# IBEHS 2E06
# Health Engineering Science Entrepreneurship 1: Human-Centred Design

Fall 2022 Course Outline

## Course Description

This inquiry-based course will explore the creation of "value" and the use of human-centred design as a mindset and methodology for discovering, defining, and transforming health challenges. Students will develop capabilities in creativity, communication, empathy, qualitative research, acting and building to learn, self-awareness, leadership and collaboration through personal development and group projects using a design thinking process.

Lecture (three hours); one term
Tuesdays 8:30 AM - 11:20 AM – MDCL 1010
Pre-requisite(s): IBEHS 1P10 A/B and registration in the Health, Engineering Science and Entrepreneurship Specialization of the Integrated Biomedical Engineering and Health Sciences (IBEHS) program
Anti-requisites: HTH SCI 4ID3 - Innovation by Design

## Instructor Office Hours and Contact Information

Dr. Sean Park
spark@mcmaster.ca
Please reach out through TEAMS
Office hours – By appointment

## Teaching Assistant Office Hours and Contact Information

**Teaching Assistant Contact Information**

Emnpreet Bahra – bahrae@mcmaster.ca
Beth Mitchell – mitche4@mcmaster.ca

**Office Hours (Chat with us about anything)**

TBD

## Course Website & Methods of Communication

AVENUE to LEARN - Course materials and assignments will be shared here
TEAMS: IBEHS 2E03 Fall 2022 - Class meetings, conversation, communication with Dr. Park and TAs
MURAL - Visual collaboration platform for assignments

## Materials and Fees

*Required Texts and Other Materials*

Health Design Thinking - Creating Products and Services for Better Health
Bon Ku and Ellen Lupton
Cooper Hewitt MIT Press
ISBN 978-0-262-53913-5 (print)

Innovation Assessment ($29 USD)

https://dtassessment.treehouseinnovation.com/?ref=mcmaster-ibehs-2e03

*Optional*

Experiencing Design: The Innovator's Journey
Jeanne Lidtka, Karen Hold, Jessica Eldridge
Columbia University Press
ISBN 978-0-231-19426-6

See McMaster Campus Store for details on purchasing books

# Course Overview

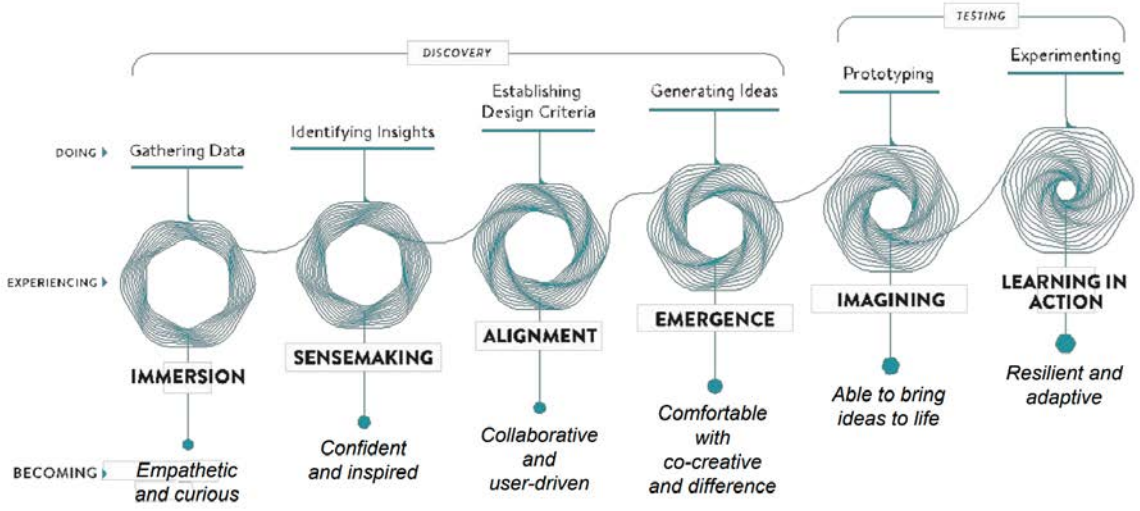
This course introduces conceptual and applied approaches to design thinking. Focus is placed on the **fuzzy front end of design** where we learn how to discover what is desirable to people (human-centred), define opportunities for improving people's lives, and get inspired to design products, services and experiences that enhance health. Design thinking is an essential component of the helping professions, ethical innovation, leadership, and entrepreneurship. It is a methodology is used to navigate ambiguity, build empathy and discover hidden opportunities for innovation.

Through team-based, experiential learning projects course addresses three dimensions of design thinking:

A. *Culture* – The development and nurturance of collaborative environments that support growth, risk-taking, safety, trust and radical creativity.

