



## Course Outline

### Instruction Team

- Dr. Jason Morrison, P.Eng. (he/him)  
E1-356 EITC  
(204) 474-8496  
[Jason.Morrison@umanitoba.ca](mailto:Jason.Morrison@umanitoba.ca)

### Student Hours

- Dr Morrison will be present during lecture/ studios
- Thursdays 3:00 – 4:00 PM
- Individual assistance is always available by appointment: talk to me.

### Teaching Assistant

- Bailey Paziuk  
[paziukb@myumanitoba.ca](mailto:paziukb@myumanitoba.ca)

### Location

- **E2-150 EITC Bldg**  
Tue Thur 11:30 - 2:15 PM

### Contact Hours

- 4 credit hours
- Lectures:  
2 hours x 12 weeks = 24 hours
- Studio Time:  
4 hours x 12 weeks = 48 hours

### Prerequisites:

- BIOE 2900 & ENG 2022

### Course Website:

<http://umanitoba.ca/umlearn>

## BIOE 3900 Biosystems Engineering Design 2 Fall 2022

### Course Objectives

To provide the fundamental knowledge and skills required by a bioengineer to begin working in a medically related field and be capable of the necessary day-to-day collaborations with professionals in medicine and engineering.

### Course Content

This course introduces the use of reverse engineering to deduce design features from previously-designed products or systems. Considerations such as design for sustainability and design for disassembly will be discussed. Students will use reverse engineering principles to:

- Develop an understanding how components fit together to form functional systems,
- Identify flaws and strengths of a design, and
- Propose design improvements.

Students will also learn appropriate techniques for documenting the reverse engineering process. Theory of project management will also be taught and discussed.

### 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.

Considering the ongoing pandemic please note:

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 is 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 Instructor will supply Materials through the course website.

## Accreditation Details

### Accreditation Units

- Mathematics: 0%
- Natural Science: 0%
- Complementary Studies: 0%
- Engineering Science: 0%
- Engineering Design: 100%

### 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	51–59
F	< 50

## Learning Outcomes

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

No.	Learning Outcome
1	Explain how reverse engineering processes are used to deduce design features from previously-designed products or systems.
2	Dissect and measure an existing product/system to reverse engineer its functional and dimensional specifications.
3	Understand how a product's intended user(s), location(s), task(s) affect the final design of a product.
4	Reverse engineering a product or systems to identify design flaws and potential improvements
5	Document the reverse engineering process using appropriate techniques.
6	Use project management principles and tools.

## Graduate Attribute Competency Levels Developed

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

## CEAB Graduate Attributes Assessed

- KB.3 – Recalls and defines, and/or comprehends and applies information, first principles and concepts in fundamental engineering science.
- PA.3 – Analyzes and solves complex engineering problems.
- CS.2 – Designs and produces appropriate engineering documents (i.e., research reports, engineering reports, design documents, graphics).
- DE.1 – Understands the complexities of an open-ended engineering design problem and defines appropriate objectives and constraints
- DE.3 – Develops possible solutions to an open-ended design problem, leading to an appropriate recommendation
- EP.2 – Understands concepts of project management.

## Important Dates

- **Brainstorming Day 1**  
Sept 13, 2022 (due in class)
- **Brainstorming Day 2**  
Sept 15, 2022 (due in class)
- **Brainstorming Day 3**  
Sept 20, 2022 (due in class)
- **Early Withdrawal Deadline**  
September 20, 2022
- **National Day for Truth and Reconciliation**  
September 30, 2022  
No classes or examinations
- **Understanding a Design A**  
Due: October 4 (11:30am)
- **Thanksgiving**  
October 10, 2022  
No classes or examinations
- **Understanding a Design B**  
Due: October 18 (11:30am)
- **Fall Term Break**  
November 7-10, 2022  
No classes or examinations
- **Remembrance Day**  
November 11, 2022  
No classes or examinations
- **Reverse Eng. I Due**  
Due Nov. 15 (11:30am)
- **Voluntary Withdrawal Deadline**  
November 22, 2022
- **Reverse Eng. II Due**  
Dec: 5, 2022 1:30pm
- **Brainstorming Day Summary**  
Due: December 12, 2022 2:30pm
- **Last Day of Classes**  
December 12, 2022

## Evaluation

Late assignments will be assessed a penalty of 10% per day or part thereof (including weekends).

Component	Value (%)	Assessor	Method of Feedback*	Learning Outcomes Evaluated	I/T**
Brainstorming Days	5	BP	S	3, 5	T
Understanding a Design Part A	15	BP	S	6	I
Understanding a Design Part A	15	BP	S	6	I
Brainstorming Summary	5	BP	S, F	1, 5	I
Reverse Eng. I	30	BP	S, F	2, 5	T
Reverse Eng. II	30	BP	S, F	2, 4, 5	T

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

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

## 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.

## 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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