

ELEC ENG 4BI6
Biomedical Engineering Design

COURSE OUTLINE

Please refer to course website for updated information.

COURSE DESCRIPTION

The design process; safety; a term project composed of small teams of students including an oral presentation and written report.

PRE-REQUISITES AND ANTI-REQUISITES

Prerequisite(s): Registration in Level IV of the Electrical and Biomedical Engineering program
Antirequisite(s): COMPENG 4OI4, 4OI5, ELECENG 4BI4, 4BI5, 4OI4, 4OI5, 4OI6, ENGINEER 4M06 A/B

SCHEDULE

Lectures: Monday, Wednesday, Thursdays 10:30 am – 11:20, in T13 107

Tutorials: Wednesday 1:30 – 2:20pm and Fridays 12:30 - 1:20pm in T13 106

Labs: Every Week: L01 Thursday 2:30 pm- 5:20 pm; L02 Friday 2:30 pm - 5:20 pm in ITB 153

INSTRUCTOR

Dr. Hubert de Bruin

Email: debruin@mcmaster.ca

Office: ITB-A211

Phone: 905-525—9140 ext. 24171

Office Hours: Team meetings to be determined

TEACHING ASSISTANTS

Jimmy Nguyen

Brian McCrindle

See course website for contact information.

TAs will be in labs during the week from 2:30 to 5:30 in ITB-153 or by appointment.

COURSE WEBSITE

Avenue to Learn <http://avenue.mcmaster.ca>

COURSE OBJECTIVES

By the end of this course, students should be able to:

- Formulate an engineering problem in a precise manner understanding approximations and risks.
- Be able to select and apply appropriate materials and supplies to tackle design problem.
- Independently acquire knowledge from a variety of sources.
- Work in a group in an effective and efficient manner.
- Manage time effectively to achieve project goals.
- Clearly communicate engineering design work in both written and oral formats.
- Understand and articulate the impact of their work on society and stakeholders.

ASSUMED KNOWLEDGE

This course applies all acquired knowledge from the program.

COURSE MATERIALS

Required Texts: None.

COURSE TIMELINE

Date/Week	Topic	Readings
Mid-Sept	Form groups of four and submit the names of project partners via Avenue to Learn. Students that do not have a group by September 18 will be divided into groups.	
Mid-Oct	<i>Project Proposal Report</i> - Each group must prepare a complete description of their proposed project. Details of the proposal format will be in the course documents. Proposal submission is through Avenue to Learn. The proposal will be discussed with the instructor during the next team meeting	
Late November	<i>Project presentation to the class</i> – Each group will present their proposal and progress to the class. Times to be determined	
Mid December	<i>Progress report</i> - A short project report will be required of each group. It is expected that each group will have at least one third of its project's deliverables ready at this stage. Report submission is through Avenue to Learn. Details about the report format will be announced later.	
Late March	<i>Progress presentation</i> - Each group must make a presentation to the class describing their progress. Presentation times will be announced on Avenue to Learn.	

Early April	<i>ECE Expo</i> – Students must prepare and present a poster outlining their design and present it to their peers and the community at large. Full or partial demonstration of project operation is encouraged to aid presentation. Individual marks will be assigned to each group member. Final report should be submitted.	
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LABORATORY OVERVIEW

Not applicable.

LABORATORY OPERATION

The laboratory for this course is in ITB-153. Students will be granted permission to enter room via access cards. No food or drink permitted in lab. Please keep lab clean. TAs will be in labs during the week to provide technical guidance on projects. Soldering is not permitted in ITB-153. Please refer to appropriate safety training at: http://www.ece.mcmaster.ca/ug_cours/Lab_Safety_2015.html

ASSESSMENT

Component	Weight
Project Proposal (report)	20%
Progress presentation, report and self-evaluation	20%
Second progress presentation	10%
Final Project (report, presentation, poster, ECE Expo, peer evaluation)	50%
Total	100%

All projects must be done in groups of 4 students. Instructor's approval is required for groups with a smaller or larger number of students. Marks are assigned individually and not on a group basis. A satisfactory final report must be submitted, else a grade of "F" in the course will be assigned.

