1. Introduction

This is a two-term course that provides students an opportunity to conduct original research by collecting data, and even acquiring field and laboratory skills, in geography or earth sciences under the supervision of a Full-time or Associate Member of the department. Upon successful completion of these courses, students should have demonstrated general proficiency in carrying out independent research; specifically, the students should have demonstrated the ability to:

- Formulate a scientific hypotheses/research question suitable for study,
- Design and conduct a project to support or refute the hypotheses/answer the question

In addition, thesis students are further challenged to present and defend their findings by making an oral presentation at the end-of-term Geography and Earth Sciences Undergraduate Symposium, to which all students in the course, and all faculty in the department and the general public are invited.

2. Eligibility of Students

2.1 Programs
This thesis course is ONLY open to students registered in Level IV of Honours Earth and Environmental Sciences, Geography, and Geography and Environmental Studies, and the joint Honours Biology and Environmental Sciences. It does not include students in Honours Environmental Sciences, or students from other programs. A cumulative average (C.A.) of 7.5, and permission of the course instructor (i.e. Course Coordinator) are required.

2.2 Other capstone opportunities
Students who wish to research a topic via an in-depth literature survey that would not include original research should register in Earth Sc/Geog 4MS3 – Independent Study.

2.3 Scheduling
This course takes place over the Fall (Term 1) and Winter (Term 2) terms. The time commitment a student needs to allocate to this course will vary with the project, supervisor and student. As a general rule of thumb, students should expect to spend a minimum of 12-15 hours per week, with more time allocated to research early in the first term. When meeting prospective supervisors, students must clarify expectations in regards to the amount of research time they should devote to their projects, as this component is highly variable. Ideally, the active phase of the project (which may include important
experimental or field components) should be completed by early February so that the remaining time can be devoted to analysis, writing and editing. All research work should cease by late February to allow for two to three weeks for completion and submission of the draft thesis by mid-March.

2.4 Research project and Grading
It is important for both supervisors and students to agree on the topic of the research. In the past, some thesis projects have been so complete, and so integral to the supervisor's research programs, that the results have been published and the students credited with authorship. At the other extreme, there are projects in which technical difficulties prevent the completion of planned research, and the results are ambiguous. In the latter situation a student may still earn an A+ grade for his/her design and analysis, for suggesting and testing alternative approaches to the problem, and for an overall understanding of the project. A high grade does not therefore necessarily depend upon collecting the hoped-for data, but comes from full and aggressive intellectual (as well as physical) involvement in attacking the problem.

3. Course Description and Expectations

Students in the course are evaluated on the basis of six components:

1. Research proposal (10%)
2. Literature Review (15%)
4. Full Draft of Written Thesis (10%)
5. Paper presentation during the Geography and Earth Sciences Undergraduate Symposium (15%)
6. Written Thesis (50%)

All aspects of the work are graded by the supervisor. The written thesis must be submitted to the supervisor on the final day of classes, at the end of Term 2. Normally, no extensions will be granted, except for medical or compassionate reasons. The student must also submit a PDF version to the course coordinator to be archived.

4. Project Selection

4.1 Selection of a supervisor
Students who wish to enrol in this course must seek the support of a supervisor, who is a Faculty, Adjunct Faculty or Associate Member of the School. Emeriti professors may act as supervisors, provided that they have an active research program.

The first step is to consult the list of potential supervisors available in GSB 206 (or on the Internet at http://www.science.mcmaster.ca/geo/faculty/index.html; look at the names listed under Faculty, Adjunct, and Associate).

Select several prospective supervisors to contact based on your general area of research interest. Make appointments to discuss potential projects and the general nature of their research program. During this meeting, you should also clarify their expectations of students with respect to hours of work per week, and whether or not weekend work is required or expected. This is particularly important for projects involving field and/or laboratory work. It is also a good idea to talk to a prospective supervisor’s current thesis student(s) in advance of the meeting to gain some insight into his/her supervisory style.
Regardless of the supervisor’s status, professors who are absent from the University during either term cannot be supervisors or co-supervisors of thesis students. Additional members within or outside the list of potential supervisors may act as co-supervisors for resource purposes, subject to approval by the Course Coordinator.

