

EARTH 436: HONOURS B.Sc. THESIS 2020-2021

Version: 8 September 2020

The Honours B.Sc. Thesis provides an opportunity for students to design and conduct independent research under the supervision of a faculty member in the Department of Earth & Environmental Sciences. In the past years, a number of excellent research projects have been completed, leading in some cases to award winning presentations at conferences and publication in peer-reviewed journals.

Earth 436 has been recently changed to consist of two terms; Earth 436A and Earth 436B.

In Earth 436A, a detailed research proposal is prepared that includes an introduction, literature review, goal(s) and objectives, experimental design and methods (including anticipated results).

Students must normally obtain a minimum mark of **75%** in Earth 436A to be allowed to register in Earth 436B.

In Earth 436B, the thesis is completed based on the experimental design formulated in Earth 436A. and a final presentation builds on the first presentation to reveal the results and conclusions of the research.

The number 1 rule of research is that it **always** takes longer than you think! Therefore, several deadlines have been set to encourage progress.

EARTH 436A:

ACTIVITIES, DEADLINES and CLASS SCHEDULE: There are several lectures and activities throughout the fall term to directed towards the development of research skills. A tentative schedule is given below. This schedule and the information in this document may be updated or changed as the term progresses, especially this year with the uncertainty due to the covid situation. The date of this version of the Earth 436 information is given at the beginning of the document. Changes will be posted on our LEARN site and also sent by email. Please ensure that you check email. If you have not already done so, you should forward your uwaterloo account to the email address that you normally check frequently.

MEETING TIMES: Note there is no scheduled time for this course. We will not have formal meeting times as this course will be delivered asynchronously to accommodate all students (and time zones). However, there will be times when we may wish to meet for discussion. There will be several times selected for any discussion activity to allow students to participate when they can. All class discussions will be non-mandatory.

Lectures and information will be recorded and posted as per the schedule below.

Again, please pay attention to the group emails for this course. We may have to change as the situation unfolds this fall.

TOPIC SELECTION: It is the responsibility of the student to arrange with one of the faculty members for the latter to serve as thesis supervisor. Many professors have a number of possible projects in mind. Some students suggest topics based on their interests. If the topic arises from a work term project, the thesis must involve additional creative research beyond the work term experience. Topics involving co-supervisors outside of the Dept. of Earth & Environmental Sciences must be approved by the Earth 436A coordinator. A co-supervisor within the department is required. Professors may post topics on a discussion board on our LEARN site. A professor may decline some requests for supervision if the professor is in heavy demand as an undergraduate supervisor. A topic and supervisor must be confirmed by 28 September and posted on our LEARN site discussion board. If you DO NOT have a confirmed supervisor and topic by this date, you will be removed from the course. If you are having difficulty finding a supervisor, please inform the course coordinator. PLEASE DO NOT WAIT UNTIL just before the deadline. Do not hesitate to contact the course coordinator if any other issues arise during the term as soon as possible.

Normally, we hold oral presentations near the end of the first term. In preparation, we also hold 3MT and 1MT presentation events in class. We cannot do this in the fall term due to the covid situation but hope to re-introduce these in the winter term.

FIRST MEETING WITH SUPERVISOR: All students will meet with their supervisor before or in the week of 21 September to discuss the following:

- i) Thesis topic
- ii) Expectations of the course for the student and supervisor
- iii) Review the deadlines
- iv) How often to hold meetings and how to meet.
- v) Whether you are planning to continue in 436B
- vi) Obtaining Honours BSc thesis from the supervisor to critique

The student is responsible for setting up this meeting and making sure that all the topics are covered.

PRELIMINARY THESIS DESIGN: The design document should be 2-3 typed pages and contain a brief introduction, and a clear statement of the goal(s) and objectives, an outline of the scope of the literature review, potential methods for the project and a tentative work timetable. Upload a copy to the LEARN dropbox **AND** give the progress report to your supervisor who will mark the report.

CRITIQUE OF HONOURS BSC THESIS: Obtain a completed Honours BSc. Thesis of a previous EES student from your supervisor. Write a short summary of the project and include the objectives, context, methods and major findings (250 work max.) in sentence form. Then give a critique of the thesis in sentence form. Pay attention to the thesis structure, objectives, data manipulation and presentation and conclusions sections. A list of some guiding questions will be provided on LEARN. Maximum length for the summary and critique is **one page single spaced**. Send this to supervisor **and** post on LEARN dropbox.

THESIS POSTER PRESENTATIONS: In lieu of oral presentations, poster presentations will be given this year. The poster presentations will be available to all faculty and students via a discussion board on LEARN. Feedback will be provided by faculty and students. The posters can be done in powerpoint and are to cover all the aspects of your thesis design project including: abstract, context, objectives, methods, results and conclusions. The abstract should be in sentence form; the other sections can be in point form. Everyone will post their posters as a PDF on the discussion board. On the discussion board, an example of a poster will be posted.

