McMaster University
Inspiring Innovation and Discovery
Department of Mechanical Engineering

Course Outline

1. COURSE INFORMATION

Session Offered	Winter 2024	
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**
Guirguis, John Mounir	guirgj5@mcmaster.ca	Shen to Zou
Player, Matthew	playerm@mcmaster.ca	Nikic to Sheehan
Lech, Greg	lechg1@mcmaster.ca	Li Seth to Nasir
Saciotto, Victor Rossi	saciottv@mcmaster.ca	Harnoor to Li Mattias
Shiravi Khouzani, Hosseinali	shiravih@mcmaster.ca	Elsamadony to Haq
Yang, Yunzhe	yangy489@mcmaster.ca	Cabak to Downey
Zheng, Jeremy	zhenj19@mcmaster.ca	Abdelmouti to Byers

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)	

Wk 1	9-Jan, 10-Jan		Course Outline, Intro
	12-Jan	Hw01	Centric Buckling
Wk 2	16-Jan, 17-Jan		Eccentric Buckling
	19-Jan	Hw02	Eccentric Buckling and Centric Symmetrical Bending
Wk 3	23-Jan, 24-Jan		Centric Unsymmetrical Bending
	26-Jan	Hw03	Centric Unsymmetrical Bending
Wk 4	30-Jan, 31-Jan		Eccentric Symmetrical Bending and Sandwich Material
	2-Feb	Hw04	Sandwich Material and Eccentric Unsymmetrical Bending
Wk 5	**5-Feb**		**Test 1: Hw01, Hw02, Hw03 and Hw04**
	6-Feb, 7-Feb		Eccentric Unsymmetrical Bending
	9-Feb	Hw05	Shearing Stress Non Thin Wall
Wk 6	13-Feb, 14-Feb		Shearing Stress Non Thin Wall
	16-Feb	Hw06	Shearing Stress Thin Wall
Wk 7	19-Feb to 23 Feb		Reading Week
Wk 8	27-Feb to 28 Feb		Shearing Stress thin Wall and Sandwich Material
	1-Mar	HW07	Longitudinal Shear
Wk 9	**4-Mar**		**Test 2: Hw05, Hw06 and Hw07**
	5-Mar, 6-Mar		Longitudinal Shear and Compound Loading
	8-Mar	Hw08	Compound Loading
Wk 10	12-Mar, 13-Mar		2D and 3D Mohr Circle
	15-Mar	Hw09	3D Mohr Circle
Wk 11	19-Mar, 20-Mar		Transmission Shaft Design
	22-Mar	Hw10	Transmission Shaft Design
Wk 12	26-Mar, 27-Mar		Design and Analysis of Beams
	29-Mar		Good Friday
Wk 13	2-Apr, 3-Apr	Hw11	Ductile Yield Criteria
	5-Apr		Deflection of Beams

Wk 14	9-Apr, 10-Apr		Deflection of Beams

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 (10 in total) 0.5% would be deducted when each homework are submitted late with or without MSAF. Marks are based on completion.	10%
Term Test (Two term tests) 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	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.