

IBEHS 4P04
Health Solutions Design Projects IV: Economics and Project Management
Fall 2021
Course Outline

CALENDAR/COURSE DESCRIPTION

This course will complete the 4-part Health Solutions Design Project course series by teaching students how to apply engineering solutions to society. To develop project management skills, students will work in groups and connect with a real-world client to identify prevalent health care needs, propose and work towards a solution, and present their projects to a group of stakeholders. Additionally, an emphasis on economics will be placed by incorporating the time value of money, value engineering, cash flow analysis, and comparison methods.

PRE-REQUISITES AND ANTI-REQUISITES

Prerequisite(s): IBEHS 3P04 and registration in the Integrated Biomedical Engineering and Health Sciences (IBEHS) program

Antirequisite(s): None

CLASS HOURS

C01 Lecture (weekly):

Monday's 1:30PM - 2:20PM

Wednesday's 1:30PM - 2:20PM

Design Studio Tutorials (weekly):

T01	T02	T03	T04A	T05
Monday's	Tuesday's	Wednesday's	Thursday's	Friday's
10:30AM - 12:30PM	10:30AM - 12:30PM	10:30AM - 12:30PM	10:30AM - 12:30PM	10:30AM - 12:30PM

INSTRUCTOR OFFICE HOURS AND CONTACT INFORMATION

Dr. Fei Geng

ETB 203

gengf@mcmaster.ca

+1 905-525-9140 ext. 20285

Office Hours:

Friday's 1:30PM – 2:30PM

Or by appointment

TEACHING ASSISTANT CONTACT INFORMATION

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COURSE WEBSITE/ALTERNATE METHODS OF COMMUNICATION

In this course, we will be using Avenue to Learn (A2L) and Microsoft Teams. Students should be aware that when they access the electronic components of this course, private information (e.g., 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 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.

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

<https://www.microsoft.com/en-ca/microsoft-365/microsoft-teams/group-chat-software/>

<https://www.mcmaster.ca/uts/teams/>

COURSE OBJECTIVES

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

#	Learning Outcome
1	Demonstrate ability to identify reliable literature and critically analyze information.
2	Apply principles of economics to analyze the feasibility of a solution.
3	Create a list of objectives for a project.
4	Design a solution to a real-world healthcare problem, including proposing, developing, and defending that solution.
5	Explain the environmental, societal, and economic barriers effecting the implementation of engineering solution.
6	Analyze the feasibility of a solution based on a location's population, environment, society, and economic status.
7	Apply effective principles of team-based learning.
8	Provide constructive feedback for peers.
9	Apply the principles of project management towards an engineering solution.
10	Demonstrate effective technical communication, both orally and in writing.
11	Use economic principles to analyze, defend, and improve solutions.
12	Demonstrate professional competency.
13	Analyze sources of funding for their engineering solution.
14	Identify ethical issues in the engineer and business professions.
15	Consider the role of businesses in the implementation of an engineering solution.
16	Reflect on past experiences and consider what was learned from these experiences.
17	Construct a non-technical sketch.

MATERIALS AND FEES

Required Texts:

Engineering Economics: Financial Decision Making for Engineers' Sixth Edition. Editors; NM Fraser, EM Jewkes, M Pirnia. Pearson Canada Inc. 2017.*

*This text is the same as the required one for IBEHS 3P04

Calculator:

Only the McMaster Standard Calculator (Casio fx-991 and Casio fx-991MS) will be permitted in tests and examinations. This is available at the Campus Store.

Other Materials:

Since this course is online due to the COVID-19 pandemic, students will need reliable wifi-connection and a working computer with a microphone and camera. If there are any accessibility issues, please contact Dr. Fei Geng (gengf@mcmaster.ca) to discuss your situation and set up an alternative.

COURSE OVERVIEW

Date/Week	Topic	Readings
Sept 8 th	Course Introduction	/
Sept 14 th	Health Solution I	Chapter 11
Sept 15 th	Health Solution I	Chapter 11
Sept 21 st	Health Solution II	Chapter 11
Sept 22 nd	Health Solution II	/
Sept 28 th	Health Solution III	Chapter 12
Sept 29 th	Health Solution III	Chapter 12
Oct 5 th	Project Management I	Chapter 12
Oct 6 th	Project Management I	Chapter 10
Oct 12 th	MID-TERM RECESS	/
Oct 13 th	MID-TERM RECESS	/
Oct 19 th	The Production, Cost and	Chapter 10
Oct 20 th	Technology of Health Care	Chapter 10
Oct 26 th	The Production, Cost and	/
Oct 27 th	Technology of Health Care	Chapter 4
Nov 2 nd	The Production, Cost and	Chapter 4
Nov 3 rd	Technology of Health Care	Chapter 4
Nov 9 th	Cost Benefit Analysis for Health	Chapter 5
Nov 10 th	Economics	Chapter 5
Nov 16 th	Cost Benefit Analysis for Health	Chapter 5
Nov 17 th	Economics	Chapter 7
Nov 23 rd	Cost Benefit Analysis for Health	Chapter 7
Nov 24 th	Economics	Chapter 7
Nov 30 th	Cost Benefit Analysis for Health	Chapter 9
Dec 1 st	Economics	Chapter 9
Dec 7 th	Project Management II	Chapter 9
Dec 8 th	Summary	/

ASSESSMENT

Component	Weight
Milestone 1: Problem Identification	5%
Milestone 2: Initial Solution Designs	10%
Milestone 3: Solution Selection and Economic Evaluation	15%
Milestone 4: Final Solution Proposal and Presentation	20%
Midterm Test	20%
Lecture Quizzes (in-class)	10%
Final Exam	20%
Total	100%

ACCREDITATION LEARNING OUTCOMES

The Learning Outcomes defined in this section are measured for Accreditation purposes only, and will not be directly taken into consideration in determining a student's actual grade in the course.

Graduate Attribute Indicator	Learning Outcome
3.3 Estimates outcomes, uncertainties and determines appropriate data to collect.	1, 2, 3
4.2 Recognizes and follows engineering design principles including appropriate consideration of environmental, social and economic aspects as well as health and safety issues.	4, 5, 6
6.3 Works in a group, taking a leadership role as appropriate and relinquishing the leadership role as appropriate.	7, 8, 9
7.1 Demonstrates an ability to respond to technical and non-technical.	10
11.1 Applies economic principles in decision making	11
11.3 Understands the business processes for implementing engineering ideas	12, 13, 14, 15
12.01 Critically evaluates and applies knowledge, methods and skills procured through self directed and self identified sources, including those that lie outside the nominal course curriculum.	16

For more information on Accreditation, please visit: <https://www.engineerscanada.ca>

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 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 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

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.

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.

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.

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”.

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	