

Course Outline Fall 2017

EARTH 436A and 436B – Honours Thesis EARTH 499 – Research Project

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Office hours: Tuesdays 8:30 to 11:30 a.m., and longer if several people show up. Additional office hours may be scheduled if necessary. Any other times by appointment or times you can catch me in my office which is most mornings (I have administrative meetings mostly in the afternoons). I try to use Friday as my teaching preparation and research day and so may not always be in my office.

Meeting Times: 11:30-12:50 p.m. Mondays; Room: STC 0060
 We will have our first meeting on Sept 1.

Prerequisites: EARTH 436A is a prerequisite for EARTH 436B. EARTH 436A is an anti-requisite for EARTH 499.

Texts (not required):

ALL are on reserve in the Davis Library.

Copeland, Peter. 2012. *Communicating rocks: writing, speaking, and thinking about geology*. Pearson. ISBN-13: 9780321830425.

Grant, Brian. 2003. *Geoscience reporting guidelines. 356 pages, Includes: Geologic Time Scale (2003)*
ISBN: 0-9687693-1-4.

Neither of these books is required, however, I may refer to them during meetings. The Grant book is a great guidebook that you will find useful not only for this course but throughout your geoscience career. Copies are available at the Bookstore. Also, you can purchase copies through the Geological Association of Canada website (www.gac.com). Regular price is \$109 and is \$59.96 + tax and shipping for GAC members.

Learning Outcomes:

Communication about one's work as a geoscientist is central to being a professional. It involves oral communication either one on one or before groups both large and small. Written communication involves preparation of maps, charts and narrative reports with personal observations, analyses and reviews of your own new work and that of previous workers. While most of your work will be technical and reflect scientific rigour, you may be called upon to prepare shorter status and policy briefs for decision-makers, legal summaries and commentaries, and mine stakes and resource claim descriptions, and other items, all of which require organized and well-reasoned clear writing. Your writing must be proper English with correct grammar, spelling and most often without abbreviations; everyday jargon terms such as "seds", "lab", "paleo", and "geochem" is strictly forbidden in professional writing. This course aims to prepare students for entering the professional world and for advancing to graduate school depending on plans after the B.Sc. in Earth Sciences.

Students should be able to be familiar with and do the following at the end of this course:

- plan and conduct independent and original research under the guidance of a research manager
- learn how to explore, organize, execute, share and disseminate the results of your own scientific questions and thought
- acquire new practical research and analytical skills using data either collected by yourself in the field or assembled in the laboratory or information/data collected by someone else (often the faculty supervisor) in a research environment that you would not have had a chance to do elsewhere in your program
- learn discipline-specific protocols and procedures for addressing scientific questions and procedures and formats for reporting technical information according to discipline or sub-discipline standards
- acquire an appreciation for and basic skill level to organize, interpret, and identify relevance of new information and results
- understand how to organize, communicate effectively and disseminate clearly new information to peers and other professionals, both written and orally
- know how to undertake self-assessment, and learn how to give and receive constructive review and critique by your peers

Course Communication and Meetings:

The class is scheduled to meet once a week, though we will not use all meeting dates. The list of meeting dates is given below. If you would like to use the open

time slots for discussion, practice sessions, or smaller group meetings on more specific topics, we can certainly arrange to do so.

We will repeat some or all of the meetings from the Fall semester in the Winter and Spring semesters if enrollments in Earth 436a and 499 warrant it.

You should meet with your faculty supervisor at the beginning of each semester to setup a schedule of meetings for the whole semester. It is possible that some faculty supervisors might be away for several days or more prolonged periods of time. Thus, having a schedule of meetings established at the outset will avoid frustration and surprises on both sides.

Faculty supervisors and readers will try to give you fair turnaround times; overnight is unlikely and two weeks is unreasonable considering the semester is only about 13 weeks. Turnaround times will vary on the material being reviewed; the abstract alone can be reviewed faster than the whole thesis document.

Getting Started:

You must find a faculty supervisor. Please check LEARN for supervisors who will post possible topics. All students are expected to have a confirmed faculty supervisor and general topic by 4 p.m. **21 September 2016**. Please report your supervisors name and general topic via the LEARN Dropbox to the course coordinator by the deadline. The full roster will be collated and posted on LEARN shortly thereafter.

