

**MECH ENG 4X04**  
**INDEPENDENT RESEARCH PROJECT**  
updated 01 September 2021

**COURSE DESCRIPTION:**

Individual research project over two terms to be arranged by mutual consent of a faculty supervisor 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 & student together will submit a project outline by September 18<sup>th</sup>. 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).

<b>EVALUATION:</b>	Oral progress report	10%
	Written progress report	15%
	Final oral defense	20%
	Final written report	40%
	Research grade	15%

**ORAL PROGRESS REPORT:**

Each student will deliver a 10 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 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 (10 minute presentation) followed by questions (5 minutes), to be evaluated by 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.

**RESEARCH GRADE:**

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. The project supervisor will assign a grade out of 15 on the research skills and involvement of the student.

**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:**

<i>Graduate Attribute</i>		<i>Learning Outcomes</i>
<b>A02 Problem Analysis</b>		
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
<b>A03 Investigation</b>		
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
<b>A05 Use of Engineering Tools</b>		
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
<b>A07 Communication Skills</b>		
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
<b>A12 Life-long Learning</b>		
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

## **MCMMASTER 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](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.

## **EQUITY, DIVERSITY, AND INCLUSION**

Every registered student belongs in this course. Diversity of backgrounds and experiences is expected and welcome. You can expect your Instructor to be respectful of this diversity in all aspects of the course, and the same is expected of you.

The Department of Engineering Physics is committed to creating an environment in which students of all genders, cultures, ethnicities, races, sexual orientations, abilities, and socioeconomic backgrounds have equal access to education and are welcomed and treated fairly. If you have any concerns regarding inclusion in our Department, in particular if you or one of your peers is experiencing harassment or discrimination, you are encouraged to contact the Chair, Associate Undergraduate Chair, Academic Advisor or to contact the [Equity and Inclusion Office](#).

## **PHYSICAL AND MENTAL HEALTH**

For a list of McMaster University's resources, please refer to the [Student Wellness Centre](#).

## COURSE OUTLINE – APPROVED ADVISORY STATEMENTS

### ACADEMIC INTEGRITY

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. **It is your responsibility to understand what constitutes academic dishonesty.**

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. For information on the various types of academic dishonesty please refer to the [Academic Integrity Policy](https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/), located at <https://secretariat.mcmaster.ca/university-policies-procedures-guidelines/>

The following illustrates only three forms of academic dishonesty:

- plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
- improper collaboration in group work.
- copying or using unauthorized aids in tests and examinations.

### AUTHENTICITY / PLAGIARISM DETECTION

*Some courses may* use a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. For courses using such software, students will be expected to submit their work electronically either directly to Turnitin.com or via an online learning platform (e.g. A2L, etc.) using plagiarism detection (a service supported by Turnitin.com) so it can be checked for academic dishonesty.

Students who do not wish their work to be submitted through the plagiarism detection software must inform the Instructor before the assignment is due. No penalty will be assigned to a student who does not submit work to the plagiarism detection software. **All submitted work is subject to normal verification that standards of academic integrity have been upheld** (e.g., on-line search, other software, etc.). For more details about McMaster's use of Turnitin.com please go to [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

### COURSES WITH AN ON-LINE ELEMENT

*Some courses may* use on-line elements (e.g. e-mail, Avenue to Learn (A2L), LearnLink, web pages, capa, Moodle, ThinkingCap, etc.). Students should be aware that, when they access the electronic components of a course using these elements, 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 a course that uses on-line elements will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.

### ONLINE PROCTORING

*Some courses may* use online proctoring software for tests and exams. This software may require students to turn on their video camera, present identification, monitor and record their computer activities, and/or lock/restrict their browser or other applications/software during tests or exams. This software may be required to be installed before the test/exam begins.

## **CONDUCT EXPECTATIONS**

As a McMaster student, you have the right to experience, and the responsibility to demonstrate, respectful and dignified interactions within all of our living, learning and working communities. These expectations are described in the [Code of Student Rights & Responsibilities](#) (the "Code"). All students share the responsibility of maintaining a positive environment for the academic and personal growth of all McMaster community members, **whether in person or online**.

It is essential that students be mindful of their interactions online, as the Code remains in effect in virtual learning environments. The Code applies to any interactions that adversely affect, disrupt, or interfere with reasonable participation in University activities. Student disruptions or behaviours that interfere with university functions on online platforms (e.g. use of Avenue 2 Learn, WebEx or Zoom for delivery), will be taken very seriously and will be investigated. Outcomes may include restriction or removal of the involved students' access to these platforms.

## **ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES**

Students with disabilities who require academic accommodation must contact [Student Accessibility Services](#) (SAS) at 905-525-9140 ext. 28652 or [sas@mcmaster.ca](mailto:sas@mcmaster.ca) to make arrangements with a Program Coordinator. For further information, consult McMaster University's [Academic Accommodation of Students with Disabilities](#) policy.

