



GEOPHYS 210: Structure, Dynamics and Evolution of the Earth and Planetary Interiors

A-01
Fall, 2025

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Office Hours: *Wednesday* 10:00 – 11:00 AM, *Thursday* 1:00 – 2:00 PM

Lecture Room & Time: CCIS L1-047, Tues & Thurs 11:00 AM -12:20 PM

Teaching Assistant(s): Dilhani Wickramasinghe (dilhani@ualberta.ca)

TERRITORIAL ACKNOWLEDGEMENT

The University of Alberta respectfully acknowledges that we are located on Treaty 6 territory, a traditional gathering place for diverse Indigenous peoples including the Cree, Blackfoot, Métis, Nakota Sioux, Iroquois, Dene, Ojibway/ Saulteaux/Anishinaabe, Inuit, and many others whose histories, languages, and cultures continue to influence our vibrant community.

COURSE CONTENT

Calendar Description: This course presents an overview of the interior structure, composition, dynamics, and evolution of the Earth, planets, and moons. Topics to be covered include: formation of the solar system; planets and exoplanets; the plate tectonics revolution; mountain building and continental dynamics; earthquakes, volcanoes, and other geo-hazards; Earth's interior structure and dynamics from seismology, gravity, and magnetism; the rotational dynamics of planetary bodies; mantle convection and dynamos.

Prerequisites: PHYS 20 and Math 30. Note: credit will be given for only one of GEOPH 110 or GEOPH 210.

Course Objectives and Expected Learning Outcomes: This course provide an overview of the Earth system, its internal structures and dynamics. It emphasizes the large-scale processes such as plate tectonics, and introduces various modern techniques (gravity, seismics, magnetic) for probing the Earth's interior. Basic concepts of planetary system will also be discussed.

LEARNING RESOURCES

Required Course Materials: None (see below)

Recommended Textbook (NOT REQUIRED):

- Fundamentals of Geophysics. W. Lowrie, Cambridge University Press, 1997. ISBN: 978-0521461641

Optional Learning Resources:

- The Solid Earth – An Introduction to Global Geophysics (second edition) C.M.R. Fowler, Cambridge University Press, 1997. ISBN: 978-0521461641
- Introduction to Seismology, Peter Shearer, Cambridge University Press, 1999. ISBN: 0 521 66953 7 Paperback
- An introduction to geophysical exploration (third edition), P. Keary, M. Brooks, and I. Hill, Blackwell Publishing, 2002. ISBN: 0-632-04929-4

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Course Schedule & Assigned Readings:

| Week | Dates | Topic | Readings |
|-------|----------------|--|-------------------------|
| 1-2 | Sep 3 – Sep 13 | Planets, Earth shape and basic structure | Lowrie Chap 1-2 |
| 3-5 | Sep 14 – Oct 4 | Gravity and density | Lowrie Chap 1-2, part 6 |
| 6-9 | Oct 5 – Nov 1 | Seismology and earthquakes | Lowrie chap 3 |
| 10-12 | Nov 2 – Nov 22 | Earth's magnetic field | Lowrie chap 5 |

| | | | |
|-------|---------------------------------------|--|-------------------------------|
| 13-14 | Nov 23 – Dec 8 (last day of class) | Thermal structure. Plate tectonics, isostasy, margins | Lowrie chap 6, parts 1 & 4 |
|-------|---------------------------------------|--|-------------------------------|

Note: These approximate dates are likely adjusted as needed during the term.

Other Course Fees: None

On-Line Homework Disclaimer:

Online homework is a component of this course and is provided by a third-party company. Please be aware that this company will be storing assessment information that may be associated with you. As a way to protect your personal information, you may be assigned a random ID to enter into the system. Only the random ID, performance on the online homework, and the affiliation to the University of Alberta for this random ID will be conveyed to the company. You are not required to provide any additional personal information to this company. If you have concerns about this, please contact the instructor of the course.

Students who wish to opt out of the use of the fee-for-service online homework system have the option to...

