

IBEHS 5E15/4E09A/B
Health, Engineering Science and Entrepreneurship Thesis
Fall/Winter
2023-2024
Course Outline

About the thesis course

Course Co-ordinator: Dr. Sean Park (parks5@mcmaster.ca)

The following information is for students registered in levels III and IV of the iBioMed HESE program looking to register for IBEHS 5E15/4E09 Fall/Winter 2023-24:

Due date to submit the signed Thesis Permission Form for Fall/Winter 2023-24 is September 5, 2023 or before you intend to register for the course as permission from the IBEHS Program must be obtained prior to registering.

The following information will help in the selection of a potential supervisor(s) and research project:

Course Basics

Assessment will be based on work completed. Project milestones and assessments will be agreed upon with your supervisor and include a written thesis. Expect to commit about 15 hours/week to your thesis for both Fall and Winter semesters. If the thesis is completed during the Spring/Summer term, please note that the terms are condensed compared to Fall/Winter, and therefore, the number of hours of work per week would be commensurate.

Making Arrangements for a Research Supervisor and Topic

In the fall of their penultimate year, students should begin to think about potential supervisors and research projects for IBEHS 4E09 or 5E15. (Note: Students who choose to remain in the five year HESE program MUST take 5E15.) The selection of a research topic should derive from a student's course experience and interests. It is recommended that students review the research interests of faculty members and reach out to schedule an interview with one or more faculty members to discuss possibilities for a research project and supervision. Supervisors may be from any Faculty on campus (Health Sciences, Engineering, Business, etc.), as long as the project has a relationship to biomedical engineering and health. You are encouraged to consider seeking out a co-supervisor from another Faculty to support your project; however, this is not a requirement. Students must seek approval and permission from the iBioMed Program for the proposed supervisor and intended project prior to registering for the course by completing the 'IBEHS 4E09/5E15 Thesis Permission Form' found on the IBEHS website: <https://www.eng.mcmaster.ca/ibiomed/resources#forms>

Students might also want to consider whether they wish to use the thesis as an opportunity to continue research and development of a promising project that they completed in one of the P courses or E courses with a suitable supervisor.

Each Department in each Faculty will have a faculty listing that you can review. Here are just a few listings that you might also find helpful to get started in your search:

https://fhs.mcmaster.ca/medsci/faculty_research.html

<https://www.eng.mcmaster.ca/msbe/people/faculty>

COURSE DESCRIPTION

Welcome to your senior research thesis course! The thesis course is an intensive two-term research project carried out under the supervision of a McMaster research investigator in any of the general areas of Health, Engineering Science and Entrepreneurship. The thesis is a self-directed learning experience in a cutting edge, research environment for biomedical research or entrepreneurship. Students will take initiative to practice effective time management, communication, and professionalism in order to be successful. Students will plan and execute this learning experience with inputs from both the published literature and their research environment. Your research supervisor(s) and co-workers will be very important resources. There will also be sessions with course coordinator that will help you be successful in the process.

IBEHS 4E09 will require at least as much time as the equivalent of three regular 3-unit courses across the full academic year (an average of approximately 10-20 hours per week over two terms, depending on the distribution of the 9 unit course load for 4E09); whereas IBEHS 5E15 will require at least as much time as the equivalent of five regular 3-unit course across the full academic year (an average of approximately 20-30 hours per week over two terms, depending on the distribution of the 15 unit course load for 5E15). Students should aim to spend this amount of time per week, continuously and over two terms, reading relevant background literature, conducting the research work, analysis and writing up their work in a thesis. Students should meet regularly with their supervisor/project mentor to ensure that their project goals and course expectations are being met.

All thesis work should be submitted to your supervisor by the April 11th 2024 for grading. Your supervisor requires time to grade the thesis, which must be submitted along with the final thesis document on April 25th, 2023. DO NOT misread this as meaning that your thesis is due to your supervisor on April 25th. An inability to follow this instruction could mean that your transcript will show NO GRADE or F for your thesis course until everything is submitted, potentially complicating any graduate school admissions.

