FSCI 398 D1/D2 – Research Project in Science Teaching and Learning 3
Syllabus - Fall 2020

Course Coordinator

Prof. Tamara Western - tamara.western@mcgill.ca
Department of Biology (Stewart Biology Rm. N8/2) & Office of Science Education

Course Description

FSCI 398 broadens the scope of currently available research project courses offered to undergraduate Science students. Its overall aims are to:

1. Expose undergraduate students to pedagogical research, educational assessment, and resource design in university-level science education settings
2. Hone skills in formal writing and oral communication

This course is designed to introduce undergraduate Science students to pedagogical research, educational assessment, and/or resource design in university-level science education. Examples of research topics include assessment of course activity effectiveness, research into topic-related misconceptions, research into and application of innovative teaching and learning strategies. This course contains a significant research and/or design component that requires substantial supervised work by the student. Students will be co-supervised by the Coordinator, who will provide advice and access to pedagogical resources, and a Professor teaching in a Faculty of Science course (Supervisor), who will participate in formulating the research proposal, provide context and background information. The Coordinator and Supervisor will both evaluate the student based on a research proposal, a research journal, written final report, overall research performance, and an oral presentation.

Course Format

FSCI 398 D1/D2 is a 6 credit independent research course. The expected workload is ~120 hours of research activities per term for the Fall and Winter terms (~9 hours of research activities per week for 13 weeks, or equivalent – per term).

Students must commit to:
1. Attendance at FSCI 398 cohort meetings, including pedagogy workshops (weekly for first 4 weeks, biweekly for the rest of the term);
2. Weekly meetings with the project Supervisor(s);
3. Research into and summarization of pedagogical literature relevant to their project topic;

4. Keeping a Research Journal with their research activities, notes, ideas, and reflections on their research progress and process;
5. Writing and submission of a Project Background and Proposal Paper, including summary of relevant pedagogical background;
6. Data collection and analysis relevant to your project and/or research, planning and design of new educational or outreach activities or modules;
7. Writing and submission of an Interim Report at the end of the Fall term;
8. Writing and submission of Final Research Paper (First Draft + Final Draft);
9. Oral Presentations of their research proposal and results to the cohort.

Supervisors must commit to:
1. A pre-course meeting with the Course Coordinator to discuss their proposed project and to select three relevant starter readings for their Project Student;
2. Weekly planning/progress meetings with their Project Student throughout the term;
3. Attendance at and participation in the activities of at least the FSCI 396 cohort meetings where students are presenting their proposals and final reports;
4. Providing timely and constructive feedback to their Project Student on their Research Proposal, Research Results and Draft Final Report;
5. Timely evaluation (grading) of their Project Student's Oral Report, Final Report and Overall Research Performance as per the course rubrics.

STUDENT EVALUATION

The Supervisor and Coordinator will have regular meetings with students in the course and will evaluate the student based on:

Research background and proposal	15%	(Coordinator only)
Research journal	5%	(Supervisor + Coordinator)
Progress report	10%	(Coordinator only)
Overall research activities performance	20%	(Supervisor)
Oral presentation	10%	(Supervisor + Coordinator)
Written report	40%	(Supervisor + Coordinator)

Research Background & Proposal

The research background and proposal is worth 15% of the overall grade and will require two submissions:
1. A preliminary document due at the end of the 3rd week of the course consisting of two parts:
   a. An annotated list of at least 6 initial references drawn from the pedagogical literature, where a brief note as to the relevance of each reference to the project follows each full citation.
   b. A one page draft statement of their research question, goals and approach.

The preliminary background/proposal will be reviewed by the coordinator and returned with feedback to inform the writing of the full document.

2. A full research background and proposal due at the end of the 4th week of classes. It will be composed of four parts:
   a. A background section introducing the pedagogical context and a summary of relevant pedagogical literature (5 pages).
   b. An overview of the research question and goals (1 page).
   c. An overview of the proposed approach/methodology (1-2 pages).
   d. A reference list with full citations (including at least 6 papers from the pedagogical literature).

The research background and proposal will be evaluated by the Coordinator not only for a clear and logical presentation of the project background, proposed work, and methodology, but also for the project scope (can it be plausibly completed in one semester), merit (is the project sufficiently interesting/open that it counts as research), and topicality (does the project involve a substantial amount of teaching and learning-related research to lead to deeper student learning, understanding or engagement - e.g. assessment of course activity effectiveness, research into topic-related misconceptions, research into and application of innovative teaching and learning strategies).

Research Journal

The Research Journal is worth 5% of the course grade and will act in lieu of the laboratory or field notebook kept by students doing scientific research. In it students will record their research activities, notes from meetings/class discussions, questions to follow-up or discuss, ideas, and reflections on their research progress and process. A OneNote Class Notebook has been set up that is accessible through the FSCI 396 MyCourses page and/or the McGill Office 365 portal. Students will have their own private notebook that will be shared with the Coordinator and Supervisor, and will be checked periodically to make sure that it is kept up-to-date.