ACCREDITATION LEARNING OUTCOMES

Note: The *Learning Outcomes* defined in this section are measured throughout the course and form part of the Department's continuous improvement process. They are a key component of the accreditation process for the program and will not be taken into consideration in determining a student's actual grade in the course. For more information on accreditation, please ask your instructor or visit: <http://www.engineerscanada.ca> .

Outcomes	Indicators	Measurement Methods(s)
Includes appropriate health and safety considerations.	4.5	Proposal and Progress Reports
Determines and employs applicable standards and codes of practice	4.6	Proposal and Progress Reports

Applies knowledge of law and principles of equity to ensure equitable treatment of others.	10.3	Biweekly meetings
Plans and effectively manages time, resources, and scope.	11.2	Biweekly meetings, proposal, progress report
Identifies, characterizes, assesses, and manages risks to project success.	11.4	Biweekly meetings, proposal, final report
Have a deep understanding of how their work impacts economic, environmental and societal aspects.	9.1	Proposal, final report
Manages time and processes effectively, prioritizing competing demands to achieve personal and team goals and objectives.	6.1	Biweekly meetings, progress report, proposal report
Develops and implements processes and methodologies to manage the effectiveness of a team both in terms of the quality of the work produced by the team as well as the inter-personal relationships within the team.	6.2	Biweekly meetings, proposal, progress report
Demonstrates an ability to respond to technical and non-technical instructions and questions	7.1	Biweekly meetings, presentations
Presents instructions and information clearly and concisely as appropriate to the audience	7.2	Biweekly meetings, presentations, reports
Constructs effective oral or written arguments as appropriate to the circumstances.	7.3	presentations, proposal, reports
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.	12.1	Proposal, final report
Shows an awareness of the wide range of engineering societies, literature, conferences, and other information sources	12.2	Proposal, final report
Demonstrates an ability to identify reasonable assumptions	2.1	Proposal, final report

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.

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 www.mcmaster.ca/academicintegrity .

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.

ACADEMIC ACCOMMODATIONS

Students with disabilities who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail

sas@mcmaster.ca . For further information, consult McMaster University's Academic Accommodation of Students with Disabilities policy.

Students requiring academic accommodation based on religious, indigenous or spiritual observances should follow the procedures set out in the RISO policy. Students requiring a RISO accommodation should submit their request to the Engineering Student Services 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.

STUDENT ABSENCE AND SUBMISSION OF REQUEST FOR RELIEF FOR MISSED ACADEMIC WORK

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".

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.

ONLINE ACCESS OR WORK

In this course we will be using web pages and 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 instructor.

REFERENCE TO RESEARCH ETHICS

The two principles underlying integrity in research in a university setting are these: a researcher must be honest in proposing, seeking support for, conducting, and reporting research; a researcher must respect the rights of others in these activities. Any departure from these principles will diminish the integrity of the research enterprise. This policy applies to all those conducting research at or under the aegis of McMaster University. It is incumbent upon all members of the university community to practice and to promote ethical behaviour. To see the Policy on Research Ethics at McMaster University, please go to <http://www.mcmaster.ca/policy/faculty/Conduct/ResearchEthicsPolicy.pdf>.

www.eng.mcmaster.ca/ece

Electrical and Computer Engineering Lab Safety

Information for Laboratory Safety and Important Contacts

This document is for users of ECE instructional laboratories in the Information Technology Building.

This document provides important information for the healthy and safe operation of ECE instructional laboratories. This document is required reading for all laboratory supervisors, instructors, researchers, staff, and students working in or managing instructional laboratories in ECE. It is expected that revisions and updates to this document will be done continually. A McMaster University lab manual is also available to read in every laboratory.

