IBEHS 4P03
Health Solutions Design Projects IV: Economics & Project Management
Fall 2025

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 will be placed on economics 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

Course Schedule

C01 Lecture (weekly):

Wednesday	12:30 - 1:20 PM
Friday	12:30 - 1:20 PM

Design Studio Tutorials (weekly):

T01	T02	T03	T04	T05	T06
Monday	Tuesday	Wednesday	Thursday	Friday	Thursday
10:30AM-12:20PM	10:30AM-12:20PM	10:30AM-12:20PM	10:30AM-12:20PM	10:30AM-12:20PM	8:30-10:20AM

Instructor Office Hours and Contact Information

Dr. Fei Geng
Location ETB-203
gengf@mcmaster.ca

Office Hours:
- TBD
- Or by appointment

Instructional Team

Kansas Mackay

mackak8@mcmaster.ca

Course Delivery

Avenue-to-Learn will be the online management system for the course. Through **Avenue**, you will be able to:

- Find all course materials (lecture slides, lab materials, project documents, etc.)
- View course-related announcements
- Submit course work (assignment, project deliverables) for grading
- View your gradebook

Materials and Fees

Recommended Textbooks

- Engineering Economics: Financial Decision Making for Engineers' Sixth Edition. Editors: NM Fraser, EM Jewkes, M Pirnia; Pearson Canada Inc. 2017.*
- Biomedical Engineering Design First Edition. Editors: J. Tranquillo, J. Goldberg, R. Allen; Academic Press 2022
- Management Consulting: A Guide to the Profession Fourth Edition. Editor: Milan Kubr; Brookings Institution Press 2003

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.

Course Objectives and Learning Outcomes (LO)

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

LO.01	Demonstrate ability to identify reliable literature and critically analyze information.
LO.02	Apply principles of economics to analyze the feasibility of a solution.
LO.03	Create a list of objectives for a project.
LO.04	Design a solution to a real-world healthcare problem, including proposing, developing, and defending that solution.
LO.05	Explain the environmental, societal, and economic barriers effecting the implementation of engineering solution.

LO.06	Analyze the feasibility of a solution based on a location's population, environment, society, and economic status.
LO.07	Apply effective principles of team-based learning.
LO.08	Provide constructive feedback for peers.
LO.09	Apply the principles of project management towards an engineering solution.
LO.10	Demonstrate effective technical communication, both orally and in writing.
LO.11	Use economic principles to analyze, defend, and improve solutions.
LO.12	Demonstrate professional competency.
LO.13	Identify ethical issues in the engineer and business professions.
LO.14	Reflect on past experiences and consider what was learned from these experiences.
LO.15	Construct a non-technical sketch.

Assessments

The course is assessed as follows.

GRADING MODULE	WEIGHT
Design Project	**53%**
Case Studies Activity #1	(1%)
Milestone 0	(0%)
Milestone 1	(5%)
Milestone 2	(8%)
Poster Presentation	(15%)
Final Report	(20%)
Learning Portfolio	(4%)
Teamwork and Engagement	
Administrative Contributions	Varies
Self- and Peer-Evaluations	Varies
Lecture Take-Home Assignments	12%
Final Exam	**35%**

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.

Accommodations for Missed Academic Work

Students who miss work are required to submit a **McMaster Student Absence Form (MSAF)** to be eligible for accommodations. Please note the following accommodations and eligibility requirements:

- **Design Project Milestones 1-2**: Design project milestones are completed in teams. If all team members submit an MSAF, the deadline will be extended 48 hours from the date of the *first* submitted MSAF. If an individual student submits an MSAF, the weight of the missed milestone will be moved to Milestone #4.
    - Students that submit multiple MSAFs for project milestones may need to be removed from their team and be required to complete the entire project individually.
- **Design Project Final Submission**: Project final submissions are completed in teams and include an individual component. Accommodations will only be granted for administrative report (Type B) MSAFs and will only be discussed after the student reaches out to the instructor via email (ibio4p04@mcmaster.ca). Accommodations may include completion of individually assigned work associated with the project.

Submission Penalties

Please be aware of the following penalties for Design Project and Assignments:

- All worksheets must be uploaded to Avenue by the posted deadline, or they will be subject to a **late penalty of 20% per day**.
- **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**.

Grading Concerns

Grades for design project work will be posted to Avenue as soon as possible upon completion. **You will have 7 days from the date your grade is posted to address any concerns you may have to instructional team**.

- Any questions/concerns must be addressed via email to ibio4p04@mcmaster.ca.
- Concerns will not be considered without submitting through the appropriate channels.
- Any concerns or appeals brought to the intention of the instructional team after 7 days from the day the grade was posted to Avenue will not be processed.

