

Course Outline

Instructor

- Mr. Eric Hawley, P-eng
eric.hawley@umanitoba.ca

Office Hours

- Will aim to respond within 5 business days.

Teaching Assistant

- Peng Wu
- wup4@myumanitoba.ca

Contact Hours

- 4 credit hours
- Lectures: 37 hours
- Tutorials: 33 hours

Prerequisite

- BIOE 2800 or CIVL 2800 or MECH 2222.

Course Website:

<http://umanitoba.ca/umlearn>

BIOE 3400 Design of Structural Components in Machines

Course Objectives

- To increase the student's ability to apply statics and mechanics of materials to engineering design problems.
- To discuss the design of structural components as they occur in machines.
- To provide an introduction to computer assisted design using interactive structural design tool.

Lecture Content

Textbook chapter	Content
1	Introduction: Structures and Machines
2	Reviewing the Basics
3	Computer and Design
4	Designing for Axial Tension
5	Designing for Axial Compression
7	Designing for Pinned Trusses
8	Designing for Bending
9	Designing for Torsion
10	Designing for Combined loads: Axial and Bending
11	Designing for Combined loads: Torsion and Bending

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.

Tutorial Content

No.	Date	Content
1	Sept 12	Loading diagrams
2	Sept 19	IDMS-Introduction and Section Properties
3	Sept 26	IDMS-Computer Structure Models
4	Oct 3	IDMS-Design of Bracket for Pinned Members
5	Oct 10	IDMS- Column Buckling Analysis
6	Oct 17	Problem Solving
Midterm	Oct 24	
7	Nov 7	IDMS- Truss Design
8	Nov 14	IDMS- Beam Analysis and Design
9	Nov 21	Problem Solving
10	Nov 28	IDMS-Plane Frame Systems
11	Dec 5	Problem Solving

Accreditation Details

Accreditation Units

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

Textbook

Textbook (to be posted in UM Learn chapter by chapter):

Designing Structural Components for Machines by Larry J. Segerlind; 2010. ISBN:1-892769-76-X; LCCN: 2010902792; ASABE order number: 801M0310; Textbook number 21.

Learning Outcomes

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

No.	Learning Outcome	Skill
1	Explain the design process including the design triad and computer-assisted design (CAD) procedure.	Design
2	Develop approaches to solve a problem. Recognizes and incorporates innovation when choosing solutions for a design. Connects, integrates and transforms previous learning within the course to solve bigger design problems. Explores new directions in the design process using design tools.	Design
3	Produce a solution to an open-ended problem taking into consideration design requirements and relevant contextual factors. Evaluates/verifies the performance of the final design.	Design

CEAB Graduate Attributes Assessed:

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

Indicator (Level)	Indicator Description	Assessment Point
DE.2	Uses an appropriate design process that considers all relevant factors (i.e., health & safety risks; standards; economic, environmental, cultural and societal considerations)	Midterm exams
DE.3	Develops possible solutions to an open-ended design problem, leading to an appropriate recommendation	Assignments (Column Analysis)
DE.4	Devises and implements a plan to evaluate a proposed design solution	IDMS Tutorial (Beam Analysis)
ET.2	Evaluates and selects or creates appropriate tools for a given scenario	IDMS Tutorial (Truss Design)

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+	90–100
A	85–89
B+	80–84
B	75–79
C+	65–74
C	60–64
F	< 50

Evaluation

Component	Value (%)	Assessor	Feedback*
Final exam	50	Instructor	S and F
Midterm (Oct. 24, Thursday, 2:30-4:30)	30	Instructor	S and F
Tutorial attendance (0.5% for each of seven IDMS tutorials)	3.5	TA	S and F
Tutorial reports and assignments	16.5	TA	S and F

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

Late Submission Policy

- Assignments and tutorial reports submitted after the due date will be docked 10% per school day for the first three days, and submission after three days will receive a zero grade.
- Each student is allowed to have one late submission of assignments or tutorial reports (but no later than 3 days). You are responsible to inform the TA, when you want to use this allowance.

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.

Important Dates

- **First Day of Classes**
Sept 4, 2024
- **Early Withdrawal Deadline**
September 17, 2022
- **National Day for Truth and Reconciliation**
Sept. 30, 2024
No classes or examinations
- **Thanksgiving**
October 14, 2024
No classes or examinations
- **Remembrance Day**
November 11, 2024
No classes or examinations
- **Fall Term Break**
November 12-15, 2024
No classes or examinations
- **Voluntary Withdrawal Deadline**
November 19, 2024
- **Last Day of Classes**
December 6, 2024

Requirements/Regulations

- No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, smart watches, wireless communication, or data storage devices) are allowed in examinations unless approved by the course instructor.
- All email communication must conform to the Communicating with Students university policy.

 [Communicating with Students](#)

- Attending lectures and laboratories is essential for the successful completion of this course.
- Self-declaration forms may be completed for missed tests, exams, required tutorial attendance, tutorial reports, or assignments during short-term absences (≤ 72 hours) for extenuating circumstances. Students don't need to share personal information about their situation beyond declaring the nature of the extenuating circumstance on the self-declaration form.

 [Self-Declaration Form for Brief or Temporary Absence](#)

- 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 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*, 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 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.

Copyright Notice

All materials provided in this course are copyright and are provided under the fair dealing provision of the Canadian Copyright Act. This material may not be redistributed in any manner without the express written permission of the relevant copyright holder.

 Copyright Office