A faculty supervisor outside the Department of Earth and Environmental Sciences is permissible especially as there are faculty members outside the department who are engaged in geoscience-related research (i.e. Applied Math, Geography, and Civil Engineering) and who, indeed, may hold cross-appointments to the Department of Earth and Environmental Sciences. However, such prospective faculty supervisors should be cleared with the course coordinator to finalize your selection.

If you are having difficulty finding a supervisor, please inform the course coordinator who will assist you in doing so. **PLEASE DO NOT WAIT UNTIL THE LAST MINUTE** and after the deadline. You will be considered to be behind in keeping up with the course if you fail to do so. Do not hesitate to contact the course coordinator if any other issues arise who will be happy to work with you to find a solution – again the sooner the better and do not hesitate to do so.

Course Syllabus and Important Milestones (meeting dates and topics subject to change):

<i>Meeting Date</i>	<i>Meeting Topic</i>	<i>Important Milestones and Actions</i>	
Sept. 11	No class meeting		
Sept. 18	Introduction; How to prepare a research proposal	<i>Supervisor name and topic to be reported to course coordinator</i>	
Sept. 25	Writing and editing. With Bob Davie, Professional Geoscience Editor.		
Oct. 2	Proposal writing; how to read scientific papers		
Oct. 9	How to make oral presentations; How to write an abstract		
Oct. 16	Possible class meeting		
Oct. 23	No class meeting		
Oct. 30	No class meeting	<i>Thesis proposal to be submitted on LEARN</i>	
Nov. 6	No class meeting		
Nov. 13	No class meeting		
Nov. 20	Practice sessions (if desired)		
Nov. 27	Practice Sessions (if desired)		
Nov. 30 (to be confirmed; depends on room availability)	Symposium Day: Oral presentations		
<i>Dec. 5</i>		<i>EARTH 436B & 499 only: Final thesis copy to faculty supervisor and Reader 2</i>	

Time Management:

Research can be full of surprises. There could be those breakthrough moments of major discovery when you need to schedule time to go off to celebrate. There could be that experiment you must repeat because it did not work as expected the first time. The weather socked you in the field and you had to wait three days for it to clear before you could leave camp. The point is, your research will more likely than not take longer than you expect and you need to plan accordingly. Writing and reviewing will always take longer than you expect.

It is difficult to find large segments of time to focus on your research. Frosh week, the end of year break and Spring break are good times where you have a few full days together to concentrate on your research project. That Caribbean vacation at the end of December can wait until the following year after you have graduated!

Course Assessment:

The final thesis will be assessed by two readers, Reader 1 who will be your faculty supervisor and Reader 2 who is another faculty member in the Department of Earth and Environmental Sciences agreed to by you and your faculty supervisor. For those whose faculty supervisor is not in the Department of Earth and Environmental Sciences, Reader 2 must be a member of the Department of Earth and Environmental Sciences.

Deadlines will be those agreed to you and your faculty supervisor, who in turn, will report any late or non-submissions to the course coordinator. The course coordinator is responsible for collecting and calculating final marks from faculty supervisors and readers.

Policies outlined in the Undergraduate Calendar for Academic Regulations Related to Assignments, Tests, and Final Exam Accommodations will be followed (<https://ugradcalendar.uwaterloo.ca/page/Regulations-Accommodations>). The oral presentation is considered the same as a final examination, and as such policies for a missed final examination apply.

Course Weighting	EARTH 436A and EARTH 499	EARTH 436B	Final Mark for EARTH 436A & B
Proposal	15% (a mark of zero will be assigned for late submissions)	(not applicable)	15% Average of proposal and progress report Marks assigned by faculty supervisor
Progress Report	(not applicable)	15% (a mark of zero will be assigned for no or late submissions)	
Abstract	-5% for no or late submission	-5% for no or late submission	
Oral Presentation	20%	20%	20% Average of both EARTH 436A and 436B mark Mark assigned by faculty and student peers
Final thesis:	65% for EARTH 499 (not applicable for EARTH 436A)	65%	65% Average of mark from Reader 1 and 2
TOTAL	100% (for EARTH 499)		100%

The Thesis Proposal:

This section applies to those in EARTH 436A or 499 only. The proposal is a document which outlines what you plan to do. Considerable background reading and understanding of your topic is critical at this stage to write a proper and well thought out proposal. It is the why and the how along with a schedule of time-lines and expected deliverables. The proposal often forms the skeleton for the final thesis. About 8-10 pages in length is typical. Your faculty supervisor may recommend additional or alternative formats, but unless told otherwise, the information here will be useful.