Optional Online Learning Resources:

Additional learning resources aimed at facilitating student learning, and perhaps including formative assessment tools, are available from the textbook publisher and may be accessed for a fee paid by the student to the third-party provider (e.g., textbook company). Students choosing to access and use the online resources should note the following:

1. Registration in the system and any monetary transactions are of their own accord and not the responsibility of the University of Alberta.
2. Students should be mindful of protecting personal information and aware of how their personal information might be used and/or shared.
3. Students can consider using a non-identifying email address or account for these purposes.

REMOTE DELIVERY CONSIDERATIONS

To successfully participate in remote learning in this course, it is recommended that students have access to a computer with an internet connection that can support the tools and technologies the University uses to deliver content, engage with instructors, TAs, and fellow students, and facilitate assessments and examinations. If you encounter difficulty meeting the technology recommendations, please email the Office of Student Success and Experience (sse@ualberta.ca) directly to explore options and support. Please contact the instructor by the add/drop deadline of **Sep 9, 2025** if you do not have access to the minimum technology recommended.

Student Resources for Remote Learning:

Online learning may be new to you. Check out tips for success and find out more about online learning on the [Online + Remote Delivery Resources](#) page.

Recordings of Synchronous Activities:

- Please note that class times for this course will NOT be recorded.
- Students have the right to not participate in the recording and are advised to turn off their cameras and audio prior to the recording, but students can still participate in the text-based chat. It is recommended that students remove all identifiable and personal belongings from the space in which they will be participating.

GRADE EVALUATION

| Assessment | Weight | Date |
|-----------------------------------|-------------|-------------------|
| Assessments (4-5) | 25% (TOTAL) | |
| Midterm Exam | 30% | Nov 6, 2025 |
| Final Exam | 45% | Check Bear Tracks |

Late homework policy: A late homework assignment will incur a penalty of 10% per 24 hours after due time. Please notify TA when a late assignment is submitted. Failure to submit assignment after 3 days (72 hours) without instructor approval will result in 0 percent.

Students must verify the date of the Final Exam on BearTracks when the Final Exam Schedule is posted.

Grades are unofficial until approved by the Department and/or Faculty offering the course.

Re-examination:

A student who writes the final examination and fails the course may apply for a re-examination. Re-examinations are rarely granted in the Faculty of Science. Re-examinations are governed by university-wide [Academic Regulations](#) and [Faculty of Science Academic Regulations](#). Misrepresentation of facts to gain a re-examination is a serious breach of the [Student Academic Integrity Policy](#).

University of Alberta Grading Policy

Grades reflect judgements of student achievement made by instructors and must correspond to the associated descriptor. These judgements are based on a combination of absolute achievement and relative performance in a class. Faculties may define acceptable grading practices in their disciplines. Such grading practices must align with the [University of Alberta Assessment and Grading Policy](#) and its procedures.

Course Grades Obtained by Undergraduate Students:

This table reflects the GPA Point Value and Descriptor (e.g., Excellent, Good) for each Letter Grade.

| Descriptor | Letter Grade | Grade Point Value |
|--------------|--------------|-------------------|
| Excellent | A+ | 4.0 |
| Excellent | A | 4.0 |
| Excellent | A- | 3.7 |
| Good | B+ | 3.3 |
| Good | B | 3.0 |
| Good | B- | 2.7 |
| Satisfactory | C+ | 2.3 |
| Satisfactory | C | 2.0 |
| Satisfactory | C- | 1.7 |
| Poor | D+ | 1.3 |
| Minimal Pass | D | 1.0 |
| Failure | F or F4 | 0.0 |

Note: F4 denotes eligibility of a student to apply for a re-examination in a course.

Course Grades Obtained by Graduate Students:

This table reflects the GPA Point Value and Descriptor (e.g., Excellent, Good) for each Letter Grade.

| Descriptor | Letter Grade | Grade Point Value |
|--------------|--------------|-------------------|
| Excellent | A+ | 4.0 |
| Excellent | A | 4.0 |
| Excellent | A- | 3.7 |
| Good | B+ | 3.3 |
| Good | B | 3.0 |
| Satisfactory | B- | 2.7 |
| Satisfactory | C+ | 2.3 |
| Failure | C | 2.0 |
| Failure | C- | 1.7 |
| Failure | D+ | 1.3 |
| Failure | D | 1.0 |
| Failure | F | 0.0 |

Access to Past or Representative Evaluative Material: will be provided during the term.

