
University of Alberta

GEOPH210: Physics of the Earth **A-01** **Fall, 2024**

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Office Hours: Tuesday 1:00 – 2:00 PM, Thursday 9:30 – 10:30 AM

Course Format: In-person
Classroom: CCIS L1-047

COURSE CONTENT

Course 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.

Course 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.

Course Schedule & Assigned Readings:

Week	Dates	Topic	Readings
1-2	Sep 3 – Sep 15	Planets, Earth shape and basic structure	Lowrie Chap 1-2

3-4	Sep 16 – Sep 29	Gravity and density	Lowrie Chap 1-2, part 6
5-9	Sep 30 – Nov 3	Seismology and earthquakes	Lowrie chap 3
10-12	Nov 4 – Nov 24	Earth's magnetic field	Lowrie chap 5
13-14	Nov 25 – Dec 5 (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.

LEARNING RESOURCES

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

Course Fees: None

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., the 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 your own accord and not the responsibility of the University.
2. Students should be mindful of protecting their personal information and should be aware of how their personal information might be used and/or shared.
3. Students MUST NOT use their @ualberta email address or CCID to register into the system and instead should use a non-identifying email address or account.

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 apply for some services.

GRADE EVALUATION

Assessment	Weight	Date
Assignments	25%	
Midterm Exam	30%	Nov 7, 2024 (Thursday, before Reading Week)
Final Exam	45%	Check Bear Track (not yet available)

Students must verify this date on Bear Tracks when the Final Exam Schedule is posted.

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

Grades are assigned by taking the raw mark for each course component and calculating a total course percentage using the component weights given above. This overall, raw, unscaled mark is then used to produce a ranked list of raw marks, which in turn is then used to assign letter grades. Letter grade boundaries will be decided based on a combination of historical student performances and the instructor's expectations and judgment. Where possible natural grade boundaries will be used. The absolute percentage scores to secure a particular grade will vary from year to year because it is not possible to write exams with consistently identical difficulty levels. Historically, the GPA for this class is 2.83 ± 0.10 with a median letter grade of a B-. The Dept. of Physics will require justification that any awarded grade distributions deviate significantly from these historical values.

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 *Code of Student Behaviour*.

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

POLICIES FOR LATE AND MISSED WORK

Late Policies: **15% reduction per day** after the due time of the assignment, barring special permission from the instructor.

Missed Term Work:

A student who cannot complete a homework/lab due to incapacitating illness, severe domestic affliction or other compelling reasons (including missing an in-person assessment due to the requirement to self-isolate when experiencing COVID-19 symptoms or with a positive test result) can apply for an excused absence. To apply for an excused absence, you must contact the

instructor within two working days of missing the assessment or as soon as possible. If an excused absence is granted, then a homework assignment/lab could be submitted to the instructor at his/her discretion. 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 Code of Student Behaviour. In all cases, instructors may request adequate documentation to substantiate the reason for the absence at their discretion.

Missed Assessments Where the Cause is Religious Belief:

For an excused absence where the cause is religious belief, a student must contact the instructor(s) within two weeks of the start of Fall or Winter classes to request accommodation for the term (including the final exam, where relevant). Instructors may request adequate documentation to substantiate the student request. Students who failed at the start of term to request exam accommodations for religious beliefs are expected to follow the deferred final examination process outlined below.

Deferred Final Examination:

A student who cannot write the final examination due to incapacitating illness, severe domestic affliction or other compelling reasons (including missing the in-person examination due to the requirement to self-isolate when experiencing COVID-19 symptoms or with a positive test result) can apply for a deferred final examination. Such an application must be made to the student's Faculty office within two working days of the missed examination and must be supported by appropriate documentation or a Statutory Declaration (calendar.ualberta.ca/content.php?catoid=34&navoid=10107#attendance). Deferred examinations are a privilege and not a right; there is no guarantee that a deferred examination will be granted. Misrepresentation of facts to gain a deferred examination is a serious breach of the Code of Student Behaviour.