General Health and Safety Principles

Good laboratory practice requires that every laboratory worker and supervisor observe the following:

1. Food and beverages are not permitted in the instructional laboratories.

2. A Laboratory Information Sheet on each lab door identifying potential hazards and emergency contact names should be known.
3. Laboratory equipment should only be used for its designed purpose.
4. Proper and safe use of lab equipment should be known before using it.
5. The course TA leading the lab should be informed of any unsafe condition.
6. The location and correct use of all available safety equipment should be known.
7. Potential hazards and appropriate safety precautions should be determined, and sufficiency of existing safety equipment should be confirmed before beginning new operations.
8. Proper waste disposal procedures should be followed.

Location of Safety Equipment

Fire Extinguisher

On walls in halls outside of labs

First Aid Kit

ITB A111, or dial "88" after 4:30 p.m.

Telephone

On the wall of every lab near the door

Fire Alarm Pulls

Near all building exit doors on all floors

Who to Contact

Emergency Medical / Security: On McMaster University campus, call Security at extension **88** or **905-522-4135** from a cell phone.

Non-Emergency Accident or Incident: Immediately inform the TA on duty or Course Instructor.

University Security (Enquiries / Non-Emergency): Dial 24281 on a McMaster phone or dial 905-525-9140 ext. 24281 from a cell phone.

See TA or Instructor: For problems with heat, ventilation, fire extinguishers, or immediate repairs

Environmental & Occupational Health Support Services (EOHSS): For health and safety questions dial 24352 on a McMaster phone or dial 905-525-9140 ext. 24352 from a cell phone.

ECE Specific Instructional Laboratory Concerns: For non-emergency questions specific to the ECE laboratories, please contact 24103.

In Case of a Fire (Dial 88)

When calling to report a fire, give name, exact location, and building.

1. Immediately vacate the building via the nearest Exit Route. Do not use elevators!
2. Everyone is responsible for knowing the location of the nearest fire extinguisher, the fire alarm, and the nearest fire escape.
3. The safety of all people in the vicinity of a fire is of foremost importance. But do not endanger yourself!
4. In the event of a fire in your work area shout "*Fire!*" and pull the nearest fire alarm.
5. Do not attempt to extinguish a fire unless you are confident it can be done in a prompt and safe manner utilizing a hand-held fire extinguisher. Use the appropriate fire

extinguisher for the specific type of fire. Most labs are equipped with Class A, B, and C extinguishers. Do not attempt to extinguish Class D fires which involve combustible metals such as magnesium, titanium, sodium, potassium, zirconium, lithium, and any other finely divided metals which are oxidizable. Use a fire sand bucket for Class D fires.

6. Do not attempt to fight a major fire on your own.
7. If possible, make sure the room is evacuated; close but do not lock the door and safely exit the building.

Clothing on Fire

Do not use a fire extinguisher on people

1. Douse with water from safety shower immediately or
2. Roll on floor and scream for help or
3. Wrap with fire blanket to smother flame (a coat or other nonflammable fiber may be used if blanket is unavailable). Do not wrap a standing person; rather, lay the victim down to extinguish the fire. The blanket should be removed once the fire is out to disperse the heat.

Equipment Failure or Hazard

Failure of equipment may be indicative of a safety hazard - You must report all incidents.

Should you observe excessive heat, excessive noise, damage, and/or abnormal behaviour of the lab equipment:

1. Immediately discontinue use of the equipment.
2. In Power Lab, press wall-mounted emergency shut-off button.
3. Inform your TA of the problem.
4. Wait for further instructions from your TA.
5. TA must file an incident report.

Protocol for Safe Laboratory Practice

Leave equipment in a safe state for the next person - if you're not sure, ask!

In general, leave equipment in a safe state when you finish with it. When in doubt, consult the course TA.

Defined Roles

TA	The first point of contact for lab supervision	
ECE Lab Supervisor	Steve Spencer- ITB 147	steve@mail.ece.mcmaster.ca
ECE Chair	Tim Davidson- ITB A111	davidson@mcmaster.ca
ECE Administrator	Kerri Hastings- ITB A111	hastings@mcmaster.ca
ECE Course Instructor	Please contact your specific course instructor directly	