January 18, 2021

University of Manitoba
Faculty of Agricultural & Food Sciences
Department of Biosystems Engineering

COURSE DETAILS

Course Title & Number:	BIOE 4950 Biosystems Engineering Design 4
Number of Credit Hours:	4
Lecture/Lab Times:	MWF 1:30-2:20 pm & WF 2:30-4:20 pm
Classroom Location:	Online (remote)
Lab Location:	Online (remote)
Pre-Requisites:	BIOE 4900 Biosystems Design 3

Undergraduate Calendar Description
BIOE 4950 focuses on the fabrication of a prototype. Engineering communication topics are integrated alongside design concepts. Design teams take the design developed in BIOE 4900 and fabricate a prototype. Prerequisite: BIOE 4900.

How does this course fit into the curriculum?
This is a required course in the Biosystems Engineering program; the prerequisite for BIOE 4950 is BIOE 4900. The Biosystems Engineering program has four design courses that build upon basics that were introduced in ENG 1430 (i.e., introduction to the engineering design process and the dynamics of working as a team to solve an engineering problem). BIOE 4950 is the fourth of these courses and is to be taken during the 4th year of the program. This course will provide the student with the opportunity to use skills from other courses, build on fundamental engineering competencies, and develop engineering communication skills that are most important in industry. BIOE 4950 provides students with the opportunity to produce a prototype or proof-of-concept designed in the BIOE 4900 proposal phase.

Why is this course useful?
It is often said that design is what engineers do. Engineers use a wide variety of skills and knowledge to take an idea, formulate a concept and develop a design. To clearly articulate a design an engineer must be able to communicate effectively in written form, through design drawings and via oral presentations. This course will provide the student with the opportunity develop these skills by means of a hands-on project.

Instructor Contact Information

Instructor(s) Name:	Dr. Don Petkau, P.Eng., Senior Instructor
Office Location:	E2-358 EITC
Office Hours or Availability:	By appointment outside of class or laboratory hours.
Office Phone No.	~~204-474-7443~~
Email:	Don.Petkau@umanitoba.ca
Contact:	You may contact me with questions related to the course in person, by phone, or by email.

Instructor(s) Name:	Dr. Jillian Seniuk Cicek, Ph.D. (limited participation in this course; will only be present for Team Presentations & involved in some assessment)
Office Location:	333 Stanley Pauley Engineering Building
Office Hours or Availability:	By appointment
Office Phone No.	204-474-9698
Email:	Jillian.SeniukCicek@umanitoba.ca
Contact:	You may contact me with questions related to the course in person or by email.

Instructor(s) Name:	Mr. James White, P.Eng. (Engineer-in-Residence)
Office Location:	E1-268 EITC
Office Hours or Availability:	By appointment
Office Phone No.	
Email:	James.White@umanitoba.ca

All email communication must conform to the Communicating with Students university policy. We will do our best to respond to your questions within 24 h.

Textbook, Readings, Materials

Dunwoody, A.B., T.N. Teslenko, J. Reilly, S.E. Nesbit, P.J. Cramond and C.S. Paterson. 2018. Fundamental Competencies for the 21st-Century Engineer, Second Edition. Don Mills, ON: Oxford University Press.

Course Goals

The intent of this course is to allow students to complete the design project initiated in BIOE 4900. Design teams will be required to evaluate their design using an appropriate strategy prior to making a final recommendation to their industry client in the form of both a written project report and a formal presentation.

Intended Learning Outcomes

At the conclusion of the course, the student should be able to:

1. Use appropriate communication strategies to manage an engineering design project.
2. Use project management tools and fundamentals to manage an engineering design project.
3. Evaluate an engineering design using an appropriate strategy (i.e., prototype, proof-of-concept model, computer simulation, mathematical model).
4. Write an engineering project report for an external client.
5. Disseminate technical information in a formal presentation.
6. Exhibit lifelong learning (reflect on engineering practice lessons).
7. Exhibit professional behaviour expected of an engineering professional.

