 2123a/b and the former Earth Sciences 085a/b.

Course Calendar Description for ES 2123f/g:

An introduction to the Earth as a large heat engine; topics will focus on large-scale dynamic processes that occur in the deep interior (mantle and core convection) and their relation to activity and phenomena on the face of the Earth (tectonic plate motions, plate interactions, earth magnetic field, etc.).

Prerequisites - None; Antirequisites – ES 1023a/b and the former Earth Sciences 085a/b.

Course Description:

In this course, we explore the origin and development of Earth, its place in the Universe, its internal structure and the dynamics of its solid and liquid parts. The goal of this course is to enhance students' understanding of *how* our planet was formed, *how* it works, and *why* this is important to know. This course will focus on the following topics:

Lecture Topics :

ES1023a/b + 2123f/g is a course about planet Earth. The topics listed below may be adjusted slightly to reflect lecture progress or to introduce new and exciting developments in the field.

Building blocks of planets, stars and galaxies.
Origin and history of the Earth.
The structure of the Earth – from core to crust.
Exploring Earth's interior – seismology, geomagnetism and gravity.
Dynamic processes that modify the Earth's surface – plate tectonics, volcanism, and earthquakes.

Pre-Midterm LECTURES

1. Introduction
2. Atoms
3. Periodic Table-Sun-Fusion
4. Stellar Spectroscopy and Evolution
5. Solar System
6. Earth Size and Structure
7. Earth Structure and Seismology
8. Earth Finer Structure
9. Earth – A Heat Engine
10. Plate Tectonic Theory
11. Plate Boundaries
12. Wilson Cycle and Plate Boundary Processes

Post-Midterm LECTURES

13. Earthquakes Introduction and Pate Tectonics
14. Measuring Earthquakes and their Damage
15. Volcanism Introduction and Magma Properties
16. Volcanism – Hot Spots and Plate Boundaries
17. Earth Magnetic Field – How it is Generated
18. Earth Magnetic Field – Changes over Time
19. Gravity Introduction
20. Gravity - Isostasy

Lab Topics :

Two hour labs sessions every other week cover two broad areas: 1) exercises connected with lecture material (5 grade points each); 2) geophysical field techniques are introduced in two major labs (10 grade points each).

Course Objectives:

Upon successful completion of this course, students will be able to:

* Explain the basic processes of how the planets in our solar system developed

* Describe the interior structure of the Earth from crust to core

* Explain the basics of how seismology is used to determine Earth structure

* Explain the basic processes of plate tectonics and place it in the context of the heat engine Earth and general Earth dynamics

* Explain the basic physical processes and characteristics of earthquake and volcanic event generation

* Explain how the geomagnetic field is generated in the core and what it means to survival of life on the surface

* Explain Earth's gravity field and its effects on crustal topography

* Through knowledge gained in laboratory exercises, employ basic geophysical exploration techniques

4. COURSE MATERIALS

Course Materials / Course Website:

All course material will be posted to OWL: https://westernu.brightspace.com/

Students are responsible to check OWL (https://westernu.brightspace.com/) on a regular basis for news and updates. This is the primary method by which information (lectures, labs, announcements, assignments, forum, etc) will be disseminated to all students in the class.

If students need assistance with OWL, 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.

Textbook: There is currently no textbook for this course. Material will be presented during lectures in the form of electronic presentations

and posted on OWL. Complete lecture notes will be absolutely necessary for success in this course!

Lab Manual: Will be provided on-line via OWL.

For additional (optional) reading, the following reference books are available in the Taylor (Science) Library:

The Dynamic Earth: An introduction to physical geology, B. J. Skinner and S. C. Porter.
Earth Science, E.J. Tarbuck and F.K. Lutgens.
The Earth's Dynamic Systems: A textbook in physical geology, W. K. Hamblin.
Physical Geology, C. C. Plummer and D. McGeary.

5. METHODS OF EVALUATION

Course Evaluation:

	ES 1023a	**ES 2123f**
Midterm test (after Lecture 12; near end of October[a], 2025)	30%	25%
Final exam (TBD in December – scheduled by Registrar's Office)	40%	30%
[b]Essay (for ES 2123f students ONLY) due near end of term		15%
Laboratory Reports (5% each for Labs 1 and 4; 10% each for Labs 2 and 3)	30%	30%
TOTAL	**100%**	**100%**

[a]Most likely - the actual date will be announced at least two weeks prior to the midterm test.
[b]The actual date will be announced in a document describing details of the essay requirements to be provided on OWL

Formal supporting documentation (via an Academic Consideration) will be required by any student who misses the Midterm Test. A Make-up Midterm test will be offered at a date, time and location to be specified and will take into account the number of students, the availability of a suitable room, and availability of proctor(s).

