FSCI 396 & FSCI 397 – RESEARCH PROJECT IN SCIENCE TEACHING AND LEARNING 1/2
SYLLABUS - WINTER 2020

COURSE COORDINATOR

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COURSE DESCRIPTION

FSCI 396 & 397 broaden the scope of currently available research project courses offered to undergraduate Science students. Their 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 pair of courses 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. These courses contain 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 396 and FSCI 397 are 3 credit independent research courses. The expected workload is ~120 hours of research activities over the term (~9 hours of research activities per week for 13 weeks, or equivalent).

Students must commit to:
1. Attendance at FSCI 396/FSCI 397 joint 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 Final Research Paper (First Draft + Final Draft);
8. 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/FSCI 397 joint 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:

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<tr>
<th>Component</th>
<th>Percentage</th>
<th>Responsible Party</th>
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<tbody>
<tr>
<td>Research background and proposal</td>
<td>15%</td>
<td>Coordinator only</td>
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<tr>
<td>Research journal</td>
<td>5%</td>
<td>Supervisor + Coordinator</td>
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<tr>
<td>Overall research activities performance</td>
<td>20%</td>
<td>Supervisor</td>
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<tr>
<td>Oral presentation</td>
<td>10%</td>
<td>Supervisor + Coordinator</td>
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<tr>
<td>Written report</td>
<td>50%</td>
<td>Supervisor + Coordinator</td>
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**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/FSCI 397 MyCourses pages 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.

**Overall Research Activities Performance**

The overall research activities performance is worth 20% of the final course grade. 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 396/FSCI 397 joint cohort meeting.

Written Report

The written report is worth 50% 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 396 and FSCI 397 have MyCourses pages 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 396/FSCI 397 MyCourses pages 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**

Winter 2020 classes run from Mon January 6 through Tues April 4. 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 term.

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<tr>
<th>Date/Deadline</th>
<th>Meeting or Task</th>
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<tr>
<td>Week 0 (Jan 6-10)</td>
<td>Students meet with Supervisors to discuss project &amp; establish their 3 starter readings</td>
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<tr>
<td>Week 1 (Jan 13-17)</td>
<td>Cohort meeting #1 – Introduction to Pedagogy (workshop TBC)</td>
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<td>Week 2 (Jan 20-24)</td>
<td>Cohort meeting #2 – Literature Research Techniques (workshop TBC); Discussion of Cohort Reading #1</td>
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<td>Week 3 (Jan 27-31)</td>
<td>Cohort meeting #3 – Active Learning (workshop TBC) – Includes Discussion of Cohort Readings #2-4 Research Question-Main Approach (1 page) + Annotated Bibliography (at least 6 references) due Fri Jan 31</td>
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<td>Week 4 (Feb 3-7)</td>
<td>Cohort meeting #4 – Qualitative Content Analysis (workshop TBC) Research Background and Proposal due Mon Feb 10</td>
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<td>Week 5 (Feb 10-14)</td>
<td>Cohort co-working time/Coordinator office hours</td>
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<td>Week 6 (Feb 17-21)</td>
<td>Cohort meeting #5 – Student status (10 min each); Discussion of Cohort Reading #5</td>
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<td>Week 7 (Feb 24-28)</td>
<td>Cohort co-working time/Coordinator office hours</td>
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<td>Week 8 (Mar 2-6)</td>
<td>(Reading Week)</td>
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<td>Week 9 (Mar 9-13)</td>
<td>Cohort meeting #6 – Student status (10 min each); Discussion of Cohort Readings proposed by students</td>
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<td>Week 10 (Mar 16-20)</td>
<td>Cohort co-working time/Coordinator office hours</td>
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<td>Week 11 (Mar 23-27)</td>
<td>Cohort meeting #7 – Student status (10 min each); Discussion of Cohort Readings proposed by students</td>
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<td>Week 12 (Mar 30-Apr 3)</td>
<td>Cohort co-working time/Coordinator office hours</td>
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<td>Week 13 (Apr 6-9)</td>
<td>Cohort meeting #8 – Student Oral presentations Draft Reports due Thurs April 9</td>
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<td>Final Reports due Mon April 27</td>
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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).