Expected Competency Level **

Learning Outcome	Attributes*											
	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1							A					
2											A	
3				A								
4							A					
5							A					
6												A
7								A				

***CEAB Graduate Attributes:**

KB A knowledge base for engineering
PA Problem analysis
IN Investigation
DE Design
ET Use of engineering tools
IT Individual and team work
CS Communication skills
PR Professionalism
IE Impact of engineering on society/ environment
EE Ethics and equity
EP Economics and project management
LL Lifelong learning

*****Expected Level of Development*:**

I - Introductory

D – Developing

A- Advanced

Using Copyrighted Material

Please respect copyright. We will use copyrighted content in this course. We have ensured that the content used is appropriately acknowledged and is copied in accordance with copyright laws and University guidelines. Copyrighted works, including those created by us, are made available for private study and research and must not be distributed in any format without permission.

Recording Class Lectures

The course instructors and the University of Manitoba hold copyright over the course materials, presentations and lectures that form part of this course. No audio or video recording of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission from the course instructors. Course materials are for the participant's private study and research.

Course Technology

It is the general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. The student can use all technology in classroom setting only for educational purposes approved by instructor and/or the University of Manitoba Student Accessibility Services. While we recognize the importance of technology in our daily lives (laptops, cell phones, blackberries) we ask that you use them with discretion. For example, this includes turning off cell phones during class time and if working on a laptop, ensuring that the work is related exclusively to the lecture/course. Some course materials will be available through UM Learn.

Class Communication

In accordance with university policy all email communication for this course shall be conducted using your University of Manitoba email address only.
For full details of the Electronic Communication with Students please visit: http://umanitoba.ca/admin/governance/media/Electronic_Communication_with_Students_Policy_-_2014_06_05.pdf

Please note that all communication between you as a student and your instructors must comply with the electronic communication with student policy:
(http://umanitoba.ca/admin/governance/governing_documents/community/electronic_communication_with_students_policy.html).

Please ensure that you are also monitoring your UM Learn account for this course.

Expectations: You Can Expect Us To

Learning is most effective when both the instructors and the students are engaged in the subject material. The role of the instructors, therefore, is to create an environment that facilitates student engagement and learning. In this course, you can expect an active learning environment. Some dissemination of information will occur using the traditional lecture format. However, a substantial portion of the course will be used to facilitate teamwork and the development of teams' design projects. The nature of design tends to be open-ended, iterative and relies on the self-discipline of the engineer to see a project through to completion. The schedule for this course provides for multiple blocks of time each week, in which a portion of the time will be used to present more traditional lecture material for certain aspects of the course. This will be done to

provide direction for assignments and other activities required for the course. The remainder of class time will be reserved to work on design projects. This time will be used for a variety of activities, including: consulting with the instructors, working on design drawings, meeting with industry members, sourcing product information, and evaluating the proposed design.

Expectations: We Expect You To

Attendance and punctuality are expected, primarily as this is a team-based course, requiring students to maximize opportunities to work effectively with their teammates in class. If you must be absent, please notify your team members and us beforehand via email. When we are engaged in class discussion and interaction, your full attention is requested. While instruction time for this course is less structured than in a traditional analysis course, successful completion of the course requirements demands that this time be used wisely.

Academic Integrity:
All applicable rules and regulations in the University of Manitoba General Calendar, including those on plagiarism, cheating (Section 7.1) and examination impersonation (Section 4.2.8) are to be read and followed. Continued registration in this course implies that you accept, and will comply, with these conditions. Reproduction of another student's work is not acceptable. Please refer to the "Academic Integrity" section of the University of Manitoba Undergraduate Academic Calendar. (http://crscalprod.ad.umanitoba.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=341&chapterid=4295&loaduseredits=False).

Referencing Style

Students are expected to follow the CSBE reference style when citing references in course assignments. The ***Biosystems Engineering Citation Guide – CSBE Style*** is available through UM Learn. Please refer to this guide to ensure that you follow the correct referencing style.