4.2 Registration
Students intending to enrol in this course must submit an application to the appropriate Course Administrator by March 1 of the academic year prior to registration. Application forms are available online through the SGES website and must be completed and submitted online. The application form must be signed by the prospective supervisor.

Registration is also contingent upon successful completion of one of EARTSC 3RD3 or GEOG 3MA3 (Geography); or EARTHSC 3RD3 or GEOG 3MA3 (for B.SC. students). Please also note that students MUST have a C.A. of 7.5 to be allowed in Earth Sc/Geog 4MT6.

5. Roles and Responsibilities

5.1 Responsibilities of the Supervisor
Supervisors are responsible for the immediate direction and instruction of the student and should commit on average, a minimum of 30 minutes of contact time each week with the student. Supervisors will also be responsible to inform the Course Coordinator of the marks obtained by the thesis student(s) under their supervision for the different course components, by the specified due date. Supervisors should also notify the Course Coordinator of any serious issue arising during the course of the project.

Supervisors will communicate their own expectations in terms of the protocols used to track research progress and collect data (i.e. use of note books, etc.), as well as of the day-to-day conduct of the student in the laboratory/field (if appropriate). Since it is impractical to insist on a single format for all disciplines and project types, as supervisor, you are responsible for setting guidelines and terms of reference for the research proposal or literature review for your own students. The supervisor should provide regular oral or written feedback to the student in regards to level of productivity, and degree of satisfaction of the student’s progress. Students should be clear on what is expected of them throughout the course.

It is also the responsibility of the supervisor to inform as soon as possible the Course Coordinator of any deadline missed by the student, in the submission of Earth Sc/Geog 4MT6 course materials.

Supervisors are also responsible for the safety of the students in the lab and/or in the field, if these are components are the research project, and to ensure that all necessary equipment have been made available and appropriate safety courses have been taken by the student before commencement of laboratory or field work. Safety training such as Chemical Spills and Gas Cylinder training, or other courses deemed appropriate by the supervisor must be taken, but office safety courses do not need to be taken as per EOHSS guidelines. Additional information about safety training requirements can be found on the EOHSS website (http://www.workingatmcmaster.ca/eohss/).

All research work should cease no later than Friday, February 24th 2017, to give sufficient time for students to complete the analysis, writing and editing of the first draft, which must be submitted to the supervisor in mid-March.
5.2 Responsibilities of the Student
It is the responsibility of the student to keep the supervisor up-to-date regarding progress on the project throughout the year. In particular, the student must organize a meeting before the end of September to seek approval on the nature and scope of the project. During this meeting, the student should also request guidelines and a marking scheme for the research proposal and the literature review. Any research issues (particularly ones of a scientific nature, when appropriate) should be directed to the supervisor at any time. However, if conflicts arise that cannot be solved between the student and the supervisor; it is the responsibility and right of the student to ask the Course Coordinator to intervene. The student should consult with the supervisor on all aspects of the course including the guidelines and requirements for the research proposal, literature review, mid-year progress report, oral presentation and written thesis. Finally, it is the student’s responsibility to check Avenue to Learn regularly for updates provided by the Course Coordinator.

5.3 Responsibilities of the Coordinator
There will be an initial meeting in September, during which all students will meet with the Course Coordinator to discuss course expectations and deadlines. All students in the course can meet throughout the year with the Course Coordinator to discuss various issues relating to deadlines, course requirements, etc and to get guidance on time –management and how to communicate effectively with the supervisor. Conversely, supervisors may discuss any issue arising during the course of the project with the Course Coordinator. The Course Coordinator can provide individual counselling if problems cannot be solved between student and supervisor. To book an appointment, either email me at bhattacharjoo@mcmaster.ca or contact Sal Santos (ssantos@mcmaster.ca) to book a time.

The Course Coordinator will also maintain an Avenue to Learn shell (http://avenue.mcmaster.ca) for the course and use it to remind students of important deadlines, to provide updates about the organization of the course, and to update the online grade book. It is also the responsibility of the Course Coordinator to impose heavy penalties for any deadline missed by the student, in the submission of Earth Sc/Geog 4MT6 course materials.