Progress Report

The progress report is worth 10% of the course grade and will be due at the end of the Fall term. It should include: (a) updates/changes to the project goals and objectives, (b) updates/changes to the project methodology, and (c) a summary of the progress to date on achieving the project goals including preliminary data. The Coordinator will evaluate the progress report.

Overall Research Activities Performance

The overall research activities performance is worth 20% of the final course grade (10% at the end of the Fall term and 10% at the end of the Winter term). These will be judged through the student's

updates, discussions and progress throughout the term as apparent through their personal interactions/weekly meetings with their Supervisor(s), and through student's Research Journal entries. The Supervisor(s) will evaluate the overall performance of the student using metrics that reflect an understanding the project, motivation and enthusiasm, commitment, curiosity, industry to work, technical ability and problem solving, organization and precision, judgment and common sense, and interpersonal communication and interactions.

Oral Presentation

The Supervisor and Coordinator will evaluate a 15-minute oral presentation, worth 10% of the overall grade, made by the student. The oral presentation will represent a summary of the research project, and its structure will be determined with guidance from the Supervisor. The oral presentation will be held in in the context of a FSCI 398 cohort meeting.

Final Written Report

The final written report is worth 40% of the course grade. The body of the paper will be approximately 20 double-spaced pages (see formatting instructions for details). A first full draft of the report will be due on the last day of classes (or at an otherwise agreed-upon date), and will be returned to the student with feedback to aid the writing of the final version of the report for grading. The Supervisor and Coordinator will evaluate the final report for overall organization, clarity of presentation, presentation of research question, data analysis or resource design, clarity of tables and figures, discussion of research findings or resource design, and proposed future research directions.
A copy of the research report along with the Supervisor's and Coordinator's grade will be sent to student and the Office of Science Education, by the end of the examination period.

RESOURCES

FSCI 398 has a MyCourses page on which students can find course information. The Coordinator and Supervisors may also use it to post Course Announcements and Resources (e.g. relevant articles, resource summaries, guidelines, and grading rubrics). The Assignments tool will be used for student submission of their Proposal, Presentation Slides and their Research Paper (First draft + Final paper).

A OneNote Class Notebook has been set up that will be accessible through the FSCI 398 MyCourses page and/or the McGill Office 365 portal. Students will have their own private notebook that will be shared with the Coordinator that will be used for their Research Journal.

SCHEDULE

The weekly day/time for class Cohort Meetings will be established at the start of term. They will be 90 minutes long and held every week for Weeks 1-4, and every other week for the rest of the Fall term.

Date/Deadline	Meeting or Task
Fall Term	
Week 1	Cohort meeting #1 – Introduction to Pedagogy & Active Learning (lecture/workshop TBC)
Week 2	Cohort meeting #2 – Research Techniques Tips; Discussion of Cohort Reading #1
Week 3	Cohort meeting #3 – Discussion of Cohort Readings #2 & 3 Research Question-Main Approach (1 page) + Annotated Bibliography (at least 6 references) due Fri
Week 4	Cohort meeting #4 – Students give 10min introductions to their projects and proposals
Week 5	Cohort co-working time/Coordinator office hours Research Background and Proposal due Mon
Week 6	Cohort meeting #5 – Student status (10 min each); Discussion of Cohort Reading TBA
Week 7	Cohort co-working time/Coordinator office hours
Week 8	Cohort meeting #6 – Student status (10 min each); Discussion of Cohort Reading TBA
Week 9	Cohort co-working time/Coordinator office hours
Week 10	Cohort meeting #7 – Student status (10 min each); Discussion of Cohort Reading TBA
Week 11	Cohort co-working time/Coordinator office hours
Week 12	Cohort co-working time/Coordinator office hours
Week 13	Cohort meeting #8 – Attend FSCI 396/397 Student Oral presentations
	Progress Reports due at end of term.

Date/Deadline	Meeting or Task
Winter Term	
Week 1	Coordinator office hours/student meetings
Week 2	Cohort meeting #1 – Student status/plans for term (10 min each);
Week 3	Cohort co-working time/Coordinator office hours
Week 4	Cohort meeting #2 – Student status (10 min each); Discussion of Cohort Reading TBA
Week 5	Cohort co-working time/Coordinator office hours
Week 6	Cohort meeting #3 – Student status (10 min each); Discussion of Cohort Reading TBA
Week 7	Cohort co-working time/Coordinator office hours

Week 8	Cohort meeting #4 – Student status (10 min each); Discussion of Cohort Reading TBA
Week 9	Cohort co-working time/Coordinator office hours
Week 10	Cohort meeting #5 – Student status (10 min each); Discussion of Cohort Reading TBA
Week 11	Cohort co-working time/Coordinator office hours
Week 12	Cohort co-working time/Coordinator office hours
Week 13	Cohort meeting #6 – Student Oral presentations Draft Reports due last day of classes
	Final Reports due two weeks later.

REQUIRED ACADEMIC STATEMENTS

By the direction of Senate (January 29, 2003), all course outlines must include the following statement: McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/integrity for more information).

In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French, any written work that is to be graded." (approved by Senate on 21 January 2009 - see also the section in this document on assignments and evaluation).