COURSE COORDINATOR CONTACT INFORMATION

Dr. Sean Park

Parks5@mcmaster.ca

Office Hours:

By appointment

There will be no set office hours as the IBEHS team has open-door policies. We welcome you to email, drop by our offices, or schedule a meeting in advance if you need to see us.

COURSE WEBSITE

<http://avenue.mcmaster.ca/>

MATERIALS AND FEES

None required

ASSESSMENT

Components	Weight
Assessments as agreed upon with the supervisor in the thesis permission form which must include a final written thesis	95%
3-Minute Thesis Presentation	5%
1 Page Self-Assessment	Mandatory
Total	100%

Initial Meeting Form, Safety Form(s) and Acknowledgement of Confidentiality Form

- Students will meet with their thesis supervisor to complete the “Initial Meeting Form” at the beginning of the course. Students will also complete mandatory safety form(s) and an acknowledgement of confidentiality form. These forms (available on A2L) are to be submitted to the A2L assignment folder by the specified due date, or you will not be allowed to do the research/project work

Primary Thesis Early Assessment

- Half-way through the course, supervisor will provide an interim assessment and feedback based on performance-to-date. The intent is to provide students some sense of where they stand, clarify expectations, and recalibrate if necessary to help ensure the student is set up for success. This assessment is not included in the final grade calculation. A form (available on A2L) must be submitted by December 9th, 2023.

Thesis Research/Project Work & Written Thesis Report

- Students will engage in an undergraduate thesis caliber primary research topic, including sufficient depth and breadth, as predetermined and approved jointly by the student’s Primary Supervisor and the Course Coordinator.
- Throughout the year, students will complete wet- and/or dry-lab experiments, data analysis, synthesis, etc.

- Students will prepare a written thesis document that makes clear the relevant background, the problem that they are trying to solve, the progress made and analysis of results in the context of the research field. Maximum 20-pages, double-spaced, Times New Roman (or similar) 12-point font, 2 cm margins minimum. Figures, tables and references do not count in the page limit and can be added at the end of the document (maximum additional 10-pages for all of these combined). A title page, table of contents and acknowledgement page(s) also do not count towards the 20-page maximum.
- The thesis will be assessed on the following criteria:
- Criterion 1: Understanding of the problem and relevant background information Criterion 2: Experimental design/data and carrying out of experiments/analysis Criterion 3: Interpretation/discussion of results
- Criterion 4: Overall impression
- The supervisor may also use other criteria as part of the assessment

3-Minute Thesis

Scientists and scholars have a responsibility to share their work with peers and the broader scholarly community. As most people will not have the time to read an entire thesis, clear distillations of the work's key messages help others understand the broad strokes. Synthesis and translation of the thesis into more digestible forms also helps the scholar zoom-out from the minutiae of their work to see the bigger picture and consider how to communicate to others outside the scholar's committee. The 3-Minute Thesis is one format. A number of in-person or virtual, live class sessions towards the end of the year will be hosted for students to craft and refine their script and presentation

- Students will create a video recording of themselves in line with the 3-minute thesis [staging and performance rules](#)
- Video recordings will be evaluated based on the [following criteria](#)
- The best presentations will be invited to be shown during the iBiomed showcase

Self-Assessment

- Must be completed by the student and reviewed by the supervisor after project course work is COMPLETE.
- Your self-reflection must include strengths and areas of improvement that you have identified during the project course/experience.
- Also, please provide some insight into your overall experience with this project course, going beyond the actual tasks you have completed.

Important Due Dates:

- Initial Meeting Form, Safety Training Form, Confidentiality Form due on Avenue to Learn Dropbox NOT LATER THAN **11:59 PM September 21** (sooner is more than acceptable)
- Interim Grade Form uploaded on Avenue to Learn Dropbox by **11:59 pm December 9 2023**
- Link to 3-minute Thesis video uploaded on Avenue to Learn Dropbox by **11:59 pm April 7, 2024**
- Final thesis due to the supervisor by **11:59 pm April 15, 2024**
- Thesis Grade form submitted by supervisor to IBEHS office and Thesis document uploaded to Avenue to Learn by 11:59pm April 25, 2024

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 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](#), 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 <https://www.mcmaster.ca/academicintegrity/>.

