

ERTH 3405 [0.5 credit] Geophysical Methods;

An introduction to the tools of applied geophysics including seismology, electrical, magnetic, and gravitational surveying methods. Lecture two hours a week, and a laboratory three hours a week. Most labs are computer-based geophysical practices to enhance their knowledge of modern and computer-based geophysical methods. Students will use geophysical software which comes with the textbook.

Course Topics

- Introduction to geophysics; Definitions and scope, use of physical measurements in determining the subsurface properties of the Earth.
- Seismic surveying; Stress and strain, seismic waves, reflection and refraction of seismic waves, critical refraction, rays and waves. Seismic refraction surveying: seismic sources and detectors, the geometry of refracted ray paths for horizontal, dipping and undulating layers, data interpretation.
- Electrical surveying; (i) Resistivity of rocks, electrode arrays and current flow in the ground, resistivity sounding and profiling
- Gravity surveying; Basic theory, instrumentation, and anomaly interpretation.
- Magnetic surveying; Basic theory, rock magnetism, Earth's magnetic field, instrumentation, anomaly interpretation.

Learning Outcomes

- Explain applications and limitations of different geophysical surveying methods [Understanding, Analyzing, Evaluating]
- Analyze and interpret geophysical data using computer-based methods [Applying, Analyzing, Evaluating]
- Perform seismic surveying, analyze and model the observations [Applying, Analyzing, Evaluating]
- Explain, analyze and interpret electrical and magnetic surveying data [Applying, Analyzing, Evaluating]
- Apply, interpret and model the gravitational data for near-surface surveying [Applying, Analyzing, Evaluating]

Prerequisites: labs. Prerequisites: ERTH 2105

- Lectures two hours a week and a laboratory three hours a week
- All lectures are in person
- Labs are in person
- Please note the first lab is after the second lecture. You need your laptop with a wireless connection for the first lab.
- Office hours: Thursdays 10:30-11:30

Course Requirements:

- The lab component of the course must be passed to pass the course. You must pass the lab component of the course to write the final exam. The final exam must be passed to pass the course.
- Labs must be handed in on time. Late labs will be accepted in the instance of illness, or the instance of emergencies, by consultation with your TAs and instructor. Students must contact their instructor and TAs immediately if they are ill and will miss an exam or the deadline for an assignment. Students must agree with the instructor and/or TAs on how to make up the missed components. If

the student is ill for a while and misses an exam, then their TA or instructor will arrange for some accommodation in the future – make a midterm exam added to the final, etc.

- It is the student's responsibility to attend classes and labs prepared. Reading assignments are mandatory.
- It is your responsibility to refer regularly to the course outline for lecture topics, reading assignments, laboratory topics and pre-lab review or homework.
- Regularly log onto the course website on Brightspace to check for announcements, course information, laboratory assignments and lecture material.
- Lab exercises will be posted on Brightspace.

Course Evaluation:

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| – Laboratory attendance & assignments (in person) | 25% |
| – Midterm test (in person) | 25% |
| – Final exam (in person) | 50% |

Note: The instructor *is required* to report all incidents (or suspected incidents) of plagiarism to the Dean.

Required Course Materials:

Course Text; Exploration geophysics of the shallow subsurface / H. Robert Burger. c1992.

Note: Books were ordered at the bookstore. You may also buy a used one from Haven Books, 43 Seneca St, Ottawa (613) 730-9888.

Teaching Assistant(s): TBA by the department

Feeling Sick?

If you feel very sick (e.g., fever, chills, stomach upset) do not come to class or campus. [insert here any information about missed lectures/labs, etc.]

Mental Health

If you are struggling, please do not hesitate to reach out. I am happy to listen, and/or direct you to resources that might help. In terms of class, if you need extra help or missed a lesson, don't stress! Email me and we will set a time to meet. I'll work with you, I promise. Remember that Carleton also offers an array of mental health and well-being resources, which can be found [here](#).

University Policies

In accordance with the Carleton University Undergraduate Calendar Regulations, the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A- = 80-84	B- = 70-72	C- = 60-62	D- = 50-52
F = <50			

WDN = Withdrawn from the course

DEF = Deferred

Academic Accommodations, Regulations, Plagiarism, Etc.