FEEDBACK: THESIS DESIGN POSTER: Each student must provide substantive comments (on the methods, science, objectives etc.) on 5 posters (not including their own poster). The posters to be reviewed by each student will be assigned by the course instructor so that everyone receives some feedback. Even though some posters may not be “in your subfield of EES, the poster content should be fully explanatory to the audience (in this case faculty and students in Earth 436A/B). Plan your poster accordingly. Marks will be awarded based on substantive value of the posted comments (i.e. comments like “pretty poster” or “nice photos”, although encouraging, will not garner any marks).

FINAL THESIS DESIGN PROJECT: The final project contains an Introduction, Comprehensive Literature Review, Overall Goal(s) and (specific) Objectives, Experimental Design and Methods (including anticipated results and potential data presentation). Include a “mock-up” of your potential data figures if you can. The goal is to elicit as many comments as possible from your supervisor.

The thesis design project will be read by two readers; your supervisor and one additional faculty member. Selection of the second reader is the responsibility of the supervisor. For those whose faculty supervisor is not in the Department of Earth & Environmental Sciences, the 2nd reader must be a member of the Department of Earth & Environmental Sciences. It is the responsibility of the supervisor to complete the marking by mid-December so students can anticipate if they need to replace Earth 436B with another course.

[Schedule is on next page].

DATE	ACTIVITIES & DUE DATES	MARKS
Week beginning:		
14 Sept.	Informal Meeting: Class Discussion: What is research? What are course expectations ? We will arrange a few video chat sessions (likely on 16-17 Sept) on Microsoft Teams depending on student schedules. You can post questions at any time on Q&A discussion board for class. Please make sure there is a useful title for your discussion post so that other students can find the answers when they need them.	Non-Mandatory
21 Sept.	Meet with supervisor. Discuss project and deadlines. Obtain a copy of a previous EES Honours thesis. Prepare a critique of this Honours BSc thesis. Thesis critique: due 19 October to supervisor & to dropbox.	Critique of BSc thesis: 10%.
28 Sept.	DUE DATE: 28 SEPT. Post supervisor and topic on LEARN discussion board to be allowed to continue in the course. Scientific method video; Short online quiz. https://contensis.uwaterloo.ca/sites/open/topics/ScientificMethod/toc/modules/the-scientific-method.aspx DUE DATE: 5 Oct. Short quiz on LEARN	Mandatory: available online Short Quiz: 3%
5 Oct:	Recorded Lecture: Finding and Organizing reference material: Kate Mercer DUE DATE: 12 Oct. Short quiz on LEARN	Mandatory; Will be recorded Short Quiz: 3%
12 Oct.	Reading Break	
19 Oct.	DUE DATE: Thesis Critique Work on preliminary thesis design	
26 Oct.	Martin Ross: Applying for NSERC & other scholarships for graduate school. DUE DATE: Preliminary Thesis design: Due 28 October to supervisor & dropbox	Non-mandatory Preliminary Thesis design: 5%
2 Nov	Work on Thesis design project	
9 Nov.	Jean Richardson; DUE DATE: 16 Nov. Short quiz on Learn	Mandatory Short Quiz: 3%
16 Nov	No meeting or activity: Work on your poster.	
23 Nov.	DUE DATE: POSTER PRESENTATION: 25 November DUE DATE: POSTER FEEDBACK: by 2 Dec. Must provide constructive comments on 5 posters (not including your own poster !):	Poster: 16%
30 Nov.	Finish writing & Edit DUE DATE: POSTER FEEDBACK: 2 Dec. as a thread on Discussion Board.	<u>Poster feedback.</u> 10 %
7 Dec.	DUE DATE: FINAL THESIS DESIGN PROJECT: 8 December: Final copy due to supervisor and posted on dropbox.	Final thesis design project: 50%

EARTH 436B:

ACTIVITIES, DEADLINES and CLASS SCHEDULE: Students that completed 436A in spring 2020 term will follow all the online activities and timetable of the fall term 436A class as above. The marking scheme is slightly different (see table below) to emphasize the value and importance of the final thesis copy. A progress report must be submitted to your supervisor midway through the term to ensure that the thesis is on track for completion. In addition, you will help your peers with comments at their poster presentations, so that they will benefit from your experience and ideas. This schedule and the information in this document may be updated or changed as the term progresses. The date of this version of the Earth 436 information is given at the beginning of the document.