B. *Design Mindsets and Capabilities* –We will explore a few mindsets including navigating ambiguity, creative confidence, empathy, and collaboration. Capabilities are concrete behaviours that can be strengthened and measured. Each mindset has a set of capabilities and includes observing, sensemaking, and experimenting.

C. *Process* - The design thinking journey can be framed as process that takes practitioners through various phases including immersion, sensemaking, aligning directions, emergence of and imagining ideas, and learning in action. (see more about the design thinking process here)




(Liedtka, Hold, and Eldridge, 2021)

# Course Objectives

By the end of this course, students will have an appreciation of the front end of the innovation process. Understanding user experiences and needs is a critical factor for designing new products, services, and experiences that can provide value to or generate health for people. You will have developed the following mindsets and capabilities within each phase of the design thinking process as defined by Liedtka, Hold, and Eldrige (2021). This reflective practitioner approach will enable students to Identify and pursue personal opportunities for growth in the context of developing a human-centred design mindset beyond the course.

*Immersion*

- becoming more empathetic about the lived experience of others through conversation, interviews, ethnographic observation, and storytelling
- experience health as personal and relational phenomenon
- develop awareness of personal biases
- become more curious and personally engaged
- cultivate patience and sustained interest in current reality before developing solutions
- critical awareness of superficial definitions and solutions

*Sensemaking*

- more willing to step into ambiguity to achieve greater understanding
- treat problem definition as a hypothesis
- can analyze and synthesize qualitative data to discover insights and translate these insights into personas and stories that illustrate where a design is required
- develop clarity about what is important to those they are designing for
- be inspired about potential solutions
- build deep commitment to addressing real needs
- recognize different ways of framing issues

Alignment

- see value in shared perspective taking
- comfortable with giving and receiving feedback about team member performance
- feels connected and psychological safe with team
- able to let go of one's own perspectives and be open other views

*Emergence*

- confident in contributing ideas
- expressive of more authentic self that can offer nontraditional and unexpected ideas
- become more playful, resourceful with constraints and metaphorical thinking
- develop patience for higher-order solutions and avoids early compromises

- able to critically analyze a range of design options to converge on a decision

*Imagining*
- able to turn abstract ideas into concrete form
- use visual thinking to stimulate conversation
- able to move forward despite incomplete prototypes
- think about prototypes as stories with beginning, middles and ends
- can identify assumptions in prototypes

*Learning in action*
- can treat ideas as hypotheses and seeks to quickly and rigorously test the assumptions about how people will respond to and experience the prototype
- develop emotional connection with those being designed with
- able to use the feedback to gain more empathy, redefine the opportunity, or refine the prototype
- becomes open to being off-course and seeks feedback that will help gain further clarity
- can use a range of user testing methods to elicit feedback for iteration and pivoting

*See more on Design Thinking Mindsets and Competencies here*

## Projects, Milestones and Assessment

Work will be evaluated on an individual and group basis, and groups will be assigned. You are expected to contribute consistently and equally to group work. Each group member will keep a journal of activities, readings, artifacts, drawings, notes, challenges, and successes for use in their final reflection.

*Autoethnography Project: The Journey of Becoming a Health Design Thinker: (45%)*

This personal project will serve multiple aims. First, you will document your learning experiences over the course using qualitative research methods to illustrate your journey of becoming a health design thinker. This project will include deflections, observations, 'action-assignments' and a final portfolio. Second, your individual 'data' from this project will provide inspiration for your group challenge.

*TCPS Core Certificate – (5% of final grade)*

Students are also required to complete the TCPS2 Core Module – the Tri-Council Policy Course on Research Ethics - an online tutorial covering basic research ethics - and

submitting a certificate of completion.

*Group Project (50% of final grade)**

Project themes will vary year-to-year. A focus is placed on projects that examine health and wellness as (w)holistic phenomenon, not merely as the absence of disease. Past projects have included designing for behaviour change around nutrition, physical activity, digital distraction/technology addiction, and mental health. Assignments include:

- Building a great team (5/60 points) – a group-based assignment to explore values and needs around creating a collaborative, focused design team
- Design Brief (20/60 points) – a document providing an overview of a challenge, evidence from field work, and opportunity/problem definition
- Prototype Report (15/60 points) - description of ideation process, prototype, prototype testing plan, and results from testing prototype
- Final Presentation and Reflection (10/60 points) – formal presentations of learning process and project outcomes
- Peer assessments and feedback – Assessment of team member performance will enable students to identify strengths, areas for improvement, and **adjustment to your project grade*.

**Total: 100%**

*As part of developing skills in giving and receiving feedback, as well as collaboration, peer ratings from the peer feedback assessment tool are factored into the group project mark. The assessment allows team members to evaluate each other and themselves on a variety of teamwork competencies including: commitment, communication, capabilities, focus, and standards. Scores on these five categories are averaged and will be used to adjust individual marks accordingly. See link for an in depth explanation of the group feedback assessment tool used in this course.

