McMaster University
Inspiring Innovation and Discovery
Department of Mechanical Engineering

Course Outline

1. COURSE INFORMATION

Session Offered	Spring/Summer 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**	
Player, Matthew	playerm@mcmaster.ca	

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	07 May – 09 May		Course Outline, Intro, Centric Buckling
Wk 2	14 May – 16 May		Euler's Extended Theory to Buckling and Eccentric Buckling
	15 May	HW01	
Wk 3	21 May – 23 May		Eccentric Buckling and Normal Stresses Induced by Bending Moment
	22 May	HW02	
Wk 4	28 May – 30 May		Centric and Eccentric Symmetrical Bending
	29 May	HW03	
Wk 5	04 June		Centric and Eccentric Unsymmetrical Bending
	06 June		**Test 1: HW01, HW02, HW03**
Wk 6	11 June – 13 June		Combined Loading and Shearing Stresses
	12 June	HW04	
Wk 7	18 June – 20 June		Shearing Stresses
	19 June	HW05	
Wk 8	*25 June – 27 June*		*No lecture*
Wk 09	02 July – 04 July		Shearing Stresses for Thin Wall and Longitudinal Shear
	03 July	HW06	
Wk 10	09 July		Longitudinal Shear
	11 July		**Test 2: HW04, HW05, HW06**
Wk 11	16 July – 18 July		Combined Loading
	17 July	HW07	
Wk 12	23 July – 25 July		Combined Loading and 2D Mohr Circle
		HW08	
Wk 13	30 July – 01 Aug		3D Mohr Circle and Yield Criteria
Wk 14	06 Aug		Design and Analysis of Beams
	08 Aug		**Final Exam: HW03, HW04, HW05, HW06, HW07, HW08**

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.