



## Course Outline

### Instruction Team

- Dr. Danny Mann, P.Eng.  
E2-376B EITC  
(204) 474-7149  
[Danny.Mann@umanitoba.ca](mailto:Danny.Mann@umanitoba.ca)
- Dr. Jillian Seniuk Cicek (she/her)  
Stanley Pauley Engineering Building  
(204) 474-9698  
[Jillian.SeniukCicek@umanitoba.ca](mailto:Jillian.SeniukCicek@umanitoba.ca)

### Student Hours

- Individual assistance is available by appointment.

### Teaching Assistants

- Anita Ezeagba  
[ezeagbaa@myumanitoba.ca](mailto:ezeagbaa@myumanitoba.ca)
- Md. Shadhin  
[shadhinm@myumanitoba.ca](mailto:shadhinm@myumanitoba.ca)

### Location

- **E2-130 EITC Bldg**  
MWF 1:30 - 2:20 pm
- **E2-130 EITC 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 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.

## BIOE 2900 Biosystems Engineering Design 1 Fall 2023

### 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 opportunity to apply these principles to design problems. The course will provide 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](http://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

- 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

## 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.

## Graduate Attribute Competency Levels Developed

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

## CEAB Graduate Attributes Assessed

- IN.1 – Gathers information (literature review, measurements, experiments, laboratory exercises) and analyzes data
- DE.1 – Understands the complexities of an open-ended engineering design problem and defines appropriate objectives and constraints
- DE.2 – Uses an appropriate design process that considers all relevant factors (i.e., health and safety risks, standards, economic, environmental, cultural and societal considerations)
- DE.3 – Develops possible solutions to an open-ended design problem, leading to an appropriate recommendation
- IT.1 – Participates equitably in group activities and decision-making in leadership and followership (support) roles
- IT.2 – Exhibits appropriate interpersonal skills when interacting with team members, including giving and receiving constructive feedback
- CS.1 – Designs and produces effective written and graphical engineering documents for specific audiences (e.g., research reports, engineering reports, design documents)
- CS.2 – Delivers, produces, and delivers effective technical presentations for specific audiences
- PR.1 – Understands the role of the engineering profession in society and the responsibility of the Professional Engineer in protection of the public
- EE.1 – Appreciates and articulates ethical considerations, and resolves ethical issues, related to engineering activities

## Important Dates

- **Early Withdrawal Deadline**  
September 19, 2023
- **National Day for Truth and Reconciliation**  
Mon. Oct. 2, 2023  
No classes or examinations
- **Thanksgiving**  
Mon. Oct. 9, 2023  
No classes or examinations
- **Midterm #1**  
Friday, Oct. 27, 2023
- **Draft Design Report due**  
Monday, Oct. 30, 2023
- **Fall Term Break**  
Nov. 13-17, 2023  
No classes or examinations
- **Remembrance Day (observed)**  
Mon. Nov. 13, 2023  
No classes or examinations
- **Voluntary Withdrawal Deadline**  
November 21, 2023
- **Midterm #2**  
Wednesday, Nov. 29, 2023
- **Final Design Reports due**  
Monday, Dec. 4, 2023
- **Team Presentations**  
Wednesday, Dec. 6, 2023
- **Self-evaluation due**  
Monday, Dec. 11, 2023
- **Last Day of Classes**  
Mon. Dec. 11, 2023

## Evaluation

Component	Value (%)	Assessor	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Midterm Exams (2)	20	DM	S	2, 3, 4	I
Draft Design Report	20	JSC	F,S	5	I
Final Design Report	20	DM	S	4	I
Design Presentation	10	JSC & DM	F,S	4, 5, 6	T
Professional Activities	20	JSC	F, S	1, 6	I
Quizzes	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 Exams:** Students will be evaluated on the application of principles of safety engineering (midterm #1) and human factors engineering (midterm #2) to design problems.

**Draft Design Report:** Each student is expected to submit a draft design report following the format described in class. The report should not exceed 3 pages, focusing on a description of the conceptual solution that has been proposed in response to the design problem posed by the course instructor.

**Final Design Report:** Each design team is expected to submit a final design report that fully describes the conceptual solution that has been proposed in response to the design problem posed by the course instructor. Design teams should take advantage of feedback provided by Dr. Seniuk Cicek on the draft design reports. The final design report should also include assessments of the team's safety deliberations and human factors deliberations that were completed since the submission of 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 that individual students will complete throughout the term that will contribute to the development of your professional skills. These include: three reflective letters (Introductory, teamwork, informational interview); two progress emails; individual presentations, project journal with meeting minutes, and peer feedback for individual and team presentations. At the end of the term, individual students will be required to reflect on their own contributions to the completion of the design project (self evaluation) and on their own interpersonal skills when interacting with team members.

**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 ( $\leq 72$  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.

## Copyright Notice

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