Statement on Use of Generative AI in 4P03

Students may use generative AI in this course in accordance with the guidelines outlined for each assessment, and so long as the use of generative AI is referenced and cited following posted citation instructions. Use of generative AI outside assessment guidelines or without citation will constitute academic dishonesty. It is the student's responsibility to be clear on the limitations for use for each assessment and to be clear on the expectations for citation and reference and to do so appropriately.

Examples of **acceptable** use of generative AI include working through in-class examples during lecture or brainstorming preliminary ideas for a design project. Examples of **unacceptable** use of generative AI include any towards the completion of *any* final project deliverable, such as technical submissions, written work (e.g., milestones), or scripts for a presentation.

Important Dates

Fall Term	
Tuesday, September 2	Fall Classes Begin
September 8-12	Project Introduction (Wk-1 Design Studio)
Tuesday, September 30	**National Day for Truth and Reconciliation (no classes)**
October 13– 19	**Fall Reading Week (no classes)**
Thursday, October 23	Midterm Exam
Thursday, December 4	Fall Classes End; **Final Report and Learning Portfolio Due**
December 6 – 19	**Fall Term Examinations**

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.

Communication Policy

Need help and have questions related to the course? We want to make sure your questions get answered. To ensure this, it's important that the correct communication method is used.

Got a question ***during*** scheduled class hours (e.g., lecture, Design Studio)? The best way to get a prompt response is to message the person directly on **MS Teams** using the "@" tool.

Got a question ***outside*** scheduled class hours? In this case, email is the best method. Please direct all emails to ibio4p04@mcmaster.ca. This ensures your email gets directed to the most appropriate individual for the fastest response. Every attempt will be made to reply within 24 hours (excluding weekends). Please include a subject prefix of "IBEHS 4P04". Emails must be sent from your @mcmaster.ca account. Be sure to include your student number in your email.

Accreditation

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
4.1 Defines the problem by identifying relevant context, constraints, and prior approaches before exploring potential design solutions.	1, 3, 4
4.2 Recognizes and follows engineering design principles including appropriate consideration of environmental, social and economic aspects as well as health and safety issues.	5, 6
4.3 Develops models/prototypes; tests, evaluates, and iterates as appropriate.	4, 9, 15
4.4 Justifies and reflects on design decisions, giving consideration to limitations, assumptions, constraints and other relevant factors.	10, 14
6.1 Actively contributes to the planning and execution of a team project.	7
6.2 Manages interpersonal relationships, taking leadership responsibilities as needed.	8, 12
7.1 Demonstrates an ability to respond to technical and non-technical.	10
7.2 Composes an effective written document for the intended audience.	10
7.3 Composes and delivers an effective oral presentation for the intended audience.	10
8.1 Describes the duty of a Professional Engineer to the public, client, employer, and the profession.	13
8.2 Integrates appropriate standards, codes, legal and regulatory factors into decision making.	13
9.1 Evaluates the environmental impact of engineering activities, identifies uncertainties in decisions, and promotes sustainable design.	5
9.2 Evaluates the social impact of engineering activities, including health, safety, legal, cultural, and other relevant factors, and identifies uncertainties in decisions.	6
11.1 Applies economic principles in decision making	2, 11
11.2 Plans and effectively manages a project's time, resources, and scope, following business practices as appropriate.	9
11.3 Understands the business processes for implementing engineering ideas	11
12.1 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.	1, 14

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

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, 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-policiesprocedures-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.

On all work submitted for credit by students at McMaster University, the following pledge is either required or implied: *"I understand and believe the main purpose of McMaster and of a university to be the pursuit of knowledge and scholarship. This pursuit requires my academic integrity; I do not take credit that I have not earned. I believe that academic dishonesty, in whatever form, is ultimately destructive to the values of McMaster, and unfair to those students who pursue their studies honestly. I pledge that I completed this assessment following the guidelines of McMaster's academic integrity policy."*

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 either directly to Turnitin.com or via Avenue to Learn (A2L) 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 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.

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 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 Observations (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 prof1p10@mcmaster.ca. Sending to 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 his/her course.
    - In the event an MSAF is applied to either the **Graphics Design Final Assessment** or **Computing Final Assessment**, they **will be rescheduled**.

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 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.

Details on Standard Operating Procedures (SOPs), Health and Safety videos and other resources can be found online at the iBioMed Health and Safety webpage.

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

IBEHS Lab Technician	Leela Pilli, pillil@mcmaster.ca
IBEHS Instructional Assistant	Parmveer Bola, bolap1@mcmaster.ca
IBEHS Wet Lab Technician	Andrej Rusin, rusina@mcmaster.ca
IBEHS Co-Directors	Dr. Colin McDonald, cmcdona@mcmaster.ca Dr. Michelle MacDonald, macdonml@mcmaster.ca
IBEHS Program Manager	Alexa Behar-Bannelier, alexa.behar@mcmaster.ca
IBEHS Course Instructor	Please contact your specific course instructor directly