

ES 1023b / ES 2123g
Planet Earth: Shaken and Stirred / The Dynamic Earth
Winter 2026

1. COURSE INFORMATION

Location: In Person Delivery

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

Lectures (1023b + 2123g):

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.

1023b labs: Section 002
 Section 003
 Section 004

2123g 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.

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 Plate 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.

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 possibly the midterm and final exam) and respond in a timely manner when required, a working computer and a stable internet connection is required. For any Zoom meeting that may be required, computer with working microphone and webcam is required.

5. METHODS OF EVALUATION

Course Evaluation:

	ES 1023b	ES 2123g
Midterm test (after Lecture 12; near end of February ^a , 2026)	30%	25%
Final exam (TBD in April – scheduled by Registrar's Office)	40%	30%
^b Essay (for ES 2123g 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%

^aMost likely - the actual date will be announced at least two weeks prior to the midterm test.

^bThe actual date will be announced in a document describing details of the essay requirements to be provided on OWL

Use of Generative AI Tools

Use of generative AI tools (e.g., ChatGPT, Copilot, Gemini) for all assessments and assignments (lab reports and essay) is **prohibited**.

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.

Evaluation Scheme for Missed Assessments

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 48 hours after 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 48 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 #5) to be posted on-line via OWL near 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 48 hours of the due date. The Make-up Lab will have a grade value equivalent to the grade value of your missed lab. **The Make-up Lab will be entirely self-guided and a major lab laboratory report will be required.** TAs will not present the lab as in a normal lab session. Lab reports that are submitted more than 48 hours after the due date will have a late penalty of 10% per day applied.

Essential Learning Requirements

Essay: As part of the course requirements **for students enrolled in ES 2123g 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 in a file named "ES2123_Essay Requirements". Students are expected to submit their essay by the deadline listed in this file. Should extenuating circumstances arise, students do not need to request Academic Consideration and they are permitted to submit their essay up to the time and date past the deadline, as given in this file, without a late penalty. Should students submit their assessment beyond this extended time and date, a late penalty of 10% per day will be applied. Each essay will be submitted through the OWL Assignment portal and will undergo a similarity review check using Turnitin® software.

NOTE TO ES 2123G STUDENTS : YOU MUST PASS THE ESSAY COMPONENT OF THE ES 2123G COURSE in order to satisfy the Senate requirement that students must demonstrate "some minimal competence in essay writing" and IN ORDER TO RECEIVE CREDIT FOR THIS COURSE. If you do not meet this requirement, you will receive a final course grade of 45, regardless of the grade calculation from all other components of the course assessments.

6. ADDITIONAL STATEMENTS

6.1 Religious Accommodation

When a recognized religious holiday or observance conflicts with an examination, test, or other scheduled academic obligation, students must request accommodation via the University's Student Absence Portal (SAP). This request should identify the conflict and specify which course component(s) (e.g. test, midterm, exam) are affected.

Students are encouraged to submit the SAP request as early as possible, but no later than two weeks before any examination, or one week before any mid-term test or quiz, to allow sufficient time for adjustment.

The SAP request serves as official notification to both the course instructor and the Academic Advising Office, in accordance with University policy:

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

The Faculty of Science considers religious accommodations as scheduling conflicts. Instructors should provide either a make-up exam or an earlier sitting of the same exam to accommodate the student.

For more information on recognized religious holidays, please visit the Diversity Calendar posted on the Equity, Diversity & Inclusion website - <https://www.edi.uwo.ca>

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.

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, and wireless earbuds or headphones.

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

Only devices expressly permitted by the instructor (e.g., non-programmable calculators) may be brought into the assessment room. It is your 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 your responsibility to seek clarification before using any AI tools in academic work.

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>).

6.5 Support Services

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/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 (GBSV) and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced GBSV (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. If you have any questions regarding accommodations, you may also wish to contact Accessible Education at

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

This course is supported by the Science Student Donation Fund. If you are a student registered in the Faculty of Science or the 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.