McMaster University
Inspiring Innovation and Discovery
Department of Mechanical Engineering

Course Outline

1. COURSE INFORMATION

Session Offered	Winter 2025	
Course Name	Engineering Mechanics	
Course Code	MECH ENG 3A03	
Program Name	Bachelor of Mechanical Engineering	
Calendar Description	Singularity functions, generalized Hooke's law; shear stress, shear flow in beams; shear centre. Biaxial and unsymmetrical bending, analysis of indeterminate beams and frames using energy methods, impact loads. Buckling of compression members. Introduction to yield criteria.	
Instructor	Dr. Eu-Gene Ng	Phone: 905 525 9140 Ext. 27916 E-Mail: nge@mcmaster.ca

T.As	**T.A. Email**	**Allocated Students Last Name**
Ahmadniafeizabadi, Masoud	ahmadnim	Adams to Ciarmoli
Campbell, Linnea	campbl11	Cirone to Gnanamuttu
Mirhakimi, Anooshe Sadat	mirhakia	Grant to Lau (Andy)
Player, Matthew	playerm	Lau (Raymond) to Morelli
Shiguemoto, Eduardo Akira Sr.	shigueme	Morisson to Ryan
Shiravi Khouzani, Hosseinali	shiravih	Saha to Stephenson
Yang, Yunzhe	yangy489	Strecker to Zunti

2. COURSE SPECIFICS

Course Description

This courses deals with analyzing of structure under combined loading (axial, bending, shear and torsion) and designing or selecting the appropriate prismatic beams. The design criteria of the structure can be based on ductile or brittle failure. The selection of the loaded structure can be a function of deflection, stresses or instability (Buckling). Identify the operating limits of the fundamental mechanics of structure analysis.

Instruction Type

Code	**Type**	**Hours per term**
C	Classroom instruction	48
L	Laboratory, workshop or fieldwork	
T	Tutorial	
DE	Distance education	
	Total Hours	48

Resources

ISBN	**Textbook Title & Edition**	**Author & Publisher**
978-1-260-56997-1	Mechanics of Materials	Beer, Johnston, Dewolf and Mazurek. McGraw Hill Education
Other Supplies	**Source**	

Prerequisite(s)	MECH ENG 2P04

Corequisite(s)	
Antirequisite(s)	
Course Specific Policies	This course will be using a range of software. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor. The instructor may also use other software including: e-mail and Avenue All assignments must be handed in class and on schedule. All assignments must be hand written.
Departmental Policies	Students must maintain a GPA of 4.0 on a 12 point scale to continue in the program. The use of cell phones, iPods, laptops and other personal electronic devices are prohibited from the classroom during the class time, unless the instructor makes an explicit exception. Announcements made in class or placed on Avenue are considered to have been communicated to all students including those not in class.
3. SUB TOPIC(S)	

Wk01	Jan 6 to Jan 10	Introduction, Centric Buckling, Extended Euler Formula
Wk02	Jan 13 to Jan 17	Eccentric Buckling, Allowable Stress Design Buckling
Wk03	Jan 20 to Jan 24	Centric Symmetrical and Unsymmetrical Bending
Wk04	Jan 27 to Jan 31	Composite Material, Eccentric Symmetrical and Unsymmetrical Bending
Wk05	Feb 3 to Feb 7	Combined Loading and Shearing Stress for Non Thin Wall, **Test 1 (Feb 4)**
Wk06	Feb 10 to Feb 14	Shearing Stress for Non Thin Wall and Composite Material
Wk07	**Feb 17 to Feb 21**	**Reading Week**
Wk08	Feb 24 to Feb 28	Shearing Stress for Thin Wall and Longitudinal Shearing Stress
Wk09	Mar 3 to Mar 7	Longitudinal Shearing Stress and Combined Loading, **Test 2 (Mar 4)**
Wk10	Mar 10 to Mar 14	Combined Loading Analysis and 2D Mohr Circle
Wk11	Mar 17 to Mar 21	2D, 3D Mohr Circle and Yield Criteria
Wk12	Mar 24 to Mar 28	Yield Criteria, Design and Analysis of Beams
Wk13	Mar 31 to Apr 4	Yield Criteria and Combined Loading
Wk14	Apr 7 to Apr 8	

Note that this structure represents a plan and is subject to adjustment term by term.
The instructor and the University reserve the right to modify elements of the course during the term. The University may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes.

4. ASSESSMENT OF LEARNING	Weight
Homework (Eight in total) 0.625% would be deducted when each homework are submitted late with or without MSAF. Marks are based on completion.	10%
Term Test (Two in total) Students getting 25 to 49/100 for the test are required to do a correction test. The highest grade for the correction term test is 50/100. If the grade is less than 24.9/100, no correction test will be allowed.	50%
Final Examination. **Must pass final exam to pass the course**	40%
TOTAL	**100%**

Course results determined on a percentage scale will be converted to an official letter grade, as indicated in the Undergraduate Calendar. The results of all courses attempted will appear on your transcript as letter grades.

5. LEARNING OUTCOMES

1. Analyze structure under combined loading and designing the appropriate prismatic beams.
2. Calculate principal stresses from normal and shear stresses in three dimensional configuration.
3. Design and specify structure which are made of either ductile or brittle materials.
4. Design of beams based on either structure deflection, stresses or buckling.
5. Evaluate strain measurement in specific directions into principal strain.
6. Identify the operating limits of the fundamental mechanics of structure analysis.