MECH ENG 4X04

INDEPENDENT RESEARCH PROJECT

updated 11-June-2017

COURSE DESCRIPTION:

Individual research project over two terms to be arranged by mutual consent of a professor and the student with approval of the Department Associate Chair (Undergraduate).

PREREQUISITES:

A minimum GPA of 9.5; and registration in Level IV Mechanical Engineering or Level V Mechanical Engineering and Management or Mechanical Engineering and Society.

SUPERVISION:

It is the student's responsibility to secure a supervisor for this course; if interested, please contact a professor for available projects. The project supervisor is responsible for the immediate direction and instruction of the student, and should commit a minimum of 30 minutes of contact time to each student per week, on average.

The supervisor will submit a project outline by the first week of September of the project year. The student must review the project description and agree to the project and the deliverables. The supervisor is responsible for ensuring the student completes required health & safety trainings (*e.g.,* WHMIS).

EVALUATION:		
	Oral progress report	15%
	Written progress report	15%
	Final oral defense	30%
	Final written report	30%
	Lab notebook	10%

ORAL PROGRESS REPORT:

Each student will deliver a 10-15 minute oral presentation on their research project at the end of the first semester, to be attended by all students enrolled in the course. The presentation will be evaluated by two other supervisors involved in the course.

WRITTEN PROGRESS REPORT:

Each student will submit a written progress report at the end of the first semester (recommendation ~10 pages), to be evaluated by the supervisor.

FINAL ORAL DEFENSE:

Each student will present their research project at the end of their second semester (15 minute presentation) followed by a defense (10 minutes), to be evaluated by two other supervisors involved in the course.

FINAL WRITTEN REPORT:

The student will prepare a final report documenting the research project undertaken, relevant literature, major findings, and analysis of the data and limitations (recommendation 15-20 pages). This will be delivered to the research supervisor by the end of the second semester for evaluation.

LAB NOTEBOOK:
Students are expected to maintain a lab notebook, documenting regular meetings with the project supervisor and all work conducted on the project. It should be held to engineering standards for notebook records, and will be submitted to the project supervisor along with the final report.

LEARNING OUTCOMES:

Upon successful completion of the project, the student will be expected to have demonstrated the ability to:

1. Critically review and briefly summarize the existing scientific literature on the topic.
2. Identify a research question including formulating a testable hypothesis / hypotheses if applicable.
3. Design a research approach including identifying appropriate tools / techniques and/or apparatus
4. Recognize assumptions and identify uncertainty in research methods
5. Obtain a substantiated conclusion based on the results and recognizing limitations of the methods
6. Effectively communicate results in a written scientific report and in an oral defense.

MAPPING TO GRADUATE ATTRIBUTES:

Graduate Attribute		***Learning Outcomes***
A02 Problem Analysis		
2.01	Demonstrates an ability to identify reasonable assumptions (including identification of uncertainties and imprecise information) that could or should be made before a solution path is proposed.	2,3,4
2.02	Demonstrates an ability to identify a range of suitable engineering fundamentals (including mathematical techniques) that would be potentially useful for analyzing a technical problem.	3,4
A03 Investigation		
3.01	Recognizes and discusses applicable theory knowledge base.	1,6
3.02	Selects appropriate model and methods and identifies assumptions and constraints.	2,3,4
3.03	Estimates outcomes, uncertainties and determines appropriate data to collect.	3,4
A05 Use of Engineering Tools		
5.01	Evaluates and selects appropriate modern tools.	3
5.03	Creates, adapts, modifies and extends tools/techniques as appropriate to solve problems.	3,4
A07 Communication Skills		
7.01	Demonstrates an ability to respond to technical and non-technical instructions and questions.	1-6
7.02	Presents instructions and information clearly and concisely as appropriate to the audience	6
7.03	Constructs effective oral or written arguments as appropriate to the circumstances	6
A12 Life-long Learning		
12.01	Critically evaluates and applies knowledge, methods and skills procured through self directed and self identified sources, including those that lie outside the nominal course curriculum.	1,6

MCMASTER POLICY REMINDERS:

The Faculty of Engineering is concerned with ensuring an environment that is free of all adverse discrimination. If there is a problem, that cannot be resolved by discussion among the persons involved, individuals are reminded that they should contact the Department Chair, the Sexual Harassment Office or the Human Rights Consultant, as soon as possible.

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and 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 kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at http://www.mcmaster.ca/senate/academic/ac_integrity.htm

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.

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.