

IBEHS 4EE6

Innovators in Scrubs

Fall/Winter 2021-2022

1. INSTRUCTIONAL TEAM

Here are the people that will teach and support you throughout this semester:

PROFESSOR

Dr. Anna Korol, MSc, PhD Office: MDCL 3515
korola3@mcmaster.ca

TEACHING ASSISTANTS (TA's)

Monica Banayoty
banayotm@mcmaster.ca

Yumna Irfan
irfany1@mcmaster.ca

Lubna Najm
najml1@mcmaster.ca

Sophini Subramaniam
subras1@mcmaster.ca

2. COURSE DESCRIPTION

This final 'E-series' 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.

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

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

3. SCHEDULE AND DELIVERY

This course will be delivered fully in-person, which includes a weekly in-class lecture (3 hours) and bi-weekly on-site hospital placement (4 hours). You will be working in teams of 4-5 students. Each team will be matched with one of 8 hospital departments partnering with our program.

LECTURES

Lectures in this course will be delivered in-person:

- **Mondays 2:30-5:20pm at The Clinic @ Mac, HSC-1B9**

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 on completion of milestones

PLACEMENTS

Hospital placements will occur on-site in the department you are matched with. You will attend placements on a rotating bi-weekly schedule in pairs.

- **Thursdays 2:30-6:20pm** on-site in your matched hospital department (unless scheduled otherwise)

VIRTUAL TEACHING PLATFORMS

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

Microsoft Teams:

- A general Team for class announcements and questions
- A private Team to collaborate with your group under the mentorship of your TAs

Avenue to Learn:

- Review course materials and assignment expectations
- Submit course work for grading into assignment dropboxes
- View grades and feedback

4. 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 chat.

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.

5. COURSE PHILOSOPHY AND PROGRESSION

In this course, we will be using a needs-driven approach to innovation as a way to: (1) source unmet clinical needs and opportunities for innovation; and (2) design biomedical products or services that solve these needs.

In order to achieve these goals, this course takes a unique approach to experiential learning. Each student will *scrub in* and shadow health professionals in hospital departments across Hamilton, engaging with clinical teams and key stakeholders involved in healthcare delivery. During observation sessions, students will identify as many unmet clinical needs and pain points as they can. Following a rigorous filtering process that considers the desirability, feasibility, and viability of a solution, students will select a single clinical need to focus on.

Working through this process requires a significant commitment of time both inside and outside the class. As such, it is expected that **classes consume three hours per week, placements 4 hours bi-weekly, and work outside of class consumes at least 3 hours per week**. This includes class preparation, clinical observation, stakeholder interviews, group meetings, mentorship, reflection, and analysis.

6. STUDENT RESPONSIBILITIES

Our partnering hospitals and preceptors are critical to the success of this course and provide access to *real* projects, *real* people, 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.

7. COURSE WORK AND ASSESSMENTS

EVALUATION STRUCTURE

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

GROUP*	Weight
Roundtable Discussions	40%
Discussion 0 Virtual needs observation	
Discussion 1 Needs finding	
Discussion 2 Assess market landscape	
Discussion 3 Develop prototype	
Discussion 4 IP and Regulatory Strategy	
Discussion 5 Funding Strategy	
Biomedical Innovation Project	40%
Milestone 0 Virtual needs selection	
Milestone 1 Needs finding	
Milestone 2 Assess market landscape	
Milestone 3 Develop prototype	
Milestone 4 IP and Regulatory Strategy	
Milestone 5 Funding Strategy	
Milestone 6 Pitch product or process	
INDIVIDUAL	Weight
On-call Participation	20%

*Individual ratings from Group Feedback Assessments are factored into group mark.

GRADED ASSESSMENTS

Roundtable Discussions

Groups will lead three large-group roundtable discussions each term, highlighting their progress within their clinical area and their “lessons learned”. This is an opportunity to share interesting observations and insights gained from clinical immersion sessions, as well as a means of collaborating and seeking different perspectives from other groups within the class. Groups will be graded on the insightfulness of discussion content presented and the effectiveness of discussion prompts. It is imperative that there is progress shown between discussion sessions through self-guided first- and second-hand research. It is expected that all members of the group will contribute equally to this deliverable.

Biomedical Innovation Project

Throughout the entirety of the course, you will work in a team on a Biomedical Innovation project in partnership with a hospital department in Hamilton. Across a 6-month period, you will spend time in this department shadowing health professionals and staff. Through observation, you and your team will identify opportunities for innovation and develop a solution for an unmet healthcare challenge. You will complete a set of milestones throughout the project using a guided Biomedical Innovation Roadmap©. By the end of the course, you will pitch your solution back to the department. After the completion of this course, promising projects will be selected for further support and development through The Clinic @ Mac Residency program.

On-Call Participation

Participating in class discussions is key to knowledge synthesis and critical thinking. In order to afford everyone an equal opportunity to develop these skills, students will be “on-call” specific weeks of the term (schedule to be posted on Avenue). When on-call, it is expected that you come prepared to fully participate in any class discussions, completing any assigned work and self-guided research before class. When “on-call”, you will be called upon by your instructor, TA or other classmates at any moment to contribute your perspective and ideas. Your participation mark will be assessed during these on-call sessions and is based on your ability not only to talk, but to listen to others and build meaningful discussions that *extend* the conversation. Mere attendance without participation will not earn you participation marks.