Introduction: This section is a general introduction to your topic and the specific question(s) you are setting out to answer. It can include a general review of the literature, not all literature on the topic, but instead the most important work that relates to your project. After all how can you conduct original research without having an understanding of what is already known and what has been done before you begin your work. After reading this section, the reader should have enough background to understand why you are setting out to ask the objectives and goals that follow.

Objective(s): You should identify and articulate the problem or question(s) you are setting out to address. It may be a single objective or it may consist of 2-3 inter-related objectives, but generally not more than 3 or 4. For the most part, these are the objectives you will come back to when providing the answers to in the Results and Discussion sections of your final thesis.

Methods or Approach: This section is a general description of how you plan to answer your objectives. If it involves both field work and laboratory analyses, you should describe them separately. Most importantly, you should have a clear sense of what you will do and what you will need in terms of supplies and equipment before you leave on your field trip or before you enter the laboratory. If you are standing in the field or at the laboratory bench, and then start thinking about what to do, you are not ready and probably behind the others in the class.

Timelines: It is important to develop a clear schedule with tangible goals and deliverables. This is important because it will help guide both you and your faculty supervisor to keep on schedule. You should meet with your faculty supervisor so that both of you are aware of the plans and agree on a schedule.

Example of a table showing timelines and deliverables (Fall semester)

Date	Milestone	Deliverable
Sept 30	Complete library literature research	Write literature summary and write Intro for proposal
Oct 5	Prepare hand samples and send to ABC Labs for analysis	

Nov. 12-17	Prepare Powerpoint talk and schedule dry-runs and make oral present	Colloquium Day Talk
Dec. 14-30	Lab experiment #1 or analyse field data	

References Cited:

Follow the same format as given in Thesis Format Guidelines document.

Year 4 Symposium Day:

All students are expected to participate in the Year 4 Symposium Day near the end of the regular class meetings and before the final exam period. This is a full-day of simultaneous presentations designed like sessions in any geoscience conference or symposium. As with professional conferences, students are required to prepare an Abstract. All Abstracts will be compiled and distributed prior to the Symposium Day. See Thesis Format Guidelines for instructions on how to write an abstract.

Each student is expected to prepare a Powerpoint Presentation that is a total of 20 minutes in duration, 15 minutes for the talk and five minutes for questions. Instructions and tips for making oral presentations will be discussed in our class meetings.

The Final Thesis:

This section applies to those in EARTH 436B or 499 only. Your final thesis document is not a one-time effort. It will take several drafts, often at least three iterations, between you and your faculty supervisor before you achieve the final product. Those who spend more time with their faculty supervisors on the Proposal and the Progress Report, find it easier and are often better prepared for writing the final thesis. You and your faculty supervisor should agree on a set of submission deadlines and dates for the return of your drafts so as to stay on track in order to make the final submission deadline. The final submission deadline is firm.

The thesis is highly variable in length and varies with the nature of your project. Typically, the thesis is around 45 pages (including figures, tables and references)

A set of Thesis Format Guidelines has been prepared and is given below. You should follow these guidelines carefully.

University of Waterloo Policies

- **Academic Integrity:** University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility. [Check www.uwaterloo.ca/academicintegrity/ for more information.]
- **Grievance:** A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70, Student Petitions and Grievances, Section 4, www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please be certain to contact the department's administrative assistant who will provide further assistance.
- **Discipline:** A student is expected to know what constitutes academic integrity [check www.uwaterloo.ca/academicintegrity/] to avoid committing an academic offence, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about "rules" for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to Policy 71, Student Discipline, www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check Guidelines for the Assessment of Penalties, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.
- **Appeals:** A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground. A student who believes he/she has a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.
- **Note for Students requiring AccessAbility Services:** The AccessAbility Services Office, located in Needles Hall, Room 1401, collaborates with all academic departments to arrange appropriate accommodations for students requiring such support. Please contact their office and register as necessary.