

## IBEHS 1P10: Health Solutions Design Projects I

### Fall/Winter 2019-20

### 1. ADMINISTRATIVE DETAILS

#### COURSE INSTRUCTORS:

**Dr. Colin P. McDonald, PhD, P.Eng**  
[cmcdona@mcmaster.ca](mailto:cmcdona@mcmaster.ca)

**Office:** ETB-107

**Office Hours:** Mondays 3:00-4:30pm  
Wednesdays 3:30-5:00pm

**Dr. Kathryn Grandfield, PhD**  
[kgrandfield@mcmaster.ca](mailto:kgrandfield@mcmaster.ca)

**Office:** ABB-C305

**Office Hours:** By-Appointment

#### INSTRUCTIONAL ASSISTANT INTERNS/TEACHING ASSISTANTS:

**Instructional Teaching Assistants (Teaching TAs):** Your Instructional TAs will be guiding your Labs, and will be a point of contact for all students during lab activities

Hosam Abdel Hafeez	<a href="mailto:abdelh1@mcmaster.ca">abdelh1@mcmaster.ca</a>	Karlo Nesovic	<a href="mailto:nesovick@mcmaster.ca">nesovick@mcmaster.ca</a>
Roberta Dolling-Boreham	<a href="mailto:dollingr@mcmaster.ca">dollingr@mcmaster.ca</a>	Erin Puersten	<a href="mailto:epuersten@gmail.com">epuersten@gmail.com</a>

**Lab Teaching Assistants (TAs) – FALL TERM:** Each Lab section will have two (2) of the following TA's

Ahmed Abdel Halim Attia	<a href="mailto:abdela11@mcmaster.ca">abdela11@mcmaster.ca</a>	Meghan Mazer	<a href="mailto:mazerm@mcmaster.ca">mazerm@mcmaster.ca</a>
Ali Ammar	<a href="mailto:ammar@mcmaster.ca">ammar@mcmaster.ca</a>	Amanda Tompkins	<a href="mailto:tomkinsa@mcmaster.ca">tomkinsa@mcmaster.ca</a>
Matana Hendrickson	<a href="mailto:hendrm2@mcmaster.ca">hendrm2@mcmaster.ca</a>	William Ward	<a href="mailto:wardw1@mcmaster.ca">wardw1@mcmaster.ca</a>

**Design Studio Teaching Assistants (TAs) – FALL TERM:** Each Design Studio (Tutorial) section will have one (1) of the following TA's

Joe Deering	<a href="mailto:deeringj@mcmaster.ca">deeringj@mcmaster.ca</a>	Prerana Keerthi	<a href="mailto:keerthip@mcmaster.ca">keerthip@mcmaster.ca</a>
Konrad Grala	<a href="mailto:gralak@mcmaster.ca">gralak@mcmaster.ca</a>	Andrea Obungen	<a href="mailto:obungena@mcmaster.ca">obungena@mcmaster.ca</a>
Christina Hassey	<a href="mailto:hasseyc@mcmaster.ca">hasseyc@mcmaster.ca</a>		

#### LAB TECHNICIAN:

**Leela Pilli**  
ABB-C103/A  
[pillil@mcmaster.ca](mailto:pillil@mcmaster.ca)

**Office Hours:**  
Drop-in or by  
appointment

#### INSTRUCTIONAL COORDINATOR:

**Sinah Lee**  
MDCL 3510  
[leesk2@mcmaster.ca](mailto:leesk2@mcmaster.ca)

**Office Hours:**  
By appointment

#### INSTRUCTIONAL ASSISTANT:

**Parmveer Bola**  
ABB-C103/A  
[bolap1@mcmaster.ca](mailto:bolap1@mcmaster.ca)

**Office Hours:**  
Drop-in or by  
appointment

## EMAIL POLICY

Please direct all emails to: [prof1p10@mcmaster.ca](mailto:prof1p10@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 1P10". Emails must be sent from your @mcmaster.ca account. Be sure to include your student number in your email.

