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

Course Outline

Instructor
- Kenton McCorquodale-Bauer, P.Eng. (he, him)
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TA
- Stephane Le Heiget (he, him)
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Office Hours (Kenton)
- Individual assistance is always available by appointment or stop by!

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

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 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

Tutorial Content

No.	Date	Content
1	Sept 11	Loading diagrams
2	Sept 18	IDMS-Introduction and Section Properties
3	Sept 25	IDMS-Computer Structure Models
4	Oct 2	IDMS-Design of Bracket for Pinned Members
5	Oct 9	IDMS- Column Buckling Analysis
6	Oct 16	Problem Solving
Midterm	**Oct 23**	
7	Oct 30	IDMS- Truss Design
8	Nov 6	IDMS- Beam Analysis and Design
9	Nov 20	Problem Solving
10	Nov 27	IDMS-Plane Frame Systems
11	Dec 4	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

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)

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

Expected Competency Levels:

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

CEAB Graduate Attributes Assessed:

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

DE.4 – Devises and implements a plan to evaluate a proposed design solution

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

Important Dates

- **First Day of Classes**
  Sept 2, 2025
- **Early Withdrawal Deadline**
  September 16, 2025

- Every Child Matters - Orange Shirt Day: Sept. 30, 2025
  Thanksgiving Day: Oct 13, 2025
  Remembrance Day: Nov. 11, 2025
- **Fall Term Break**
  November 10-14, 2025
  No classes or examinations

- **Voluntary Withdrawal Deadline**
  November 18, 2025

- **Last Day of Classes**
  December 8, 2025

Evaluation

Component	Value (%)	Assessor	Feedback*
Final exam	50	Instructor	S and F
Midterm (Oct. 23, 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.

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.

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