

# IBEHS 4EE6 A/B

## Innovators in Scrubs

### Fall/Winter Terms (2023-24)

## Course Outline

### Calendar/Course Description

This course will integrate design thinking, health engineering and business concepts and apply them to the process of innovating health technologies. Students will work in teams to identify and design solutions for unmet clinical needs based on exposure to real-world healthcare environments and clinical stakeholders. Emphasis will be placed on user-centred design and further development of teamwork and communication skills, adaptability and creativity.  
One lecture (three hours), lab/placement (four hours); both terms.

### Pre-Requisites and Anti-Requisites

Prerequisite(s): IBEHS 1HS0; and IBEHS 3EE6 A/B or IBEHS 4E06 A/B; and registration in Level IV in the Health, Engineering Science and Entrepreneurship Specialization of the Integrated Biomedical Engineering and Health Sciences (IBEHS) program

Antirequisite(s): HTHSCI 4IS3, IBEHS 3E06 A/B

### Instructor Office Hours and Contact Information

**Sophini Subramaniam**  
[subras1@mcmaster.ca](mailto:subras1@mcmaster.ca)

**Office Hours:**

- To request an appointment please email the instructor directly

### Instructional Team

**Teaching Assistants:**

- Kulmanak (Manak) Bajaj, [bajajk2@mcmaster.ca](mailto:bajajk2@mcmaster.ca)
- Fatima Gafoor, [gafoorf@mcmaster.ca](mailto:gafoorf@mcmaster.ca)
- Daeun (Diane) Kim, [kimd102@mcmaster.ca](mailto:kimd102@mcmaster.ca)
- Ariel Motsenyat, [motsenya@mcmaster.ca](mailto:motsenya@mcmaster.ca)
- Julia Ungureanu, [ungureaj@mcmaster.ca](mailto:ungureaj@mcmaster.ca)

### Course Schedule

This course will be delivered through class lectures, roundtable discussions and work sessions (3 hours), in addition to on-site hospital placements and virtually streamed surgeries (4 hours). You will be working predominantly individually for the first term and in teams of 4-5 students for the second term. Each student will rotate through different clinical areas to identify opportunities for innovation. The first term will culminate in an individual application identifying the top three unmet needs. The desirability of solving these needs and strength of application will inform team formation and the clinical focus for the second term.

**LECTURES:** Mondays 2:30-5:30pm (Lecture locations are listed on the Course Outline posted on Avenue to Learn).  
The purpose of lecture time will be to:

- Introduce project milestone concepts through the Biomedical Innovation Roadmap
- Receive mentorship and coaching as project progresses
- Lead roundtable discussions with entire class to share project progress and placement experiences
- Seek feedback through team-team check-in meetings
- Protected time and space to collaborate and ideate as a team toward completion of milestones

**CLINICAL PLACEMENTS:** 4 hours every week for an 8- to 10-week rotation block. The purpose of this block is to:

- Identify unmet clinical needs and opportunities for innovation in a healthcare setting
- Communicate with various stakeholders engaged in the healthcare system
- Test the desirability, feasibility and viability of a novel tool or service

## Course Delivery

We will be using two virtual learning platforms – **Avenue to Learn** and **Microsoft Teams**.

[Avenue-to-Learn](#) will be the online management system for the course. Through **Avenue**, you will be able to:

- Find course materials and schedule of assessments
- Submit deliverables for grading
- View your gradebook

**Microsoft Teams** will be used to:

- View course-related announcements
- Use the Biomedical Innovation Roadmap
- Communicate with your instructor, TAs and peers

## Materials and Fees

### Textbooks

There is *no required textbook* for the course. All required reading materials will be made available for free as online documents through the course management systems (Avenue to Learn and Microsoft Teams) and through use of peer-reviewed literature available online through the [McMaster library](#).

### Hospital Placement Requirements

To enter hospitals, students require health and safety clearance from the Faculty of Health Sciences Health Screening Office and the Hamilton Health Sciences Student Affairs office. These requirements begin in the spring/summer term prior to course start with enrolment and completion of IBEHS 1HS0.