PROGRESS REPORT: Progress reports should contain an updated clear statement of goal(s) and objectives of the thesis, a brief description of methods, an analysis of progress and problems, and a revised timetable for completion of the remaining stages of the research project. Reports can take the form of written outlines and should include an analysis of progress and problems, and a revised timetable for completion of the remaining stages of the research project.

FINAL COPY of THESIS: The format of the final thesis will be decided by the student and supervisor. A thesis may be written in the format of a standard scientific paper. Refer to scientific journals appropriate to each subdiscipline for examples of publication format (e.g., Canadian Journal of Earth Sciences). The university graduate office has some standard guidelines for the UW thesis format including the front pages which must be followed. These are available at:

<https://uwaterloo.ca/graduate-studies/thesis/preparing-your-thesis>

The due date for the submission of your thesis is final. By or on the due date in the table above you must submit your thesis with a complete set of figures and tables for marking. You must upload either your final copy for marking **OR** a draft of all your work completed to date and a realistic schedule for thesis final submission. This will allow your supervisors to evaluate how best to help you in this next phase. There will be 2 dropboxes. Make sure you upload your thesis to the correct dropbox. Please also email a copy directly to your supervisor

To be fair to all students, extensions will only be allowed in rare and exceptional circumstances by **written appeal** to the Earth 436 thesis coordinator. If your work is not complete, you must hand in what you have on the due date to your supervisor accompanied by a letter of explanation and a revised timetable for completion. The letter of explanation and a revised timetable for completion must also be sent to the thesis coordinator (sschiff@uwaterloo.ca). Late submissions may be subject to a 10% penalty, and even delay your degree.

The thesis will be read by two readers; your supervisor and one additional faculty member. Selection of the second reader is the responsibility of the supervisor. The supervisor is also responsible for seeing that the second reader provides a grade and comments in sufficient time so the student can revise the thesis and submit it in final form by the date for mark submission to the Registrar (late December). The thesis comments will be returned to you as quickly as possible. If you are planning to graduate at the end of term that you are completing your thesis, then you must follow the deadlines above in order to have everything completed by the dates when the marks for graduating students are due to the registrar.

We are now accepting and storing only electronic copies of Honours BSc theses. These electronic theses will be stored by the library and accessible online. Please upload the final copy of your thesis to the dropbox on our LEARN site. It is **IMPORTANT** to put **YOUR NAME in the file name**. Please load the thesis as PDF file. Your thesis will be considered FINAL and will be uploaded to the university library for access by all.

Note: your final mark WILL NOT be submitted to the Registrar's Office until we have received an electronic copy of your thesis that is complete with all figures and maps.

The student and/or supervisor can also elect to formally bind the project. Examples of bound BSc theses may be available from your supervisor, The Dept no longer stores bound copies of BSc theses. The costs for binding may be covered by your supervisor. Binding is not expensive. In 2014f, the cost of binding was \$25/copy. The instructions for binding can be found at:

<http://newmediaservices.uwaterloo.ca/mediadoc/printing/thesis.html>

Additional copies either formally bound or ring-bound may be needed for collaborators, funding agencies or other students in the laboratory group. Please discuss and arrange binding and copies directly with your supervisor. Note that even if you bind your thesis, **you must upload an electronic copy to our LEARN site before your mark will be released to the registrar.**

ADDITIONAL INFORMATION FOR BOTH EARTH 436A AND EARTH 436B

Students who commence a study in which they receive data, technical assistance, expenses, etc. from a supervisor should be aware of the ethical obligation to complete the study.

RECOMMENDED TEXT: W. Strunk and E.B. White, "The Elements of Style" (available in Bookstore under writing style section).

There is no formal text for this course. The following two books are on reserve in the Davis Library.

1. Copeland, Peter. 2012. Communicating rocks: writing, speaking, and thinking about geology. Pearson. ISBN-13: 9780321830425. 2

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

Neither of these books is required. The Grant book is a great guidebook that you will find most useful not only for this course but throughout your geoscience career. You can purchase copies through the Geological Association of Canada website (www.gac.ca). Regular price is \$109 and is \$59.96 + tax and shipping for GAC members. You can join the GAC as a student member for \$15 and then purchase the book, which is still a big savings plus includes the benefits of being a member.

THESIS COORDINATOR for 436A/436B: Sherry Schiff
In fall 2020, I will be mostly working from home. Please email me.
We can also set up a one-on-one meetings in Microsoft Teams.
Email: sschiff@uwaterloo.ca

COMMUNICATION: The primary mode of communication will be our LEARN site for Earth 436. To access this site, please go to the UW home page and follow the links. You will need to log in using your UWdir/Quest userid and password.