Statement of Expectations for AI Use: No AI Use Allowed

In this course, our primary focus is to cultivate an equitable, inclusive, and accessible learning community that emphasizes individual critical thinking and problem-solving skills. To ensure a fair and consistent learning experience for all students, the use of advanced Generative Artificial Intelligence (AI) tools such as ChatGPT or Dall-E 2 is strictly prohibited for all academic (written/coding/creative/etc.) work, assignments, and assessments in this course. Each student is expected to complete all tasks without substantive assistance from others, including AI tools.

Any use of AI tools in your academic work may result in academic penalties and be considered an act of cheating and a violation as outlined in the [Student Academic Integrity Policy](#).

Re-evaluation of Term Work: approval by Instructor

POLICIES FOR LATE AND MISSED WORK

Late Policies: For each assignment, a **10 percent penalty per 24 hours** (from submission deadline) will apply. After 72 hours (3 days), the assignment will not be acceptable (i.e., the score will be 0). Please contact the instructor or TA as soon as possible regarding special circumstances or considerations.

Missed Term Work/Final Exam Due to Non-medical Protected Grounds (e.g., religious beliefs):

When a term assessment or final exam presents a conflict based on [non-medical protected grounds](#), students must apply to the Academic Success Centre for accommodations via their [Register for Accommodations](#) website. Students can review their eligibility and choose the application process specific for Accommodations Based on Non-medical Protected Grounds.

It is imperative that students review the dates of all course assessments upon receipt of the course syllabus, and apply AS SOON AS POSSIBLE to ensure the timely application of the accommodation. Students who apply later in the term may experience unavoidable delays in the processing of the application, which can affect the accommodation.

Missed Term Work:

A student who cannot complete **an assessment (assignment or midterm exam)** due to incapacitating illness, severe domestic affliction, or other compelling reasons must contact the instructor within two working days of missing the assessment, or as soon as possible, to request an excused absence. If an excused absence is granted, then a late submission or, in certain cases, transfer of a specific assignment weight to other assignment may be granted. An excused absence is a privilege and not a right. There is no guarantee that an absence will be excused. Misrepresentation of facts to gain an excused absence is a serious breach of the [Student Academic Integrity Policy](#). In all cases, instructors may request adequate documentation to substantiate the reason for the absence, at their discretion.

Deferred Final Examination:

A student who cannot write the final examination due to incapacitating illness, severe domestic affliction, or other compelling reasons can apply for a deferred final examination. Such an application must be made to the student's home Faculty Office within two working days of the missed exam and must be supported by appropriate documentation or a Statutory Declaration (see calendar on [Attendance](#)). Deferred examinations are a privilege and not a right; there is no guarantee that a deferred examination will be granted. The Faculty may deny deferral requests in cases where less than 50% of term work has been completed. Misrepresentation of facts to gain a deferred examination is a serious breach of the [Student Academic Integrity Policy](#).

STUDENT RESPONSIBILITIES

Academic Integrity and Student Conduct:

The University of Alberta is committed to the highest standards of academic integrity and honesty, as well as maintaining a learning environment that fosters the safety, security, and inherent dignity of each member of the community, ensuring students conduct themselves accordingly. Students are expected to be familiar with the standards of academic honesty and appropriate student conduct, and to uphold the policies of the University in this respect.

Students are particularly urged to familiarize themselves with the provisions of the [Student Academic Integrity Policy](#) and the [Student Conduct Policy](#), and avoid any behaviour that could potentially result in suspicions of academic misconduct (e.g., cheating, plagiarism, misrepresentation of facts, participation in an offence) and non-academic misconduct (e.g., discrimination, harassment, physical assault). Academic and non-academic misconduct are taken very seriously and can result in suspension or expulsion from the University.

All students are expected to consult the [Academic Integrity website](#) for clarification on the various academic offences. All forms of academic dishonesty are unacceptable at the University. Unfamiliarity of the rules, procrastination or personal pressures are not acceptable excuses for committing an offence. Listen to your instructor, be a good person, ask for help when you need it, and do your own work -- this will lead you toward a path to success. Any academic integrity concern in this course will be reported to the College of Natural and Applied Sciences.