Placements are located within a healthcare setting. The hospitals and healthcare facilities continue the requirement to wear a **medical mask** while indoors, therefore you will be required to wear a mask during placements and to follow all guidelines required by the hospital site. The university continues to monitor the situation closely and update the [covid19.mcmaster.ca](https://www.mcmaster.ca/covid19) website.



### **Virtually Streamed Surgery Session Requirements**

Students are expected to be fully engaged during the virtually streamed surgery sessions. This includes keeping cameras/webcams on, actively interacting with the facilitators and surgeons (where applicable and as appropriate), as well as preparing questions in advance to ask during the scheduled sessions. Additional requirements may be communicated by the instructor or during the streamed sessions.

## **Course Objectives and Learning Outcomes (LO)**

Upon successful completion of the course, the student should be able to:

<b>LO.01</b>	<b>Identify</b> unmet clinical needs in a healthcare setting
<b>LO.02</b>	<b>Evaluate</b> the value proposition of a biomedical product or process
<b>LO.03</b>	<b>Communicate</b> with various stakeholders engaged in the healthcare system
<b>LO.04</b>	<b>Engage</b> in co-creation and collaboration when designing novel tools and services
<b>LO.05</b>	<b>Outline</b> the procedural and documentation requirements related to intellectual property and biomedical technology testing
<b>LO.06</b>	<b>Pitch</b> an innovative biomedical product or process to solve an identified clinical need
<b>LO.07</b>	<b>Implement</b> strategies for effective leadership and conflict management when working in a team setting

## **Student Responsibilities**

Our partnering hospitals and preceptors are critical to the success of this course and provide access to *real* projects, *real* people in a healthcare setting, and *real* opportunities for innovation. This is not a simulation and has the capacity to lead to the creation and implementation of *real* products, tools, and services. As such, full commitment, accountability, and respect is expected for this course and the experiences afforded to you by the partnering institutions.

Lecture periods for this course will be interactive and include small- and large-group roundtable discussions, mentorship and coaching, and protected time for you and your team to work towards completion of milestones. As such, attendance, preparation, and participation are essential components of this course, both for the learning benefit of the student, as well as out of respect for your peers and mentors. Students who are well prepared and actively engage in the content will get the most out of this course.

**Attendance:** You are expected to attend each class on time. Your instructor and group members must be notified in advance if you cannot attend a class for a legitimate reason, at the discretion of the instructor.

**Preparation:** You are expected to come to class prepared with relevant project progress and share experiences from your hospital placements. You are also expected to come to class with energy to participate and engage with the material, no matter what time of day it is. This type of preparation will differ for each student, but is just as important (e.g., sleep, hydrate, exercise). Preparation will directly impact your ability to learn and lead to better learning outcomes.

**Lack of awareness or understanding of the course policies or any of the assessment criteria outlined below cannot be invoked at any point during this course for failure to meet them. It is your responsibility to ask for clarification on any course content that you do not understand before assessment evaluation. All grades are final once released.**

## Assessments

Throughout the course, you will complete a set of milestones and roundtable discussions:

<b>INDIVIDUAL (Term 1)</b>	<b>Weight</b>
Roundtable Discussions	25%
Roundtable 1 Biomedical Background	
Roundtable 2 Needs Finding	
Roundtable 3 Assess Market Landscape and Filtering	
Biomedical Innovation Project	40%
Milestone 1 Biomedical Background	
Milestone 2 Needs Finding Phase 1	
Milestone 3 Needs Finding Phase 2	
Milestone 4 Needs Finding Phase 3	
Instructor and TA Impression Mark	10%
Final Assessment	25%
Final Report and Application	
<b>GROUP* (Term 2)</b>	<b>Weight</b>
Roundtable Discussions	25%
Roundtable 4 Develop Prototype	
Roundtable 5 IP and Regulatory Strategy	
Roundtable 6 Funding Strategy	
Biomedical Innovation Project	30%
Milestone 5 Develop Prototype	
Milestone 6 IP and Regulatory Strategy	
Milestone 7 Business Model Development and Funding Strategy	
Instructor and TA Impression Mark (individual)	10%
Regulatory Module Quizzes (individual)	10%
Final Assessments	25%
Final Pitch	
Final Report and Summary	



## Completion and Submission of Work

It is the student's responsibility to ensure assessments are correctly submitted to the correct location, on time, and in the specified format. **Failure to correctly submit an assignment will result in a mark deduction** (see below).