Finally, in the rare event of a disagreement between the Supervisor and the student over the marking of the written thesis, it is the responsibility of the Course Coordinator to find a faculty member in the supervisor’s area of expertise who will remark the written thesis.

5.4 Responsibilities of the Course Administrator
The Course Administrator deals with the functional aspects of the course and initially determines if a student should be allowed to register in Earth Sc/Geog 4MT6. The Administrator is responsible for handling the application forms submitted (in the preceding academic year) by students intending to enrol in this course, to make sure that students meet prerequisites and to assist the Coordinator in managing the enrolment of students in Earth Sc/Geog 4MT6, i.e. by activating permissions on SOLAR (based on the Coordinator’s recommendation) allowing their registration into the course.

The Course Administrator may also assist the Course Coordinator with their duties (outlined in section 5.3), as needed. The Course Administrator is finally responsible at the end of the year to handle the archival of the written thesis submitted by the students.

5.5 Research Ethics
All projects must meet the Research Ethics Policy of McMaster Policy, and follow the appropriate guidelines. All research involving human subjects must be cleared by the McMaster University Research
Ethics Board. This includes a very wide range of research activities such as using human subjects in experiments or interviews, using identifiable personal data, and using human remains in, e.g., geoarchaeological investigations. It is the student’s responsibility to check if the proposed research is subject to review and obtain the necessary approvals. This may take up to three weeks.

For more information on research ethics policy and guidelines, consult the McMaster Research Ethics Board website (http://www.mcmaster.ca/ors/ethics/index.htm).

6. Deadlines and Late Penalties

In the event of an absence for medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar “Requests for Relief for Missed Academic Term Work” (MSAF). When using the MSAF, report your absence to bhattaj@mcmaster.ca and directly to your supervisor. Absences lasting more than three days must be reported to the Associate Dean’s Office (KTH 129 for Social Science students and BSB 129 for Science students) and appropriate documentation must be provided. For medical absences, the University reserves the right to require students to obtain medical documentation from the Campus Health Centre. Please note that this form is simply a request for relief, the nature of the relief is left to the instructor’s /supervisor’s discretion. Once the form is filled out, the student must contact their supervisor and the course coordinator (bhattaj@mcmaster.ca, x23528) as soon as possible in order to make necessary arrangements for making up work. Generally, the accommodation will be to grant an extension, which matches the length of the absence, at the discretion of the supervisor and in consultation with the course coordinator.

7. Communication

All formal communication regarding this course will be through McMaster email accounts and/or Avenue to Learn. Please be sure to check your McMaster account regularly. If you have not received emails regarding 4MT6, it is your responsibility to contact the course coordinator with your McMaster email address and ensure your name is on the distribution list. Similar information will be posted on Avenue to Learn.

8. Academic Dishonesty

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. Academic credentials you earn are rooted in principles of honesty and academic integrity.

Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at http://www.mcmaster.ca/academicintegrity

The following illustrates only three forms of academic dishonesty:
1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

In this course we will be using Avenue to Learn. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the Course Administrators.

**SCHEDULE OF ACTIVITIES**

**EARTH SC/GEOG 4MT6**

**2016-2017**

**ORGANIZATIONAL MEETING**
Friday September 8th 2017, 8:30-9:20 pm.
Room: MDCL 1008
The Course Coordinator will meet all the students registered in the course to discuss course expectations and deadlines.

**INITIAL MEETING WITH SUPERVISOR**
No later than: Friday, September 15th 2017
A meeting should be organized (if it has not already occurred) involving the student and the supervisor to establish the nature and scope of the research project, general expectations (e.g. conduct in the laboratory), time commitment (when and how long), and guidelines for various written components, including at a minimum the research proposal, but also the final written thesis/project.

**RESEARCH PROPOSAL**
Weight of Final Mark: 10%
Due: Friday, October 6th, 2017, 4:30 pm.
This will be graded by the supervisor and the marking sheet will be signed by the student and returned to the Course Coordinator. Problems with the project and suggested remedies should be communicated to the student by the supervisor at this time. If needed, the student should also consult with the Course Coordinator regarding the proposal.
Proposals should be passed directly to your supervisor.
Marks & Comments due: Friday, October 20th 2017, 4:30 pm.