Students Accessibility Services

Student Accessibility Services
If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

Student Accessibility Services http://umanitoba.ca/student/saa/accessibility/
520 University Centre
204 474 7423
Student_accessibility@umanitoba.ca

Class & Lab Schedule

Week 1
January 18 Course overview
January 20 Design reviews with all teams (4 teams)
January 22 Design reviews with all teams (4 teams)

Week 2
January 25 Unstructured design time; **Project Update Memo #1 due**
January 27 Engineering Practice Lecture
January 29 Unstructured design time; Meeting with individual teams

Week 3
February 1 Unstructured design time
February 3 Engineering Practice Lecture; James relationships between manufacturers and distributors
February 5 Unstructured design time

Week 4
February 8 Unstructured design time
February 10 Engineering Practice Lecture
February 12 Unstructured design time

Week 5
February 22 Unstructured design time; **Project Update Memo #2 due**
February 24 Engineering Practice Lecture
February 26 Unstructured design time

Week 6
March 1 Unstructured design time
March 3 Engineering Practice Lecture
March 5 Unstructured design time

Week 7
March 8 Unstructured design time
March 10 Engineering Practice Lecture
March 12 Unstructured design time

Week 8
March 15 Unstructured design time; **Project Update Memo #3 due**
March 17 Engineering Practice Lecture
March 19 Unstructured design time

Week 9
March 22 Unstructured design time
March 24 Engineering Practice Lecture
March 26 Review of Engineering Logbooks

Week 10
March 29 Unstructured design time
March 31 Engineering Practice Lecture
April 2 Good Friday

Week 11

April 5	Engineering Practice Lecture
April 7	**Design Project Presentations**
April 9	**Design Project Presentations**

Week 12

April 12	Instructions for Self & Peer Evaluations discussed; **Lecture Summaries due**
April 14	Unstructured design time
April 16	Course evaluations to be completed. **Design Project Report due.** **Self & Peer Evaluation due; Capstone Experience Reflection due**

Important Dates:

February 15-19:	No classes – Louis Riel Day & Winter Break
March 31:	Last date for Voluntary Withdrawal for winter term courses.
April 7 & 9:	Design Project Presentations
April 16:	Design Project Reports due

Course Evaluation Methods

Engineering Design Project (65% of course grade)

- Design Project Report (50%)
- Design Project Presentation (10%)
- Client Evaluation (5%)

Term Assignments (10% of course grade)

- Engineering Logbook/Journal
- Project Update Memos (3)

Lifelong Learning (10% of course grade)

- Lecture Summaries
- Capstone Experience Reflection

Professionalism (15% of course grade)

- Attendance at lectures (5%)
- Self & Peer Evaluations (10%)

Grading

The grading scale used for this course is shown below.

Letter Grade	Percentage out of 100
A+	92-100
A	85-91
B+	78-84
B	72-77
C+	66-71
C	60-65
D	50-59
F	Less than 50

Assignment Descriptions

Engineering Design Project (65% of course grade)

Design Project Report (50%): Design teams are required to submit a written project report that summarizes the project work over both semesters (BIOE 4900 & BIOE 4950), with emphasis on the evaluation of the design work completed during the current semester (i.e., process used to evaluate the design). This report will be shared with the industry client as a final record of the project that has been completed. The report will also be graded by the course instructors. An assessment rubric will be provided to students that will give an overview of the content expected to be contained in the Design Project Report.

Design Project Presentation (10%): At the end of the term, each student is expected to participate in a Design Project Presentation. The industry client will be invited to these presentations.

Client Evaluation (5%): The design team's industry client will be asked to assess the final design.

Term Assignments (10% of course grade)

Engineering Logbook/Journal: Students are expected to keep an engineering logbook/journal for their design project.

Project Update Memos: Design teams are expected to provide regular progress updates to the course instructors using the format of written memos.

Lifelong Learning (10% of course grade)

Lecture Summaries: We have arranged a series of lectures, some to be delivered by guests, covering topics that are relevant to the practicing engineer. You will be expected to take notes and write a short reflection indicating how the topic might be relevant to the engineering career that you envision.

Capstone Experience Reflection: The capstone experience is intended to provide the engineering student with an opportunity to integrate knowledge gained throughout the engineering program into an open-ended real-world design problem presented by an industry client. You will be asked to prepare a written reflection on this experience.

Professionalism (15% of course grade)

Attendance (5%): Attendance will be taken for each class. Students who have unexcused absences will forfeit all or part of the 5% Attendance grade.

Self & Peer Evaluations (10%): Through confidential peer evaluations conducted at the end of term, each student will be given the opportunity to assess his/her teammates in terms of their collaborative and design contributions throughout the project period.

Assignment Extension and Late Submission Policy

Deadlines are a reality in the world of engineering. We expect assignments to be completed on time. Assignments submitted after the due date will be deducted 10% per day. Missed assignments will receive a grade of zero.