University of Manitoba | Price Faculty of Engineering
Department of Biosystems Engineering

Course Outline

Instruction Team

- Dr. Danny Mann, P.Eng.
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- Dr. Jillian Seniuk Cicek (she/her)
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Student Hours

- Individual assistance is available by appointment.

Teaching Assistants

- Makenna Coldwell
  coldwel1@myumanitoba.ca
- Jordan Carrette (he/him)
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Location

- **300 Human Ecology Bldg.**
  MWF 1:30 - 2:20 pm
- **300 Human Ecology Bldg.**
  W 2:30-5:15 pm

Contact Hours

- 4 credit hours
- Lectures:
  3 hours x 12.3 weeks = 37 hours
- Design Studio:
  2 hours x 13 weeks = 26 hours

Prerequisites:

- ENG 1430 Design in Engineering

Course Website:

http://umanitoba.ca/umlearn

Traditional Territories Acknowledgement

The University of Manitoba campuses are located on the original lands of Anishinaabeg, Ininiwak, Anisininewuk, Dakota Oyate and Dene, and on the National Homeland of the Red River Métis.

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.

BIOE 2900 Biosystems Engineering Design 1
Fall 2025

Course Description

An introduction to the professional discipline of Biosystems Engineering and the philosophy of systems thinking that is used by the Biosystems engineer. Students will be introduced to several principles (i.e., safety engineering, human factors engineering, and biomimicry) that should be considered during the design process and will be given the opportunity to apply these principles to design problems. The course will provide an opportunity for students to develop technical communication, project management and teamwork skills.

Course Goals

- To introduce students to the professional discipline of Biosystems Engineering and the philosophy of systems thinking that is essential to the Biosystems engineer.
- To introduce fundamental concepts of safety engineering, human factors engineering, and biomimicry; and to demonstrate how these design principles can be considered during the design process.
- To provide students with an opportunity to use the engineering design process to solve problems.
- To provide students with an opportunity to collaborate equitably with group members in a team setting to manage an engineering design project.
- To provide students with instruction in the basics of professional communication skills and information literacy, and with opportunities to practice using these skills to effectively communicate a design solution.

Course Content

- Introduction to Discipline of Biosystems Engineering
  - History of Biosystems Engineering, Philosophy of Systems Thinking, Lifelong Learning for the Biosystems Engineering Professional, Ethics & Professionalism in Engineering
  - Career Development
- Engineering Communication Topics:
  - Principles of Effective Communication: Technical Presentations, Professional Written Correspondence; Writing Engineering Reports; Team Presentations
  - Teamwork (Brainstorming; Working in Teams; Professional and Ethical Behaviour)
- Engineering Design Principles
  - Engineering Design Process, Sources of information for the design engineer (scientific literature, case studies, nature)
  - Safety Engineering: Safety Engineering Hierarchy, Design of guards & warning labels
  - Human Factors Engineering: Anthropometrics, Human-Machine Interface, Task Analysis, Issues with Automation

Course Delivery

Lectures and Studio Time will proceed as listed in the left and this time will be used to deliver course content, provide time for design work, testing and presentations.

The Department of Biosystems Engineering has devised a plan so that there is minimal impact on the delivery and content of the course, should the instructor fall sick and be unable to continue lectures in-person. Please be assured that the alternative plan outlining any deviation from the normal mode of instruction will be communicated to you as quickly as possible if/when the need arises.

Recommended Reading

The instructors will supply materials through the course website (www.umlearn.com).

Accreditation Details

Accreditation Units

- 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

I - Introduced
D – Intermediate (Developing)
A - Advanced

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

Learning Outcomes

By the end of this course, you will be able to:

No.	Learning Outcome
1	Describe careers available to Biosystems engineers and how the professional Biosystems engineer can practice lifelong learning.
2	Apply knowledge gained from the scientific literature, case studies, or nature (bioinspiration) to the solution of open-ended design problems.
3	Critique case studies of engineering design failures to i) identify principles of safety engineering or human factors engineering that were violated, and ii) assign responsibility for the errors.
4	Apply principles of safety engineering and human factors engineering to design problems.
5	Demonstrate effective written, oral, and graphic communicative competence in conducting engineering tasks.
6	Work in a team setting to complete an open-ended engineering design project.