REMOTE DELIVERY CONSIDERATIONS

Technology for Remote Learning:

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 assessment and examinations. Please refer to [Technology for Remote Learning - For Students](#) for details. If you encounter difficulty meeting the technology recommendations, please email the Dean of Students Office (dosdean@ualberta.ca) directly to explore options and support.

Please contact the instructor by the add/drop deadline of **Sep 16, 2024** if you do not have access to the minimum technology recommended. The instructor will make arrangements for accommodating students who contact the instructor before this date. Failure to do so may result in a zero in any assessment that depends on the minimum technology.

Remote Proctoring Consideration:

We will use a remote proctoring approach (e.g., Zoom) for exams. Your computer and environment will be monitored during exams.

- You should arrange for a place to write timed exams without interruption.

- Tablets and mobile devices are incompatible with remote proctoring services.

Home-Based Lab Activities:

As part of the learning experience in this course, you will be required to undertake certain activities in or around your place of residence. To ensure that you undertake the activity safely and fully informed of the risks, please review the University of Alberta's [Remote Learning Lab-Based Assignment Information Advisory](#). If you have questions or concerns, contact your instructor.

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 [Campus Life](#) page, and specifically on the [Academic Skills Online & Remote Delivery Resources](#) page.

STUDENT RESPONSIBILITIES

Academic Integrity:

"The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behaviour (online at www.governance.ualberta.ca) and avoid any behaviour which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offence and can result in suspension or expulsion from the University."

All forms of academic dishonesty are unacceptable at the University. Any suspected offence will be reported to the Faculty of Science. Anyone who is found in violation of the Code of Student Behaviour may receive a sanction. Typical sanctions include conduct probation, a mark reduction or a mark of 0 on an assessment, a grade reduction or a grade of F in a course, a remark on the transcript, and a recommendation for suspension or expulsion.

Students are expected to familiarize themselves with the [Academic Integrity](#) resources (covering the topics of cheating, collaboration, plagiarism, and substantial assistance) on the website of the Office of the Dean of Students.

Appropriate Collaboration: Students are encouraged to work in small groups for their assignments, but each student must hand in his/her own work without exception.

Exam Conduct:

- Your student photo I.D. is required at exams to verify your identity.
- Students will not be allowed to begin an examination after it has been in progress for 30 minutes. Students must remain in the exam room until at least 30 minutes has elapsed.
- All cell phones must be turned off and stored in your bags.
- For zoom exam sessions, video must be turned on at all times.

Cell Phones:

Cell phones are to be turned off during lectures, labs and seminars.

Students Eligible for Accessibility-Related Accommodations:

Eligible students have both rights and responsibilities with regard to accessibility-related accommodations. Consequently, scheduling exam accommodations in accordance with [Accessibility Resources](#) deadlines and procedures is essential. Please note adherence to procedures and deadlines is required for U of A to provide accommodations. Contact [Accessibility Resources](#) for further information.

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 author(s).

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 and harassment. It does not tolerate behaviour that undermines that environment.

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 the Dean of Students](#): *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 you wait to access a service, the Dean of Students office is here to help.*

Feeling Stressed, Anxious, or Upset?

It's normal for us to have different mental health experiences throughout the year, particularly as we adjust to returning to campus as we move through a pandemic. Know that there are people who want 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).

Policy about course outlines can be found in [Course Requirements, Evaluations Procedures and Grading](#) of the University Calendar.

Land Acknowledgement:

The University of Alberta respectfully acknowledges that we are situated on Treaty 6 territory, traditional lands of First Nations and Métis people.

To learn more about the significance of this land acknowledgement, please read [this](#) useful article and associated links to more information.

Disclaimer:

Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar and takes precedence over the final examination date reported in this syllabus.

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Dr. [Jeff Gu](#), Department of [Physics](#), Faculty of Science, University of Alberta (2024).