



## Course Outline

### Instructor

- Dr. Natasha Jacobson, P.Eng.  
(she/her)  
E1-358 EITC  
(204) 474-7917  
[Natasha.Jacobson@umanitoba.ca](mailto:Natasha.Jacobson@umanitoba.ca)

### Office Hours

- Wednesdays 3:00 – 4:00 PM
- Or by appointment

### Communications Support

- Dr. Jillian Seniuk-Cicek (she/her)  
SP-333 EITC  
(204) 474-9698  
[Jillian.SeniukCicek@umanitoba.ca](mailto:Jillian.SeniukCicek@umanitoba.ca)

### Industry Support

- Mr. Jamies White (he/him)  
E1-268 EITC  
[James.White@umanitoba.ca](mailto:James.White@umanitoba.ca)

### Location

- **300 Human Ecology**  
Mon 1:30 – 2:20 PM  
Wed 1:30 – 4:20 PM  
Fri 1:30 – 4:20 PM

### Contact Hours

- 4 credit hours
- Lectures:  
3 hours x 12 weeks = 36 hours
- Laboratories:  
2 hours x 12 weeks = 24 hours

### Prerequisites:

- BIOE 4900 Biosystems Design 3

### Course Website:

<http://umanitoba.ca/umlearn>

## BIOE 4950 Biosystems Engineering Design 4

Winter 2023

### Course Objectives

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.

### Course Content

The following topics will be covered:

- Design Process
- Prototype Design
- Design Evaluation
- Project Management
- Communication
- Professionalism and Ethics

### Textbook

*Fundamental Competencies for the 21st-Century Engineer*, Second Edition, Dunwoody, A.B., T.N. Teslenko, J. Reilly, S.E. Nesbit, P.J. Cramond and C.S. Paterson, 2018. Don Mills, ON: Oxford University Press. ISBN 0199026602 (Optional)

### Learning Outcomes

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.

## Traditional Territories Acknowledgement

The University of Manitoba campuses are located on the original lands of the Anishinaabeg, Cree, Oji-Cree, Dakota, and Dene peoples, and on the homeland of the Métis Nation.

We respect the Treaties that were made on these territories, we acknowledge the harms and mistakes of the past, and we dedicate ourselves to move forward in partnership with Indigenous communities in a spirit of reconciliation and collaboration.

## Accreditation Details

- Mathematics: 0%
- Natural Science: 0%
- Complementary Studies: 25%
- Engineering Science: 0%
- Engineering Design: 75%

### 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: Life-long learning

### Competency Levels

- 1 - Knowledge (Able to recall information)
- 2 - Comprehension (Ability to rephrase information)
- 3 - Application (Ability to apply knowledge in a new situation)
- 4 - Analysis (Able to break problem into its components and establish relationships.)
- 5 - Synthesis (Able to combine separate elements into a whole)
- 6 - Evaluation (Able to judge the worth of something)

## Grading Scale

Note: These boundaries represent a guide for the instructor and class alike. Provided that no individual student is disadvantaged, the instructor may vary any of these boundaries to ensure consistency of grading from year-to-year.

Letter	Mark
A+	92–100
A	85–91
B+	78–84
B	72–77
C+	66–71
C	60–65
D	50–59
F	< 50

## Expected Competency Levels

Outcome	KB	PA	IN	DE	ET	IT	CS	PR	IE	EE	EP	LL
1								3				
2						3						
3						3		3				
4												
5				3				3				
6				3				3		3		3

## CEAB Graduate Attributes Assessed

DE.3 – Develops possible solutions to an open-ended design problem, leading to an appropriate recommendation

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IT.2 – Contributes equitably to completion of group work

IT.3 – Exhibits appropriate interpersonal; skills when interacting with team members

PR.3 – Exhibits behaviour expected of a Professional Engineer

EE.3 – Demonstrates individual accountability

LL.2 – Engages in activities to advance knowledge and understands the role of on-going professional development