Group Feedback

After each investigation, team members will give each other feedback on 6 key attributes: Professionalism, Teamwork, Commitment, Congeniality and Communication. Group members will then assign a rating to each member based on their feedback and comments. An adjustment factor on each individual grade will be calculated from these ratings explained in Appendix 3 of this [paper](#).

Course Schedule

Detailed course schedule with due dates can be found in the *Assessment Calendar* in Avenue to Learn.

8. 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

9. POLICIES

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 to exhibit honesty and use ethical behavior in all aspects of the learning process, especially in a complete virtual environment. 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.** Acting with academic dishonesty can result in serious academic consequences such as a grade of zero on an assignment, loss of credit with a notation on transcript (i.e. Grade of F assigned for academic dishonesty), and in severe cases, suspension or expulsion from the university. **It is your responsibility to understand what constitutes academic dishonesty.** Please see the Academic Integrity Policy on the McMaster University website. Three forms of academic dishonesty in this course include:

- Plagiarism (i.e. the submission of work that is not your/group’s own for which others have been given credit for)
- Improper collaboration on group work and
- Copying or using unauthorized aids in examinations.

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AUTHENTICITY/PLAGIARISM DETECTION

In this course, we will be using a web-based service (Turnitin.com) to reveal authenticity and ownership of student/group assessments, which includes detecting submitted work from previous iterations of the course. This plagiarism detection module is a built-in feature into Avenue to Learn. Students will be expected to submit their work electronically via Avenue to Learn plagiarism detection (a service supported by Turnitin.com) so it can be checked 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 professor(s). 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 www.mcmaster.ca/academicintegrity.

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 that require academic accommodation for religious, indigenous or spiritual observances should read and follow the RISO policy. Students that require RISO accommodation should submit their request to the Faculty or Program Office within 10 working days at the beginning of the term they require this accommodation. Alternatively, it can be submitted to the Registrar's office before examinations. Students should also inform the professor or course coordinator as soon as possible to create alternative arrangements for classes or assessments missed.

REQUESTS FOR MISSED ACADEMIC TERM WORK (MSAF)

In the event of an absence, medical or other reasons, students should review and follow the Academic Regulation in the Undergraduate Calendar as follows: Requests for Relief for Missed Academic Term Work.

1. All MSAFs are to be directed to both of the professors through email.
2. It is the prerogative of the instructors of the course to determine the appropriate relief for missed term work in this course. Please refer to above for alternative assessments in the case of missed synchronous work.

ONLINE ELEMENT

This course uses **Avenue to Learn** and **Microsoft Teams**. Students should be aware that, when they make use of these platforms, information such as first and last names, usernames for the McMaster email 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.

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. Students must not disseminate these materials to others not registered in the course, or post to third-party websites.

The recording of lectures, tutorials, or other methods of instruction may occur during a course, either by the instructor for instructional purposes; students may make recordings for the purpose of personal study but must not be disseminated in any form. 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 dates and deadlines on all courses in extreme circumstances such as severe weather, labour disruptions, etc. Changes can be communicated through communication channels like the McMaster [Daily News](#), Avenue, Teams or 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.

HEALTH AND WELLNESS RESOURCES FOR STUDENTS

As a signatory on the Okanagan Charter, McMaster University is committed to enhancing mental health and wellness and provides various resources for students to manage their well-being. Students are encouraged to seek support as necessary; the following are several campuses- and community-based resources that you may find helpful. For more resources and additional information, please visit the [Student Wellness Centre](#).

ON-CAMPUS RESOURCES:

- **Student Wellness Centre:** Provides counselling, medical services, wellness education, guided self-help, and other relevant resources. PGCLL 210; 905-525-9140, x27700; <https://wellness.mcmaster.ca>
- **Sexual Violence Support:** An on-campus resource where students, staff, and faculty of all backgrounds and social identities can find support and information about sexual, intimate partnership or family violence. UH 104; 905-525-9140 x20909; <https://svpro.mcmaster.ca>

- **Faculty/Program Office:** Feel free to contact an Academic Advisor in your Faculty/Program Office who can connect with academic advising and connect you with other resources.

OFF-CAMPUS RESOURCES:

- **Good2Talk:** Free, confidential helpline providing professional counselling and information and referrals for mental health, addictions and well-being to post-secondary students in Ontario, 24/7/365; 1-866-925-5454; <https://good2talk.ca>
- **Togetherall:** Online peer-to-peer chat-based service that provides mental health and wellbeing support, 24/7/365. <https://www.togetherall.com/>
- **SACHA (Sexual Assault Centre - Hamilton Area):** Confidential, anonymous 24-hour nonjudgmental telephone support for adults who have experienced sexual violence. 905-525-4162; <http://sacha.ca>
- If you have immediate safety concerns for yourself or others, call **Campus Security** who will respond with the **MSU Emergency First Response Team (EFRT)** at 905-522-4135 or call 911 if you are off campus.

LAND ACKNOWLEDGEMENT

McMaster University recognizes and acknowledges that it is located on the traditional territories of the Mississauga and Haudenosaunee nations, and within the lands protected by the Dish with One Spoon wampum agreement.

PEDAGOGICAL STUDY

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

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

Telephone

On the wall of every lab near the door

First Aid Kit

ABB C104, ETB 533, ETB 534, HSC
4N72 or dial "88" after 4:30 p.m.

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	