## 2. 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.

## 3. COURSE DESCRIPTION

This course will introduce students to a range of fundamental topics in engineering, including engineering design and communication, computation, graphics design, materials, and the engineering profession. Topics will be introduced at a general level and applied in a biomedical context through 5 design projects. This is the first in a series of 4 Health Solutions Design Projects and serves as the foundation for the courses taken in subsequent years. The course assumes no prior background in the content.

**LECTURES:** Monday, Wednesday and Thursday, 10:30- 11:20 in BSB-B135

**DESIGN STUDIO (TUTORIALS):** (1 hour 50 minutes per week) Refer to your assigned tutorial section for date and time. Located in ABB-C104

**LABORATORIES:** (2 hours 50 minutes/week) Refer to assigned lab section for date, time & location.

#### 4. LEARNING OUTCOMES

<b>Upon successful completion of the course, the student should be able to:</b>	
LO.01	Demonstrate correct visualization of orthographic projections
LO.02	Develop solid models and assemblies
LO.03	Construct a set of engineering drawings
LO.04	Analyze a simple computer program
LO.05	Construct a computer program to satisfy a simple specification
LO.06	Apply principles of software development, design, and testing
LO.07	Select suitable materials for real-world applications
LO.08	Discuss properties & performance of materials and their response to surrounding environment
LO.09	Evaluate classes of materials based on structure and function
LO.10	Explain the roles and responsibilities of a Professional Engineer in Canada
LO.11	Explain factors that govern engineering activities and their impact on society and the environment, including health, safety, and risk
LO.12	Identify ethical issues within the context of the Engineering Profession
LO.13	Demonstrate effective technical communication, both orally and in writing
LO.14	Apply effectively principles of team-based learning
LO.15	Reflect on both past experiences and what has been learned from these experiences
LO.16	Demonstrate effective application of the engineering design process
LO.17	Design a well-thought-out solution to a real-world healthcare problem, including proposing, developing, and defending that solution

#### 5. MATERIALS & FEES

##### **REQUIRED TEXTS**

All course materials are available through the Campus bookstore

1. Customized Courseware: Fall 2019 IBEHS 1P10 Project Modules.
2. Customized Courseware: Winter 2020 IBEHS 1P10 Project Modules\*\*.

\*\*This Customized Courseware will be available for purchase in December 2019\*\*

##### **OPTIONAL TEXTS (BUT STRONGLY RECOMMENDED)**

All course materials are available through the Campus bookstore

1. Customized Text: Health Solutions Design Projects I, Volumes 1 and 2. ISBN: 0176850635

### REQUIRED SOFTWARE

Software is available on McMaster Campus computers, as well as for download and installation

1. Autodesk Inventor Professional **2017** ([www.autodesk.com/education/home](http://www.autodesk.com/education/home))
  - a. Note: Autodesk Inventor Professional 2017 is **free** to students at McMaster University
  - b. Register in the Education Community with your McMaster University email address
  - c. To ensure compatibility with campus computers, you must select the correct version (**Autodesk Inventor 2017**) and operating system (**Windows 64-bit**).
2. Python 3.6.1 ([www.python.org/download/](http://www.python.org/download/)) → any 3.6.x version will suffice

### CALCULATOR

Only the McMaster Standard Calculator will be permitted in tests and examinations.

### ONLINE MANAGEMENT

The Course Management System will be Avenue to Learn (<http://avenue.mcmaster.ca/>).

## 6. COURSE OVERVIEW, ASSESSMENT & IMPORTANT DATES

### LAB AND DESIGN STUDIO ATTENDANCE

Students have been assigned specific Lab and Design Studio (Tutorial) sections. When attending Labs and Design Studio, students must attend the assigned room and section. Any assessment completed by a student in a different section than the one assigned will not be graded.