Carleton University is committed to providing access to the educational experience in order to promote academic accessibility for all individuals.

Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University. More information can be found at:

<https://students.carleton.ca/course-outline/>

University rules regarding registration, withdrawal, appealing marks, and most anything else you might need to know can be found on the university's website, here:

<https://calendar.carleton.ca/undergrad/regulations/academicregulationsoftheuniversity/>

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. For more details, visit the [Paul Menton Centre website](#).

Addressing Human Rights Concerns

The University and all members of the University community share responsibility for ensuring that the University's educational, work and living environments are free from discrimination and harassment. Should you have concerns about harassment or discrimination relating to your age, ancestry, citizenship, colour, creed (religion), disability, ethnic origin, family status, gender expression, gender identity, marital status, place of origin, race, sex (including pregnancy), or sexual orientation, please contact the [Department of Equity and Inclusive Communities](#) at equity@carleton.ca.

Religious Obligations

Please contact me with requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [Student Guide to Academic Accommodation \(PDF, 2.1 MB\)](#).

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: <https://carleton.ca/sexual-violence-support/>

Accommodations for Missed Work

Carleton recognizes that students may experience unexpected, temporary incapacitation (i.e., illness, injury, or extraordinary circumstances outside of a student's control). As a result, Carleton has put into place a protocol for students to apply for accommodations using a self-declaration form in the event of missed work. The form can be found at: <https://carleton.ca/registrar/wp-content/uploads/self-declaration.pdf> Note that these forms should be used for short-term concerns related to missed work; if you are experiencing chronic, ongoing challenges which necessitate a broader solution, I recommend reaching out to the Paul Menton Centre and/or the Care Support team.

For Pregnancy

Please contact me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, please review the [Student Guide to Academic Accommodation \(PDF, 2.1 MB\)](#).

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see the [Senate Policy on Accommodation for Student Activities \(PDF, 25KB\)](#).

Academic Integrity

Academic Integrity is upholding the values of honesty, trust, respect, fairness, responsibility, and courage that are fundamental to the educational experience. Carleton University provides supports such as academic integrity workshops to ensure, as far as possible, that all students understand the norms and standards of academic integrity that we expect you to uphold. Your teaching team has a responsibility to ensure that their application of the Academic Integrity Policy upholds the university's collective commitments to fairness, equity, and integrity.

(Adapted from [Carleton University's Academic Integrity Policy](#), 2021).

Examples of actions that do not adhere to Carleton's Academic Integrity Policy include:

- Plagiarism
- Accessing unauthorized sites for assignments or tests

- Unauthorized collaboration on assignment and exams
- Using artificial intelligence tools such as ChatGPT when your assessment instructions say that it is not permitted

Please review the checklist [linked here](#) to ensure you understand your responsibilities as a student with respect to academic integrity and this course.

Sanctions for Not Abiding by Carleton's Academic Integrity Policy

A student who has not upheld their responsibilities under Carleton's Academic Integrity Policy may be subject to one of several sanctions. A list of standard sanctions in science can be found [here](#).

Additional details about this process can be found on [the Faculty of Science Academic Integrity website](#). Students are expected to familiarize themselves with and follow the Carleton University [Student Academic Integrity Policy](#). The Policy is strictly enforced and is binding on all students.

Student Rights & Responsibilities

Students are expected to act responsibly and engage respectfully with other students and members of the Carleton and the broader community. See the [7 Rights and Responsibilities Policy](#) for details regarding the expectations of non-academic behaviour of students. Those who participate with another student in the commission of an infraction of this Policy will also be held liable for their actions.

Student Concerns

If a concern arises regarding this course, **your first point of contact is me**: Email or drop in during student hours and I will do my best to address your concern. If I am unable to address your concern, the next points of contact are (in this order):



Note: You can also bring your concerns to [Ombuds services](#).

Assistance for Students

Academic and Career Development Services: <http://carleton.ca/sacds/>

Writing Services: <http://www.carleton.ca/csas/writing-services/>

Peer Assisted Study Sessions (PASS): <https://carleton.ca/csas/group-support/pass/>

Math Tutorial Centre: <https://carleton.ca/math/math-tutorial-centre/>

Science Student Success Centre: <https://sssc.carleton.ca/>