

University of Alberta
ELECTROMAGNETIC AND POTENTIAL FIELD METHODS
GEOPH424, Fall 2020

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Web Page <https://www.ualberta.ca/~unsworth/UA-classes/424/424index.html>
Office Hours Please contact me to make an appointment

Lecture schedule MWF 12:00 – 12:50, CCIS L1-029
Lab schedule Mondays 14:00 - 16:50. Location TBA
 Schedule will be posted on the class webpage.

(1) Course Description

Theory and application of Maxwell's equations to geophysics; resistivity of rocks, electromagnetic exploration, magnetotellurics, frequency and time domain electromagnetic methods, forward and inverse techniques to image crustal and mantle structure. Analysis of electromagnetic data collected at field school.

(2) Course Prerequisites

MATH337, PHYS 281, PHYS 381, GEOP 325.

It is important to prepare yourself for this course through a review of the prerequisite material. Students who do not have the required prerequisites at the time of taking this course should not expect supplementary professorial tutoring from the instructor.

(3) Course Objectives and Expected Learning Outcomes

To learn the basic principles of electromagnetic (EM) exploration techniques, both those using naturally occurring EM signals and those using controlled sources. The course will cover the underlying physics, data interpretation and a review of common applications.

(4) Recommended textbooks

- **Applied geophysics**, W.M. Telford, Cambridge University Press, 1995.
- **Practical magnetotellurics**, Fiona Simpson and Karsten Bahr, Cambridge University Press, 2005.
- **Electromagnetic methods in Applied Geophysics**, edited by Misac Naibighian, Society of Exploration Geophysicists, paperback edition 1994.

(5) Past Evaluative Material

Past exams and solutions can be found at :

<http://www.ualberta.ca/~unsworth/UA-classes/424/424index.html>

(6) Grade Evaluation

All assignments and examinations in this course will be given a numerical score in percent. A cumulative course mark will be calculated from those scores, weighted as tabulated below. A final letter grade will be assigned based upon the cumulative mark and the instructor's analysis of the cumulative mark distribution of the class. Where possible, natural breaks in the cumulative mark distribution will be used in assigning grades, but no pre-determined distribution of grades will be imposed on the class. Each student's final letter grade will reflect a combination of his/her absolute achievement and relative standing in the class. In past years, the class average in this course has been in the B range. The mean grade in this year will be based on the instructor's judgment of the overall caliber of this class relative to past years.

Grades will remain unofficial until approved by Faculty Council or its designate (i.e. Departmental Chair).

Activity	Weight	Time - date
Midterm exam	20%	14:00 – 15:30, Monday, October 19 2020
Labs	25%	During term
Assignments	15%	During term
Final Exam	40%	See BearTracks when Final Exam Schedule is posted

(7) Format of Exams

See past evaluative material for sample exams.

(8) Missed midterm exam

- A student who cannot write the midterm exam due to compelling reasons is required to complete a Statutory Declaration at the Student Services Office in the Faculty of Science, and present the paperwork to the professor.
- A missed midterm exam with a Statutory Declaration will have the weight of the midterm exam rolled into the final exam. In this case, the final exam will count for 60% of the total course grade.
- Deferral of the midterm exam is a privilege and not a right.
- Misrepresentation of Facts to gain a deferral is a serious breach of the *Code of Student Behaviour*.

(9) Deferred Final Examination

- A student who cannot write the final examination due to incapacitating illness or other compelling reasons can apply for a deferred final examination. Such an application must be made to the student's Faculty office within 48 hours of the missed examination and must be supported by a Statutory Declaration or other appropriate documentation (Calendar section 23.5.6).
- Deferred examinations are a privilege and not a right; there is no guarantee that a deferred examination will be granted. The deferred final examination is scheduled for **Saturday, 16 January 2021, 09:00 - 12:00, CCIS L1-029**
- Misrepresentation of facts to gain a deferred examination is a serious breach of the *Code of Student Behaviour*.

(10) Deferred Final Examination

A student who writes the final examination and fails the course may apply for a reexamination. Reexaminations are rarely granted in the Faculty of Science. These exams are governed by University (Calendar section 23.5.5) and Faculty of Science Regulations (Calendar section 192.5.9). Misrepresentation of Facts to gain a reexamination is a serious breach of the *Code of Student Behaviour*.

(11) 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.ualberta.ca/secretariat/appeals.htm) 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 dishonesty are unacceptable at the University. Any offense will be reported to the Senior Associate Dean of Science who will determine the disciplinary action to be taken. Cheating, plagiarism and misrepresentation of facts are serious offenses. Anyone who engages in these practices will receive at minimum a grade of zero for the exam or paper in question and no opportunity will be given to replace the grade or redistribute the weights. As well, in the Faculty of Science the sanction for **cheating** on any examination will include **a disciplinary failing grade** (no exceptions) and senior students should expect a period of suspension or expulsion from the University of Alberta.

Exams: 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. Electronic equipment other than calculators cannot be brought into examination rooms and hats should not be worn.

Cell phones: Cell phones are to be turned off during lectures, labs and seminars. Cell phones are not to be brought to exams.

Students with disabilities: Students who require accommodation in this course due to a disability are advised to discuss their needs with Specialized Support & Disability Services (2-800 Students' Union Building).

Academic Support Centre: Students who require additional help in developing strategies for better time management, study skills or examination skills should contact the Academic Support Centre (2-703 Students' Union Building).

Policy about course outlines can be found in section 23.4(2) of the University Calendar.

(12) 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.

(13) Recording

Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan.

(14) 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 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 may use a remote proctoring service 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.

Recordings of Synchronous Activities:

- Please note that class times for this course may be recorded. Recordings of this course will be used for the purposes of asynchronous learning etc. and may be disclosed to other students enrolled in this section of the class.
- Students have the right to not participate in the recording and are advised to turn off their cameras and audio prior to recording; they can still participate through text-based chat. It is recommended that students remove all identifiable and personal belongings from the space in which they will be participating.
- Recordings will be made available the end of term on **December 30, 2020** and accessible by Google drive. Please direct any questions about this collection to the instructor of this course.

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 [Student Resources for Remote Learning](#) page.

(15) Copyright

Dr. Martyn Unsworth, Department of Physics, University of Alberta (2020)