## Important Dates

- **Memo 1 – Progress over Winter Break forthcoming timeline**  
January 16, 2023
- **Memo 2 – Testing Updates**  
February 6, 2023
- **Terry Fox Day**  
February 20, 2023  
No classes or examinations
- **Winter Term Break**  
February 21-24, 2023  
No classes or examinations
- **Memo 3 – Final Design Summary**  
March 6, 2023
- **Voluntary Withdrawal Deadline**  
March 22, 2023
- **Design Day**  
April 5, 2023
- **Good Friday**  
April 7, 2023  
No classes or examinations
- **Last Day of Classes**  
April 12, 2023
- **Peer Evaluations, Timesheets, Meeting Minutes**  
April 12, 2023
- **Design Project Report**  
April 13, 2023

## Evaluation

**Shop Safety Training and Orientation is required to move to BIOE 4950.**

Component	Value (%)	Assessor	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Design Project Report	40	NJ, JSC, JW	F, S	1, 3, 4, 5	T
Design Poster & Presentation <sup>A</sup>	20	All <sup>A</sup>	F, S	1, 2, 3, 4, 5	T
Client Evaluation <sup>B</sup>	5	Client <sup>B</sup>	S	2, 4, 5, 6	I/T
Memos (3)	10	NJ & JW	F, S	6	T
Professionalism <sup>C</sup>	20	NJ	F, S	6	I
Timesheets & Minutes	5	NJ & JSC	F, S	1, 5	I

\* Method of Feedback: F - Formative (written comments and/or oral discussion), S - summative (numerical grade)

\*\* I/T: I – Individual effort, T – Team effort

<sup>A</sup> Design Poster & Presentation Assessment: Grade based on feedback from instruction team, client, as well as feedback from guest experts including department technicians and internal faculty.

<sup>B</sup> Client: "Client" refers to a representative external to the instruction team responsible for supervising team projects given personal expertise in the area. May include industry representatives or faculty.

<sup>C</sup> Professionalism: Grade based on attendance, classroom engagement, self-evaluations, peer evaluations, and client evaluations. It is at the instructors' discretion to use the peer/client evaluations to inform the professionalism grade. Students with poor peer/client evaluations may lose their Professionalism mark and could be assessed up to a 10% deduction to the Team deliverables.

## Academic Integrity

Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the *General Academic Regulations on Academic Integrity*, students are reminded that plagiarism or any other form of cheating in examinations, term tests, assignments, projects, or laboratory reports is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating by another student is also subject to serious academic penalty.

## Requirements/Regulations

- All email communication must conform to the Communicating with Students university policy.

[Communicating with Students](#)

- Late assignments will be deducted at a rate of 10% per day past the outset deadline.
- **All assignments must be submitted to pass the course.**
- 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 UMLearn. Please refer to this guide to ensure that you follow the correct referencing style.
- It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should familiarize themselves with the University's *General Academic Regulations*, as well as Section 3 of the Faculty of Engineering *Academic Regulations* dealing with incomplete term work, deferred examinations, attendance, and withdrawal.

[General Academic Regulations](#)

[Engineering Academic Regulations](#)

- Students should be aware that they have access to an extensive range of resources and support organizations. These include Academic Resources, Counselling, Advocacy and Accessibility Offices as well as documentation of key University policies e.g. Academic Integrity, Respectful Behaviour, Examinations and related matters.

[Supplemental Resources](#)

## Retention of Student Work

Students are advised that copies of their work submitted in completing course requirements (i.e. assignments, laboratory reports, project reports, test papers, examination papers, etc.) may be retained by the instructor and/or the department for the purpose of student assessment and grading, and to support the ongoing accreditation of each Engineering program. This material shall be handled in accordance with the University's *Intellectual Property Policy* and the protection of privacy provisions of *The Freedom of Information and Protection of Privacy Act (Manitoba)*. Students who do not wish to have their work retained must inform the Head of Department, in writing, at their earliest opportunity.

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