**LITERATURE REVIEW**
Weight of Final Mark: 15%
Due: Friday, November 3rd 2017, 4:30 pm.

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1 The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.
This will be graded by the supervisor and the marking sheet will be signed by the student and returned to the Course Coordinator. Problems with the student’s understanding of the full intellectual setting of the project should be communicated to the student by the supervisor at this time. If needed, the student should also consult with the Course Coordinator regarding the literature review. Literature review should be passed directly to your supervisor.
Marks & Comments due: Friday, November 17th, 2017; 4:30 pm.

END OF ACTIVE RESEARCH
No later than: Friday, February 23rd, 2018
Students should not be expected to be in an active research mode (e.g. performing laboratory experimentation, running computer simulations, consulting archival material, conducting interviews, etc.) after this date, but should concentrate on the preparation of the final thesis/project submission.

FULL DRAFT OF THESIS
Weight of Final Mark: 10%
Due: Friday, March 2nd, 2018, 4:30 pm.
A draft of the written thesis should be given to the supervisor for grading, and for suggestions of improvements, either stylistic or in substance, to be made. The draft should be submitted in the format desired by the supervisor (e.g. Word document, PDF, print, etc.). The marking sheet will be signed by the student and returned to the Course Coordinator. Pass your draft to your supervisor.
Marks & Comments due: Friday, March 16th, 2018
PLEASE NOTE: By exception marks are due two weeks after submission of the draft to give students enough time to make the necessary changes before submission of the final version.

WRITTEN THESIS
Weight of the Final Mark: 50%
Due: Thursday, April 5th, 2018, 4:30 pm.
Printed copy of the final thesis will be submitted to the supervisor for grading. An electronic copy (PDF format) will be submitted to the appropriate Course Administrators. No extensions will be granted without penalty unless there is a compassionate or medical reason. Permission for an extension must be sought in writing by the supervisor from the Course Coordinator. The marking sheet will be signed by the student and returned to the Course Coordinator.
Pass your final thesis to your supervisor, and an electronic version (PDF) version to Dr. Janok Bhattacharya for files (bhattaj@mcmaster.ca). Submitted theses must be named using the following convention:

Last Name_First name.pdf

For example: Newbold_Bruce.pdf

Marks & comments due: NO LATER than noon (12:00 p.m.), Friday, April 20th, 2018

PAPER PRESENTATION
Weight of Final Mark: 15%
During the Geography and Earth Sciences Undergraduate Symposium (Research Day)
Tentative date: Tuesday, April 10th, 2018
The student will prepare a 10-12 minute presentation for Research Day, graded by their supervisor. Students should be prepared to answer questions from the audience. The grade for this presentation will reflect how well the student prepared and communicated the results, as well as their ability to handle questions. Grades for this component will given to the Course Coordinator at the end of the Symposium.

We will ask for presentation tiles and abstracts to be submitted in advance of Research Day (Due Date TBA). Failure to hand in your abstract will result in late penalty assessed at 2% per day to a maximum of 10% of your final grade.

SUBMISSION OF FINAL GRADES
Due: Friday, April 20th, 2018
The Course Coordinators will be responsible to compile the marks accumulated by all students registered in the course, and to submit the grade sheet.
## SUMMARY OF ACTIVITIES EARTH SC/GEOG 4MT6 – 2016-2017

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<th>Component</th>
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<td>Organizational Meeting</td>
<td>Sept. 8th, 2017 @ 8:30 pm</td>
<td>N/A</td>
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<tr>
<td>Initial meeting with supervisor</td>
<td>By Sept. 29th, 2017</td>
<td>N/A</td>
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<tr>
<td>Research Proposal</td>
<td>Oct. 6th, 2017 @ 4:30 p.m.</td>
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<td>Literature Review</td>
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<td>End of Active Research</td>
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<td>Draft Thesis</td>
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<td>Paper Presentation</td>
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<td>Submission of Final Grades (by coordinator)</td>
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_Last Revised: Sept. 6, 2017_