Lab attendance is mandatory (i.e. attendance will be recorded by the TAs). If a student does not attend the in-person lab session or the lab Zoom session (depending on lab) and submits a lab report, the student will receive a grade of zero for that lab report. Major laboratory reports for Labs #2,3 are due 1 week after the specific lab session. There will be no penalty if the lab report is submitted within 72 hours of the due date. Labs #2,3 each have a 10% grade value. Lab reports for Labs #1,4 are due at the end of the lab session. There will be no penalty if the lab report is submitted within 72 hours of the due date. Labs #1,4 each have a 5% grade value. Any missed lab may be replaced by an extra lab (Make-up Lab) to be posted on-line via OWL at the end of the term. This Make-up Lab will be due 1 week later but there will be no penalty if the lab report is submitted within 72 hours of the due date. The Make-up Lab will have a grade value equivalent to the grade value of the missed lab. The Make-

up will be entirely self-guided and major lab laboratory report will be required. TAs will not present the lab as in a normal lab session.

[b]Essay: As part of the course requirements **for students enrolled in ES 2123f only**, each student will submit an original essay of her/his own effort on any topic within the context of the course that highlights the *Earth as a dynamic planet*. The grade assigned for the essay will contribute 15% of the final grade for the course. Further details on the essay subject and due date will be available on OWL in due course. Each essay will be submitted through the OWL Assignment portal and will undergo a similarity review check using Turnitin® software.
NOTE TO ES 2123F STUDENTS : YOU MUST PASS THE ESSAY COMPONENT OF THE ES 2123F COURSE IN ORDER TO RECEIVE CREDIT FOR THIS COURSE.

Late Policy: Labs and the essay are due on the date specified on the assignment. 10% will be deducted for every day late following the no penalty date. If you have exceptional circumstances, please contact Dr. Secco prior to the due date.

6. STUDENT ABSENCES

General 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://www.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.

All Academic Consideration requests must include supporting documentation; however, recognizing that formal documentation may not be available in some extenuating circumstances, the policy allows students to make one Academic Consideration request **without supporting documentation** in this course. **However, the following assessments are excluded from this, and therefore always require formal supporting documentation:**

- **Midterm** (Designated by the instructor as the one assessment that always requires documentation when requesting Academic Consideration)

When a student *mistakenly* submits their one allowed Academic Consideration request **without supporting documentation** for the assessments listed above or those in the **Coursework with Assessment Flexibility** section below, the request cannot be recalled and reapplied. This privilege is forfeited.

7. ACCOMMODATION AND ACCESSIBILITY

Religious Accommodation

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university's EDID website for the recognized religious holidays:

https://www.edi.uwo.ca.

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.

8. ACADEMIC POLICIES

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

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 e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

No electronic devices will be permitted on tests and exams.

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:

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

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).

NOTE: At the time of writing, this course is planned for in person delivery of lectures, tutorials, midterm test and exam. Should there be a university-mandated switch to on-line course delivery at any time during this term, the following statements will apply.

Tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you 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.

Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. Information about the technical requirements are available at the following link:
https://www.proctortrack.com/tech-requirements/

Tests and examinations in this course may be conducted using Zoom. You will be required to keep your camera on for the entire session, hold up your student card for identification purposes, and share your screen with the invigilator if asked to do so at any time during the exam. The exam session will **not** be recorded.*

More information about the use of Zoom for exam invigilation is available in the Online Proctoring Guidelines at the following link:
https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf

Completion of this course will require you to have a reliable internet connection and a device that meets the system requirements for Zoom. Information about the system requirements are available at the following link:
https://support.zoom.us/hc/en-us

* Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please provide this information to the instructor in advance of the test or examination.

Tests and examinations in this course may be conducted using both Zoom and a remote proctoring service, such as Proctortrack.

When Zoom is used for exam invigilation, you will be required to keep your camera on for the entire session, hold up your student card for identification purposes, and share your screen with the invigilator if asked to do so at any time during the exam. The exam session using Zoom will not be recorded.*

Proctortrack will require you to provide personal information (including some biometric data). The session will be recorded. By taking this course, you are consenting to the use of this software.
More information about remote proctoring is available in the Online Proctoring Guidelines at the following link:
https://www.uwo.ca/univsec/pdf/onlineproctorguidelines.pdf

Completion of this course will require you to have a reliable internet connection and a device that meets the system and technical requirements for both Zoom and Proctortrack. Information about the system and technical requirements are available at the following links:
https://www.proctortrack.com/tech-requirements/
https://support.zoom.us/hc/en-us

* Please note that Zoom servers are located outside Canada. If you would prefer to use only your first name or a nickname to login to Zoom, please provide this information to the instructor in advance of the test or examination.

9. SUPPORT SERVICES

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

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.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will 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.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (https://learning.uwo.ca) are ready to help you improve your learning skills. They 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.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/.

Additional student-run support services are offered by the USC, https://westernusc.ca/services/.

This course is supported by the Science Student Donation Fund. If you are a student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students' Council (SSC). One or more grants from the Fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the Fee by the end of September of each academic year by completing the online form linked from the Faculty of Science's Academic Advising site. For further information on the process of awarding grants from the Fund or how these grants have benefitted undergraduate education in this course, consult the Chair of the Department or email the Science Students' Council at ssc@uwo.ca.