### SUBMISSION OF WORK

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

Grades for Lab Assignments and Design Project work will be posted to Avenue within 7 days after submission. **You will have 7 days from this date (i.e. up to 14 days from the date of submission) to address any concerns you may have to the Course Instructor or your IAI.**

### SUBMISSION PENALTIES

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

- Design Project:
  - Project Milestones: Worksheets must be uploaded to Avenue-to-Learn **by the end of your assigned Design Studio**, or they will not be graded

- Learning Portfolio: Unless explicitly indicated, all work to be submitted to your online Web Portfolio – including *Milestone Worksheets* and *Final Submissions* – must be **submitted by 11:59pm** on deadline day to be considered for grading
- Labs:
  - Submissions must be in the correct format, or will be subject to a mark deduction
- General:
  - It is your responsibility to ensure any electronic submissions can be opened by the TA. Submissions that cannot be opened will not be graded
  - 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

### CUMULATIVE ASSESSMENTS AND EXAMS

All Cumulative Assessments and Exams **must be written**. Failure to write will result in a final grade of F with the notation DNW (Did Not Write). In a case where the component weight cannot be fulfilled as a result of unforeseen and/or uncontrollable circumstance(s) in the course operation or execution, the grades assigned to that component may be pro-rated.

### ASSESSMENT

FINAL GRADE COMPONENT	WEIGHT
<b>Design Projects*</b>	<b>58%</b>
Design Project 0 (DP-0)	(3%)
Design Project 1 (DP-1)	(10%)
Design Project 2 (DP-2)	(15%)
Design Project 3 (DP-3)	(15%)
Design Project 4 (DP-4)	(15%)
<b>Lab Assignments</b>	<b>10%</b>
Two (2) <u>Lab Exercises</u> (Pass/Fail)	(P/F)
Lab Exercises are graded based on completion	
Thirteen (13) <u>Mini-Milestones</u>	(10%)
Your 3 lowest grades will be dropped from the Mini-Milestone grade calculation (note: only <i>completed</i> Mini-Milestones eligible to be dropped)	
Two (2) <u>Experiential Lab Activities</u> (Pass/Fail)	(P/F)
Experiential Lab Activities are graded based on completion	
<b>Lecture Quizzes</b>	<b>2%</b>
In-class quiz questions will occur throughout the year	
<b>Cumulative Assessments and Exams</b>	<b>30%</b>
Fall Term Exam	(9%)
End-of-Year Cumulative Assessment	(2 x 6%)
Winter Term Exam	(9%)

\*A detailed grading breakdown for each Design Project can be found in the appropriate customized courseware Project Module, which can be purchased from the Campus Bookstore.

### IMPORTANT DATES

September 4, 2019	Fall Classes Begin!
September 4-17, 2019	Design Project 0 (DP-0)
<b>September 11-17, 2019</b>	<b>DP-0 Presentations (during Design Studio)</b>
September 18 – October 22, 2019	Design Project 1 (DP-1)
<b>October 22, 2019</b>	<b>DP-1 3-Minute Thesis Presentation</b>
October 23 – December 3, 2019	Design Project 2 (DP-2)
<b>December 4, 2019</b>	<b>DP-2 Poster Presentation</b>
January 6, 2020	Winter Classes Begin!
January 6 – February 14, 2020	Design Project 3 (DP-3)
<b>February 14, 2020</b>	<b>DP-3 Design Expo</b>
February 24 – April 3, 2020	Design Project 4 (DP-4)
<b>April 6, 2020</b>	<b>DP-4 Project Presentations</b>
April 7, 2020	End-of-Year Showcase, Winter Classes End

\*Dates subject to change **with** notice.

\*\* Additional Design Project Deadlines can be found in the customized courseware Project Modules.

## 7. ACCREDITATION

The Graduate Attributes 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. For more information on Accreditation, please visit: <https://www.engineerscanada.ca>. Mapping of the Learning Outcomes outlined in Section 3 above to the Canadian Engineering Accreditation Board (CEAB) Graduate Attributes are outlined in the table below:

### MAPPING TO GRADUATE ATTRIBUTES

GRADUATE ATTRIBUTE		LEARNING OUTCOMES
<b>A01 Knowledge Base for Engineering</b>		
1.01	Competence in Mathematics	LO.04
1.02	Competence in Natural Sciences	LO.07, LO.08, LO.09
1.03	Competence in Engineering Fundamentals	LO.01, LO.05
1.04	Competence in Specialized Engineering Knowledge	LO.03, LO.06, LO.09
<b>A02 Problem Analysis</b>		
2.02	Demonstrates an ability to identify a range of suitable engineering fundamentals (including mathematical techniques) that would be potentially useful for analyzing a technical problem.	LO.02, LO.05, LO.06
2.03	Obtains substantiated conclusions as a result of a problem solution including recognizing the limitations of solutions.	LO.17