Suspected cases of non-academic misconduct will be reported to the Office of Student Success and Experience. The College, the Faculty, and the Dean of Students are committed to student rights and responsibilities, and adhere to due process and administrative fairness, as outlined in the [Student Academic Integrity Policy](#) and the [Student Conduct Policy](#). Please refer to the policy websites for details on inappropriate behaviours and possible sanctions.

The College of Natural and Applied Sciences (CNAS) has created an [Academic Integrity for CNAS Students](#) website. To access this website, students must be signed in to their UAlberta account. Website content includes the importance of academic integrity, examples of academic misconduct and possible sanctions, and the academic misconduct and appeal process. Students can also access this material as an [online, self-directed Canvas course](#) and complete assessments to test their knowledge.

"Integrity is doing the right thing, even when no one is watching" -- C.S. Lewis

Contract Cheating and Misuse of University Academic Materials or Other Assets:

Contract cheating describes the form of academic dishonesty where students get academic work completed on their behalf, which they submit for academic credit as if they had created it themselves. Contract cheating may or may not involve the payment of a fee to a third party, who then creates the work for the student.

Examples include:

1. Getting someone to write an essay or research paper for you.
2. Getting someone to complete your assignment or exam for you.
3. Posting an essay, assignment, or exam question to a tutorial or study website; the question is answered by a "content expert", then you copy it and submit it as your own answer.
4. Posting your solutions to a tutorial/study website, public server, or group chat and/or copying solutions that were posted to a tutorial/study website, public server, or group chat.
5. Sharing your login credentials to the course management system (e.g., Canvas) and allowing someone else to complete your assignment or exam remotely.
6. Using an artificial intelligence bot or text generator tool to complete your essay, research paper, assignment, or exam solutions for you (without the instructor's permission).
7. Using an online grammar checker to "fix" your essay, research paper, assignment, or exam solutions for you (without the instructor's permission).

Contract cheating companies thrive on making students believe that they cannot succeed without their help; they attempt to convince students that cheating is the only way to succeed.

Uploading the instructor's teaching materials (e.g., course outlines, lecture slides, assignment, or exam questions, etc.) to tutorial, study or note-sharing websites, public servers, or chat apps is a copyright infringement and constitutes the misuse of University academic materials or other assets. Receiving assignment solutions or answers to exam questions from an unauthorized source puts you at risk of receiving inaccurate information.

Appropriate Collaboration:

Students need to be able to recognize when they have crossed the line between appropriate collaboration and inappropriate collaboration. If students are unsure, they need to ask instructors to clarify what is allowed and what is not allowed.

Here are some tips to avoid copying on assessments:

1. Do not write down something that you cannot explain to your instructor.
2. When you are helping other students, avoid showing them your work directly. Instead, explain your solution verbally. Allowing your work to be copied is also considered inappropriate collaboration.

3. It is also possible that verbally discussing the solution in too much detail may result in written responses that are too similar. Try to keep discussions at a general or higher level.
4. If you find yourself reading another student's solution, do not write anything down. Once you understand how to solve the problem, remove the other person's work from your sight and then write up the solution to the question yourself. Looking back and forth between someone else's paper and your own paper is almost certainly copying and considered inappropriate collaboration.
5. If the instructor or TA writes down part of a solution in order to help explain it to you or the class, you cannot copy it and hand it in for credit. Treat it the same way you would treat another student's work with respect to copying, that is, remove the explanation from your sight and then write up the solution yourself.
6. There is often more than one way to solve a problem. Choose the method that makes the most sense to you rather than the method that other students happen to use. If none of the ideas in your solution are your own, there is a good chance it will be flagged as copying.

Exam Conduct:

Please refer to the [Examinations](#) section of the Academic Calendar for more details on Conduct of Exams.

Some key points to be aware of:

- Your student photo ID is required at exams to verify your identity.
- Students must arrive at the specified time to take the exam. Once the exam has started, students must remain in the physical in-person or remote environment for at least 30 minutes. Students who arrive more than 30 minutes late for an in-person exam will not be permitted to take the exam. Students who arrive more than 30 minutes late for an online exam may have their exam attempt removed or disqualified by the instructor. In both cases, students may apply for a deferred examination.
- All cell phones must be turned off and stored in your bags.