## **REQUESTS FOR RELIEF FOR MISSED ACADEMIC TERM WORK**

[McMaster Student Absence Form \(MSAF\)](#): 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".

## **ACADEMIC ACCOMMODATION FOR RELIGIOUS, INDIGENOUS OR SPIRITUAL OBSERVANCES (RISO)**

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the [RISO](#) policy. Students should submit their request to their Faculty Office **normally within 10 working days** of the beginning of term in which they anticipate a need for accommodation or to the Registrar's Office prior to their examinations. Students should also contact their instructors as soon as possible to make alternative arrangements for classes, assignments, and tests.

## **COPYRIGHT AND RECORDING**

Students are advised that lectures, demonstrations, performances, and any other course material provided by an instructor include copyright protected works. The Copyright Act and copyright law protect every original literary, dramatic, musical and artistic work, **including lectures** by University instructors

The recording of lectures, tutorials, or other methods of instruction may occur during a course. Recording may be done by either the instructor for the purpose of authorized distribution, or by a student for the purpose of personal study. Students should be aware that their voice and/or image may be recorded by others during the class. Please speak with the instructor if this is a concern for you.

## **EXTREME CIRCUMSTANCES**

The University reserves the right to change the dates and deadlines for any or all courses in extreme circumstances (e.g., severe weather, labour disruptions, etc.). Changes will be communicated through regular McMaster communication channels, such as McMaster Daily News, A2L and/or McMaster email.

# STUDENT SUPPORTS

## WELLNESS

### Student Wellness Centre

On-Campus Support for Medical and Mental Health Concerns. Doctors and Counsellors available. Located in PGCL, 2nd Floor.

**Mon-Fri 9AM-5PM 905-525-9140 ext. 27700**  
<https://wellness.mcmaster.ca/contact-us/>

### Main St. West Urgent Care Centre

For immediate health concerns that do not require the emergency room.

**690 Main St W - Mon-Sun 9AM-9PM**

### Emergency Rooms

For **immediate, serious** health concerns.

**St. Joseph's Healthcare Hamilton**  
50 Charlton Ave E

**McMaster Children's Hospital**  
Students 17 and under

### Telehealth Ontario

Telehealth Ontario is a free, confidential service you can call to get health advice or information. A Registered Nurse will take your call 24 hours a day, seven days a week.

**Toll-free: 1-866-797-0000 Toll-free TTY: 1-866-797-0007**

### Phone Lines

#### Good2Talk

Confidential helpline providing professional counselling, info and referrals for mental health, addiction, and well-being

**1-866-925-5454**

#### LGBT Youthline

Confidential, non-judgemental & informed LGBTQQ2SI peer support.

**Sun-Fri, 4-9:30 PM, Text 647-694-4275**

#### SACHA (SEXUAL ASSAULT CENTRE - HAMILTON AREA)

Confidential, anonymous 24-hour nonjudgmental telephone support for adults who have experienced sexual violence at any point in their lives; will provide accompaniment to hospital or police station for survivors wishing to seek medical attention or report; counselling services & public education

**905-525-4162**

#### Empower Me (Graduate Students)

24/7 accessible counselling services to empower you to thrive, crisis support, mental health and well-being services.

**1-844-741-6389**

#### Bounceback

CBT skills-building for mild to moderate depression and anxiety for people 15 or older. If accessed through self-referral, the client's primary care provider will be notified.

**1-866-345-0224**

## INDIGENOUS STUDENTS

### Indigenous Student Services

Academic & social counselling, employment aid  
LRW 1010

**ext. 23788**

**indigenous.admin@mcmaster.ca**  
**indigenous.mcmaster.ca**

## INTERNATIONAL STUDENTS

### International Student Services

Advising services for international students and exchange students  
GH 104

**ext. 24254**

**iss@mcmaster.ca**  
**iss.mcmaster.ca**

# STUDENT SUPPORTS

## ACADEMIC

### Student Success Centre

Academic skills assistance, job search, volunteering  
GH 110  
ext. 24254  
[studentsuccess@mcmaster.ca](mailto:studentsuccess@mcmaster.ca)

### Student Accessibility Services

Disability services, assistive technology support  
MUSC B107  
ext. 28652  
[sas@mcmaster.ca](mailto:sas@mcmaster.ca)

### TutorOcean

Student to Student Tutoring Services  
<https://mcmaster.tutorocean.com/>

## FINANCIAL

### Office of Student Financial aid and Scholarships

Emergency funding, government funds, OSAP assistance, scholarships, work programs  
GH 120  
ext. 24319  
<https://registrar.mcmaster.ca/aid-awards/>