PROVISIONAL STATEMENT ON AI

Students may use generative AI in this course in accordance with the guidelines outlined for each assessment, and so long as the use of generative AI is referenced and cited following citation instructions given by the thesis supervisor. Use of generative AI outside assessment guidelines or without citation will constitute academic dishonesty. It is the student’s

responsibility to be clear on the limitations for use for each assessment and to be clear on the expectations for citation and reference and to do so appropriately.

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 to make arrangements with a Program Coordinator. For further information, consult McMaster University's [Academic Accommodation of Students with Disabilities](#) policy.

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.

ACADEMIC ACCOMMODATIONS 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: [Policy on Requests for Relief for Missed Academic Term Work](#).

INCLUSIVE ENVIRONMENT STATEMENT

We consider this classroom to be a place where you will be treated with respect, and we welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and non-visible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class. We will gladly honour your request to address you by an alternate name or gender pronoun. Please advise us of this preference early in the semester.

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.

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.

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 <https://reo.mcmaster.ca/>.

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.

NOTICE REGARDING POSSIBLE COURSE MODIFICATION

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.

Integrated Biomedical Engineering & Health Sciences (IBEHS) Labs/Design Studio Safety

Information for Laboratory Safety and Important Contacts

This document is for users of IBEHS instructional laboratories at the following locations:

- ABB C104 (Design Studio)
- ETB 533 (Medical Imaging/Biomaterials Lab)
- ETB 534 (Medical Instrumentation/Robotics Lab)
- HSC 4N72 (Genetic Engineering Lab)

This document provides essential information for the healthy and safe operation of IBEHS instructional laboratories. This document is required reading for all laboratory supervisors, instructors, researchers, staff, and students working in or managing instructional laboratories in IBEHS. 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.

For Standard Operating Procedures (SOPs), Health and Safety videos and other resources, follow [this link](#).

General Health and Safety Principles

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

- Food and beverages are not permitted in the instructional laboratories.
- A Laboratory Information Sheet on each lab door identifying potential hazards and emergency contact names should be known.
- Laboratory equipment should only be used for its designed purpose.
- Proper and safe use of lab equipment should be known before using it.
- The lab tech or course TA leading the lab should be informed of any unsafe conditions.
- The location and correct use of all available safety equipment should be known.
- Potential hazards and appropriate safety precautions should be determined, and the sufficiency of existing safety equipment should be confirmed before beginning new operations.
- Proper waste disposal procedures should be followed.
- [Personal ergonomics](#) should be practiced when conducting lab work.
- [Current University health and safety](#) issues and protocols should be known.

Location of Safety Equipment

Fire Extinguisher

On walls in halls outside of labs or within labs

First Aid Kit

ABB C104, ETB 533, ETB 534, HSC 4N72 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.

Hospital Emergency Medical / Security:

For McMaster HSC, call Security at extension **5555** or **905-521-2100** from a cell phone.

Non-Emergency Accident or Incident: Immediately inform the Lab Tech, 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 Lab Tech, 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.

IBEHS Specific Instructional Laboratory Concerns: For non-emergency questions specific to the IBEHS laboratories, please contact appropriate personnel below from a McMaster phone:

- Leela Pilli, Laboratory Technician – 26888
- Parmveer Bola, Instructional Assistant – 23521
- Andrej Rusin, Wet Laboratory Technician – 28347
- Alexa Behar-Bannelier, Program Manager – 24548

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 the floor and scream for help or
3. Wrap with fire blanket to smother flame (a coat or other nonflammable fiber may be used if a 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 the 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 are not sure, ask!

Defined Roles

TA	The first point of contact for lab supervision	
IBEHS Lab Technician	Leela Pilli	pillil@mcmaster.ca
IBEHS Instructional Assistant	Parmveer Bola	bolap1@mcmaster.ca
IBEHS Wet Lab Tech	Andrej Rusin	rusina@mcmaster.ca
IBEHS Co-Directors	Dr. Greg Wohl Dr. Michelle MacDonald	wohlg@mcmaster.ca macdonml@mcmaster.ca
IBEHS Program Manager	Alexa Behar-Bannelier	alexa.behar@mcmaster.ca
IBEHS Course Instructor	Please contact your specific course instructor directly	