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, posters 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/or advancing to graduate school depending on your 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

NOTE FOR STUDENTS WITH DISABILITIES: The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

EXPECTATION OF ACADEMIC INTEGRITY:

- [Office of Academic Integrity](#) provides relevant information for students, faculty and staff.
- **Academic Integrity:** In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.
- **Plagiarism:** Plagiarism is the act of directly copying material from another source word-for-word without acknowledging (citing) the source. Copying material from another student word-for-word (collusion) also constitutes plagiarism. It is unacceptable to claim another person's words as your own. Acts of plagiarism are not tolerated at the University of Waterloo and are subject to disciplinary action according to Policy 71, Student Discipline (see below). If you have not already done so, it is strongly recommended that you take the Academic Integrity Tutorial at <http://www.lib.uwaterloo.ca/ait/>. An answer to a question that consists solely of a quote to a properly cited source is also **not** acceptable. Although this does not constitute plagiarism, professors are unable to assess whether any actual learning, specifically the synthesis/application of knowledge, has been achieved by the student. Although finding sources is part of learning, this type of work by itself does not merit a passing grade. Students are expected to cite the source of information (e.g., Wikipedia, website, textbook, journal article, class slides) but ALSO to **paraphrase** the material (rewrite the information in your own words) when answering questions on tasks that require an internet and/or literature search. When writing scientific or engineering reports it is **standard professional practice** to cite the appropriate work of other research scientists when discussing ideas or information that are not our own. Plagiarism is a very serious charge and can ruin promising careers.
- Use of plagiarism software:

*Turnitin.com: Text matching software (Turnitin®) will be used to screen thesis design proposals, projects and assignments in this course. This is being done to verify that use of all materials and sources in assignments is documented. Students will be given an option if they do not want to have their assignment screened by Turnitin® *(e.g., scaffolded assignment or annotated bibliography plus an interview about their paper or assignment).*

Another possibility is the use of the iThenticate software. The procedures for this will be investigated if requested. In the past, the student would need to get his/her own iThenticate account and agree to submit her/his own materials. Graduate students contacted [Sean Warren](#) in IST (ext: 46950) to arrange their own iThenticate account.
- **Grievance:** Students, who believe that a decision affecting some aspect of their university life has been unfair or unreasonable, may have grounds for initiating a grievance. Students should read [Policy #70](#), Student Petitions and Grievances, Section 4. When in doubt, students must contact the department's/school's administrative assistant who will provide further assistance.
- **Discipline:** Students are expected to know what constitutes academic integrity, to avoid committing academic offenses, and to take responsibility for their actions. Students who are unsure whether an action constitutes an offense, or who need help in learning how to avoid offenses (e.g., plagiarism, cheating) or about 'rules' for group work/collaboration should seek guidance from the course instructors, academic advisor, or the Associate Dean of Science for Undergraduate Studies. For information on categories of offenses and types of penalties, students should refer to [Policy #71](#), Student Discipline. For information on typical penalties, students should check [Guidelines for the Assessment of Penalties](#).
- **Appeals:** A decision or penalty imposed under Policy 33 (Ethical Behavior), Policy #70 (Student Petitions and Grievances) or Policy #71 (Student Discipline) may be appealed, if there is a ground. Students, who believe they have a ground for an appeal, should refer to [Policy #72](#) (Student Appeals).

COURSE RULES AND CONSIDERATIONS:

Verification of Illness Forms

Science students should be aware that the only Verification of Illness forms (VIFs) accepted for accommodation for missed assessments will be those issued by the University of Waterloo's Health Services, when this service is open (<https://uwaterloo.ca/health-services/>). VIFs issued by walk-in clinics will not be accepted, except when obtaining a VIF from Health Services is not possible. If a student is sick on a weekend, during off-hours, while out of town or receiving ongoing care from a family physician or specialist, it is acceptable to provide documentation from other health service providers.

Information should include (1) date of the physician assessment, (2) dates of illness, (3) level of incapacitation and (4) whether the diagnosis was made by the physician or based on description by the student.

Keeping the playing field level for all of our students is a priority. Students are reminded that obtaining a VIF under false pretences is an academic offense. For tests and exams, a student found guilty of misrepresentation will receive a failing grade in the course and be suspended. Any questions concerning this policy can be directed to an undergraduate advisor in the Science Undergraduate Office. *Student travel plans not considered acceptable grounds for granting an alternative examination time. Only illness and extenuating circumstances (such as a death in the family) will be considered.*

Students with Disabilities

[AccessAbility Services](#), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If students require academic accommodations to lessen the impact of their disability, they should register with AccessAbility Services at the start of each academic term.

We acknowledge that we live and work on the traditional territory of the Attawandaron (Neutral), Anishinaabeg and Haudenosaunee peoples. The University of Waterloo is situated on the Haldimand Tract, the land promised to the Six Nations that includes ten kilometers on each side of the Grand River.