### Alternative Evaluation for clinical placement / lab absence

Attendance in clinical placements / labs is required, in-person. If a student is unable to attend a clinical placement / lab as a result of unforeseen and/or uncontrollable circumstance(s), the student will attend an alternatively scheduled placement session.

### Submission Penalties

Please be aware of the following penalties for assessments:

- All assessments must be uploaded to Avenue by the posted deadline, or they will be subject to a **late penalty of 20% per day**.
- Submissions must be in the correct format, or they will be subject to a **10% deduction**.
  - It is your responsibility to ensure any electronic submissions can be opened by the TAs/instructor.
- **Any submissions deemed to be partially or fully copied will be considered an academic offence and be subject to terms laid out under the Academic Integrity Policy.**

### Completion of Major Assessments

All **Major Assessments** must be completed. In a case where the component weight cannot be fulfilled as a result of unforeseen and/or uncontrollable circumstance(s), the grades assigned to that component may be re-weighted.

## Important Dates

A detailed course schedule with due dates can be found in the **Assessments Calendar** on Avenue.

## Communication Policy

Weekly classes are the best place to ask questions and seek feedback on your progress. Classes will provide ample opportunity for mentorship and coaching from your assigned TA and instructor. If questions do remain in between sessions, please ask your TAs for their preferred form of communication (i.e. email or Teams) or post a question on the general Teams channel.

To contact the instructor, please email or message directly. Every attempt will be made to reply within 24 hours (excluding weekends). When emailing please include a subject prefix of "4EE6", use appropriate and professional conduct (e.g., salutation) and include your full name. Emails must be sent from your @mcmaster.ca account.

## 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 of this preference early in the semester so that we may make appropriate changes to our records.

## Intellectual Property

The deliverables in this course will be shared with and visible to others, both within the classroom as well as outside of it. This includes, but is not limited to, your classmates, clinical area teams, hospital executives, and program advisors. Any IP that you generate in your group project is owned by you as the student(s). For more information, please see the following Guidance Document:

[https://www.eng.mcmaster.ca/sites/default/files/uploads/guidancedocument-ipandstudentmentoring\\_.pdf](https://www.eng.mcmaster.ca/sites/default/files/uploads/guidancedocument-ipandstudentmentoring_.pdf)

## McMaster Approved Policy Statements

### 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, Microsoft Teams, 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., submission of work not one’s own or which other credit been obtained.
- Improper collaboration in group work.
- Copying or using unauthorized aids in tests and examinations.



### **Authenticity / Plagiarism Detection**

In this course we will be using a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. Students will be expected to submit their work electronically to Avenue to Learn (A2L), which has integrated plagiarism detection (a service supported by Turnitin.com) to check for academic dishonesty.

Students who do not wish to submit their work through A2L and/or Turnitin.com must still submit an electronic and/or hardcopy to the instructor. No penalty will be assigned to a student who does not submit work to Turnitin.com or A2L. All submitted work is subject to normal verification that standards of academic integrity have been upheld (e.g., on-line search, other software, etc.). To see the Turnitin.com Policy, please go to the following website: [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

### **Academic Accommodations for 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.

### **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 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 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](#)".

- All MSAFs are to be directed to the course instructor's email: [subras1@mcmaster.ca](mailto:subras1@mcmaster.ca). Indicating another email address will delay processing.
- It is the prerogative of the instructor of the course to determine the appropriate relief for missed term work in the course.

### **Courses with an On-Line Element**

In this course, we will be using **Avenue-to-Learn** and **Microsoft Teams**. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, usernames 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.



### **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, course websites/online platforms weekly during the term and to note any changes.

### **Pedagogical Study**

For the study of health sciences and engineering education, you may be asked to provide information or feedback about course components. When possible, the instructor will share these results with participants.