CEAB Graduate Attributes Assessed

This course will assess the following CEAB graduate attribute indicators shown below:

Indicator (Level)	Indicator Description	Assessment Point
DE.2 (I)	Uses an appropriate design process that considers all relevant factors (i.e., health and safety risks, standards, economic, environmental, cultural and societal considerations)	Midterm exam
DE.3 (D)	Develops possible solutions to an open-ended design problem, leading to an appropriate recommendation	Written design report
IT.1 (D)	Participates equitably in group activities and decision-making in leadership and followership (support) roles	Reflective letter #2 & Self evaluation
IT.2 (D)	Exhibits appropriate interpersonal skills when interacting with team members, including giving and receiving constructive feedback	Self evaluation
CS.1 (I)	Designs and produces effective written and graphical engineering documents for specific audiences (e.g., research reports, engineering reports, design documents)	Design report (draft & final)
CS.2 (D)	Delivers, produces, and delivers effective technical presentations for specific audiences	Final project presentation
PR.1 (I)	Understands the role of the engineering profession in society and the responsibility of the Professional Engineer in protection of the public	Midterm exam
EE.1 (I)	Appreciates and articulates ethical considerations, and resolves ethical issues, related to engineering activities	Midterm exam
LL.1 (D)	Recognizes limitations of their knowledge and engages in actions to address them	Literature Review report
LL.2 (I)	Critically reflects on successes, challenges and mistakes to guide ongoing learning	Self evaluation
LL.3 (D)	Demonstrates research and information literacy skills	Literature Review report & design reports

Important Dates

- **Reflective Letter #1 due**
  Monday, Sept. 8, 2025
- **Resource magazine presentations**
  Wednesday, Sept. 10, 2025
- **Reflective Letter #2 due**
  Monday, Sept. 22, 2025
- **Literature Review Report due**
  Wednesday, Oct. 22, 2025
- **Thanksgiving**
  Mon. Oct. 13, 2025
  No classes or examinations
- **Midterm Exam**
  Wednesday, Nov. 5, 2025
- **Conceptual Design Report due**
  Monday, Nov. 7, 2025
- **Fall Term Break**
  Nov. 10-14, 2025
  No classes or examinations
- **Voluntary Withdrawal Deadline**
  November 18, 2025
- **Informational Interview & Reflective Letter #3 due**
  Wednesday, Nov. 26, 2025
- **Final Design Reports due**
  Monday, Dec. 1, 2025
- **Team Presentations**
  Wednesday, Dec. 3, 2025
- **Self-evaluation due**
  Monday, Dec. 8, 2025
- **Last Day of Classes**
  Mon. Dec. 8, 2025

Evaluation

Component	Value (%)	Assessor	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Midterm Exam	30	DM & TA	S	2, 3, 4	I
Design Drafts	10	JSC & TA	F,S	5	I
Final Design Report	25	DM	S	4	T
Design Presentation	10	JSC, DM & TAs	F,S	4, 5, 6	T
Professional Activities	15	JSC & TA	F, S	1, 6	I
Term Design Assignments	10	TA	S	3	I

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

** I/T: **I** – Individual effort, **T** – A team effort

Description of Evaluation Components

Midterm Exam: Students will be evaluated on the application of principles of safety engineering and human factors engineering to design problems.

Design Drafts: Each student is expected to submit two design drafts covering different aspects of the design project.

- Literature Review Report (5%)
- Conceptual Design Report (5%)

Final Design Report: Each design team is expected to submit a final design report that fully describes the conceptual solution. Designs teams should take advantage of feedback provided by Dr. Seniuk Cicek on the draft design reports.

Design Presentation: Design teams will be expected to describe their proposed conceptual solution via a formal PowerPoint presentation.

Professional Activities: There are several assignments throughout the term that will contribute to the development of your professional skills. Examples include:

- Resource magazine presentation (1%)
- 3 reflective letters (3 x 1%)
- peer feedback on team presentations (1%)
- project journal (5%)
- self-evaluation (5%)

Term Design Assignments:

- Safe Work Procedure assignment (5%)
- Guard design report (5%)

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 docked 10% per day. If students know in advance that they need more time, they are encouraged to speak with instructors, and we will work to accommodate you.

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

- Please copy the Instruction Team in all emails (Instructors and Teaching Assistants). All email communication must conform to the Communicating with Students university policy.

Communicating with Students

- As the Instruction Team, we will do our best to respond to all emails **within 48 hours during working hours** (8:30 AM – 5:30 PM Monday thru Friday). Ex. A Friday night email may not be responded to until the following Tuesday.
- Self-declaration forms may be completed for missed tests, exams, or assignments during short-term absences (≤72 hours) for extenuating circumstances. This form cannot be used for planned absences like vacations. It is also not to be used for longer-term absences, or ongoing circumstances (e.g., Authorized Withdrawals, Leaves of Absence, or other accommodations), which will still require additional documentation.

Self-Declaration Form for Brief or Temporary Absence

Self-Declaration Policy for Brief or Temporary Absences

- 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*.

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*

Deferred Final Examinations

Students who miss the regularly scheduled writing of a final examination for valid medical or compassionate reasons will only be allowed to write a deferred exam if the Associate Dean (Undergraduate) approves the request. All requests for a deferred examination *must* be made within 48 hours of the missed exam and follow the procedure described on the Faculty website without exception. Course Instructors *do not have the discretion* to grant deferred final examinations.

Deferred Exam Policy (student experience website)

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 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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