## FOOD

### Food Collective Centre (FKA Mac Bread Bin)

The Food Collective Centre is a service run by students dedicated to cultivating stronger food systems in the McMaster and surrounding community. (MSU Service)  
[macbreadbin@msu.mcmaster.ca](mailto:macbreadbin@msu.mcmaster.ca)  
<https://www.msumcmaster.ca/services-directory/14-food-collective-centre>

### Neighbour 2 Neighbour

Food bank, community kitchen, community counselling, help with paying for utilities, and more. Hamilton Mountain.  
905-574-1334 <http://www.n2ncentre.com/>

## CRISIS SUPPORT

### Barrett Centre for Crisis Support

Provides a safe environment in the community and responds to the needs of individuals, 16 years of age or older, who experience a mental health crisis and do not require a hospital stay. Confidential and free services 24/7/365  
24 Hour Crisis Line: 905-529-7878, Toll Free: 1-844-777-3571

### COAST (Crisis Outreach and Support Team)

Hamilton's crisis line is answered 24 hours a day, 7 days a week. The COAST mobile team, consisting of a mental health worker, and a police officer, will respond to crisis calls between the hours of 8 a.m. and 1 a.m. daily.  
905-972-8338

### Oakville Distress Centre

Distress Centre Halton provides telephone and online support to people to better cope with crisis, loneliness, and emotional stress. Also serves the Hamilton area.  
905-849-4541

### Assaulted Women's Helpline

Free, anonymous and confidential telephone and TTY crisis telephone line to all women in the province of Ontario who have experienced any form of abuse. Provides crisis counselling, safety planning, emotional support, information and referrals accessible 24/7/365.  
Toll-free: 1-866-863-0511 TTY: 1-866-863-7868

### Crisis Resources in the GTA

The CAMH Distress Crisis Resources web page lists a number of phone lines, response teams and hospitals in the GTA.  
<https://www.camh.ca/en/health-info/crisis-resources>

# STUDENT SUPPORTS

## OTHER

### **Student Assistance Plan (Undergraduate)**

Psychological counseling (offered in-person, over the phone, or over secure video) and academic-life services (legal consultation, financial consultation, life coaching, nutrition consultation and wellness resources offered virtually or in-person)

<https://www.msumcmaster.ca/services-directory/36-health-and-dental-insurance/student-assistance-plan>

### **Ombuds Office**

Advice for students, staff, and faculty regarding academic and non-academic concerns.

MUSC 210

ext. 24151

[ombuds@mcmaster.ca](mailto:ombuds@mcmaster.ca)

[mcmaster.ca/ombuds](http://mcmaster.ca/ombuds)

### **SWHAT - Walk Safe Program**

The Student Walk Home Attendant Team (SWHAT) is a volunteer service within the McMaster Students Union that will walk or bus with students during the evening hours 7 days a week, in all kinds of weather! (MSU Service)

Ext. 27500

[swhat@msu.mcmaster.ca](mailto:swhat@msu.mcmaster.ca)

### **Student Support and Case Management**

Student rights & responsibilities

GH 207

ext. 23845

[studentconduct.mcmaster.ca](http://studentconduct.mcmaster.ca)

### **Chaplaincy Centre**

Pastoral support with personal counselling and bereavement support groups.

MUSC 231

ext. 24207

### **McMaster Engineering Society**

Support from other McMaster Engineering Students

<https://www.macengsociety.ca/>

## **MSU PEER SUPPORT SERVICES**

### **MSU Maccess**

Maccess is a service that aims to build and maintain a campus that celebrates, advocates, and ensures inclusivity in the area of disability. A central aspect to Maccess is the provision of peer support by trained volunteers with lived experiences with disability such as chronic illness, mental illness, mental health concerns, neurodivergence, and additional identities.

### **Student Health Education Centre**

SHEC is a peer-run health promotion, education, and referral service for McMaster University students. SHEC focuses on engaging with students about health-related issues through performances, peer support, fundraisers, and events. The service offers peer support, anonymous and confidential pregnancy testing, a resource library, condoms, lubricant, and menstrual products. SHEC's space is located in MUSC 202.

### **Women + Gender Equity Network**

WGEN is a service that caters to women, transfolk, people who identify outside the gender binary, and all survivors of sexual assault. WGEN provides a safe(r) space and resource library on campus in MUSC 204. Volunteers in the space offer peer support and the service also runs a support group for survivors of domestic and intimate partner violence.

### **Pride Community Centre**

The Pride Community Centre is a service of the McMaster Students Union. We provide a contact point for McMaster students that may identify as gay, lesbian, bisexual, transgender, queer, and/or any of the other diverse identities that make up our community. We offer educational programming and access to resources of interest, as well as peer support and a physical space for students to meet and socialize with each other. As advocates for gender & sexual diversity, the PCC's mandate upholds that LGBTQ+ students are entitled to a safe and supportive campus, absent of homophobia and transphobia, where the expression of one's gender & sexual identity is welcomed and respected.