## Attendance and Participation

Students are expected to attend each class on time. Attendance will be recorded and failure over the duration of the course to show up on time or at all will result in reduction of your final grade as seen below:

Missed one classes = OK
Missed two classes = grade drops by 1⁄2 letter (e.g. A to A-)

Missed three classes = full letter drop (e.g. A to B)
3 times late (more than 15 minutes) = full absence

*Accommodations based on extenuating circumstances (eg. needing to self-isolate because of COVID) will be considered on a case-by-case basis. Communicating ahead of time with the instructor about inability to participate is requested.

## Course Schedule and Locations

Schedule: Tuesdays, 8:30 AM – 11:20 AM, MDCL 1010

## IBEHS Learning Outcomes

| Outcomes | Indicators* |
|---|---|
| Identify and evaluate opportunities, needs and trends in the health and biomedical engineering sectors of the economy. | H1 |
| Apply design thinking to health and biomedical problems. | H2 |
| Understand markets, customer service and relationships and sales and marketing strategies. | H3 |
| Identify, formulate, and solve problems at the interface of engineering and health sciences. | A5 |
| Collaborate effectively with peers in multidisciplinary teams. | A7 |
| Communicate in a professional manner to interdisciplinary audiences. | A8 |
| Contribute to the assessment process through personal and peer evaluations. | A9 |
| Demonstrate a strong sense of personal awareness. | A10 |
| Demonstrate an understanding of societal, professional and ethical responsibility. | A11 |
| Recognize the need for, and demonstrate an ability to engage in, life-long learning. | A12 |

*see all IBEHS Learning Outcomes section at the end of this document

## Integrity 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 so that we may make appropriate changes to our records.

## Assignment Submissions

You are expected to submit your assignments through AVENUE. We may host some class calls and discussions over TEAMS and occasionally on ZOOM when we are hosting external guests. MURAL will be utilized for assignments and activities in class.

If you have any questions or experience any challenges with the submission process please contact Sean Park - parks5@mcmaster.ca

## 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 so that we may make appropriate changes to our records.

## Requesting Relief for Missed Academic Work

1. Students may request relief from a regularly scheduled individual or group assignment or other course component in the following ways:
2. Please visit the following page for more information about the MSAF: http://academiccalendars.romcmaster.ca/content.php?catoid=13&navoid=2208#Requests_for_Relief_for_Missed_Academic_Term_Work.

## Student Accessibility Services

Student Accessibility Services (SAS) offer various support services for students with disabilities. Students are required to inform SAS of accommodation needs for course work at the outset of term. Students who require academic accommodation must contact SAS to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study.

Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or email sas@mcmaster.ca.

For further information, consult McMaster University's Policy for Academic Accommodation of Students with Disabilities at the following URL: http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicAccommodation-StudentsWithDisabilities.pdf.

## 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.

## 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 accommodation for relief for missed academic term work

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.

## 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.

## 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". Before filling out an MSAF, contact the instructor to see what accommodations can be made.

## 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.

## Potential modifications to the course

The Instructors and McMaster 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 an explanation and the opportunity to comment on changes. It is the responsibility of students to check their McMaster email accounts weekly during the term and to note any changes.

# Pedagogical study

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

# IBEHS Learning Outcomes

Upon completion of the undergraduate program, all graduates of the Integrated Biomedical Engineering and Health Sciences program will be able to:

A1 Apply knowledge of mathematics (including differential equations and statistics), life and physical sciences, and engineering.
A2 Apply knowledge of health from biological, behavioural, and population-based perspectives.
A3 Demonstrate an understanding of the structure, function and behaviour of the human body, the environmental determinants of health and the ways that these factors interact to result in disease or illness.
A4 Exhibit a working knowledge of contemporary issues in biomedical engineering and health care.
A5 Identify, formulate, and solve problems at the interface of engineering and health sciences.
A6 Employ translational design and research practices to solve biomedical engineering problems of an interdisciplinary nature.
A7 Collaborate effectively with peers in multidisciplinary teams.
A8 Communicate in a professional manner to interdisciplinary audiences.
A9 Contribute to the assessment process through personal and peer evaluations.
A10 Demonstrate a strong sense of personal awareness.
A11 Demonstrate an understanding of societal, professional and ethical responsibility.
A12 Recognize the need for, and demonstrate an ability to engage in, life-long learning.

**Learning Outcomes for the Health, Engineering Science and Entrepreneurship specialization**

In addition to the learning outcomes common to all graduates in the IBEHS program, graduates in Health, Engineering Science and Entrepreneurship specialization will be able to:

H1 Identify and evaluate opportunities, needs and trends in the health and biomedical engineering sectors of the economy.
H2 Apply design thinking to health and biomedical problems.
H3 Understand markets, customer service and relationships and sales and marketing strategies.
H4 Understand finance and fundraising from discovery through product and service development.