<b>GRADUATE ATTRIBUTE</b>		<b>LEARNING OUTCOMES</b>
<b>A03 Investigation</b>		
3.02	Selects appropriate model and methods and identifies assumptions and constraints.	L0.05
<b>A04 Design</b>		
4.01	Recognizes and follows an engineering design process.	L0.16
4.02	Recognizes and follows engineering design principles including appropriate consideration of environmental, social and economic aspects as well as health and safety issues.	L0.17
4.03	Proposes solutions to open-ended problems.	L0.17
4.04	Employs appropriate techniques for generation of creative ideas such as brainstorming and structured inventive thinking.	L0.17
4.05	Includes appropriate health and safety considerations.	L0.17
<b>A05 Use of Engineering Tools</b>		
5.02	Demonstrates ability to use modern state-of-the-art tools.	L0.02, L0.05
<b>A06 Individual and Teamwork</b>		
6.01	Manages time and processes effectively, prioritizing competing demands to achieve personal and team goals and objectives.	L0.14
6.03	Works in a group, taking a leadership role as appropriate and relinquishing the leadership role as appropriate.	L0.14
<b>A07 Communication Skills</b>		
7.01	Demonstrates an ability to respond to technical and non-technical instructions and questions	L0.13
7.02	Presents instructions and information clearly and concisely as appropriate to the audience	L0.13
7.03	Constructs effective oral or written arguments as appropriate to the circumstances.	L0.13
<b>A08 Professionalism</b>		
8.01	Demonstrates an understanding of the role of the engineer in society, especially in protection of the public and public interest.	L0.10, L0.11
8.02	Demonstrates an understanding of legal requirements governing engineering activities (including but not limited to personnel, health, safety, and risk issues).	L0.10, L0.11
8.03	Shows an awareness of the PEO and the role of licensing.	L0.10, L0.11
<b>A09 Impact of Engineering on Society and the Environment</b>		
9.01	Identifies and quantifies the full range of short-term, long-term, local and global impacts of their engineering projects on society, including: economic aspects; social, cultural, and human health aspects, and; ecosystem integrity aspects.	L0.17

GRADUATE ATTRIBUTE		LEARNING OUTCOMES
<b>A10 Ethics and Safety</b>		
10.01	Applies the engineering code of ethics, understanding of the stakeholders: the individual, the employer, and the public.	LO.12
10.02	Applies ethical frameworks and reasoning in situations where there may be conflicting interests among the stakeholders.	LO.12
10.03	Applies knowledge of law and principles of equity to ensure equitable treatment of others.	LO.12
<b>A12 Life-Long Learning</b>		
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.	LO.15

## 8. POLICIES

### 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.

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.

It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <http://www.mcmaster.ca/academicintegrity>

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. submission of work not one's own or which other credit been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

### AUTHENTICITY / PLAGIARISM DETECTION

In this course we will be using a web-based service (Turnitin.com) to reveal authenticity and ownership of student submitted work. Students will be expected to submit their work electronically 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 [www.mcmaster.ca/academicintegrity](http://www.mcmaster.ca/academicintegrity).

### **ON-LINE ACCESS**

In this course, we will be using Avenue-to-Learn. 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.

### **ACADEMIC ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES**

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Student Accessibility Services can be contact by phone at 905.525.9140 ext. 28652 or e-mail at [sas@mcmaster.ca](mailto:sas@mcmaster.ca). For further information, consult McMaster University's [Academic Accommodation of Students with Disabilities](#) policy.

### **REQUEST 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”

1. All MSAFs are to be directed to [prof1p10@mcmaster.ca](mailto:prof1p10@mcmaster.ca). Sending to another email address will delay processing.
2. 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 the following lab assessments/assignments, **they will be rescheduled:**
    - Design Project Individual Milestones
      - DP-2 (Milestone 3B)
      - DP-3 (Milestone 4)
    - End-of-Year Cumulative Assessments

### **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 requiring a RISO accommodation 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.

### **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 (e.g., severe weather, labour disruptions, etc.). 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.

### **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/>.

### **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.