Accommodations for Students:

In accordance with the University of Alberta's [Accommodation Policy](#) and [Discrimination and Harassment Policy](#), accommodation support is available to eligible students who encounter limitations or restrictions to their ability to perform the daily activities necessary to pursue studies at a post-secondary level due to medical conditions and/or non-medical protected grounds. Accommodations are coordinated through the [Academic Success Centre](#), and students can learn more about eligibility on the [Register for Accommodations website](#).

It is recommended that students apply **AS SOON AS POSSIBLE** in order to ensure sufficient time to complete accommodation registration and coordination. Students are advised to review and adhere to published deadlines for accommodation approval and for specific accommodation requests (e.g., exam registration submission deadlines). Students who request accommodations less than a month in advance of the academic term for which they require

accommodations may experience unavoidable delays or consequences in their academic programs, and may need to consider alternative academic schedules.

Recording and/or Distribution of Course Materials:

Audio or video recording, digital or otherwise, of lectures, labs, seminars or any other teaching environment by students is allowed only with the prior written consent of the instructor or as a part of an approved accommodation plan. Student or instructor content, digital or otherwise, created and/or used within the context of the course is to be used solely for personal study, and is not to be used or distributed for any other purpose without prior written consent from the content authors.

STUDENT SUPPORTS

Faculty of Science Student Services:

The [Faculty of Science Student Services](#) office is located on the main floor of the Centennial Centre for Interdisciplinary Sciences (CCIS). This office can assist with the planning of [Your Academics](#), and provide information related to [Student Life & Engagement](#), [Internship and Careers](#), and [Study Abroad](#) opportunities. Please visit [Advising](#) for more information about what Faculty Academic Advisors can assist you with.

Academic Success Centre:

The [Academic Success Centre](#) provides professional academic support to help students strengthen their academic skills and achieve their academic goals. Individual advising, appointments, and group workshops are available year round in the areas of Accessibility, Communication, Learning, and Writing Resources. Modest fees may apply for some services.

Feeling Stressed, Anxious, or Upset?

It's normal for us to have different mental health experiences throughout the year. Know that there are people who want to help. You can reach out to your friends and access a variety of supports available on and off campus at the [Need Help Now](#) webpage or by calling the 24-hour Distress Line: 780-482-4357 (HELP).

Learning and Working Environment:

The Faculty of Science is committed to ensuring that all students, faculty and staff are able to work and study in an environment that is safe and free from discrimination, harassment, and violence of any kind. It does not tolerate behaviour that undermines that environment. This includes virtual environments and platforms.

If you are experiencing harassment, discrimination, fraud, theft or any other issue and would like to get confidential advice, please contact any of these campus services:

- [Office of Safe Disclosure & Human Rights](#): *A safe, neutral and confidential space to disclose concerns about how the University of Alberta policies, procedures or ethical*

standards are being applied. They provide strategic advice and referral on matters such as discrimination, harassment, duty to accommodate and wrong-doings. Disclosures can be made in person or online using the [Online Reporting Tool](#).

- [University of Alberta Protective Services](#): *Peace officers dedicated to ensuring the safety and security of U of A campuses and community. Staff or students can contact UAPS to make a report if they feel unsafe, threatened, or targeted on campus or by another member of the university community.*
- [Office of the Student Ombuds](#): *A confidential and free service that strives to ensure that university processes related to students operate as fairly as possible. They offer information, advice, and support to students, faculty, and staff as they deal with academic, discipline, interpersonal, and financial issues related to student programs.*
- [Office of Student Success and Experience](#): *They can assist students in navigating services to ensure they receive appropriate and timely resources. For students who are unsure of the support they may need, are concerned about how to access services on campus, or feel like they may need interim support while they wait to access a service, this office is there to help.*

Course Outlines:

Policy about course outlines can be found in the [Academic Regulations, Evaluation Procedures and Grading section](#) of the University Calendar.

Disclaimer:

Any typographical errors in this syllabus are subject to change and will be announced in class and/or posted on the course website. The date of final examinations is set by the Registrar and takes precedence over the final examination date reported in the syllabus.

Copyright:

Dr. [Jeff Gu](#), Department of [Physics](#), Faculty of Science, University of Alberta (2025).