

UNIVERSITI TEKNOLOGI MARA (UiTM)
CAWANGAN PULAU PINANG, KAMPUS PERMATANG PAUH

LESSON PLAN			
CODE / COURSE	MEC211 / Strength of Materials		
PROGRAMME	CEEM 110 – DIPLOMA OF MECHANICAL ENGINEERING		
SEMESTER	Sept 2026 – Feb 2027		
CONTACT HOUR	3 hours lecture / week & 1 hour tutorial / week		
SLT / CREDIT	120 Hours / 3 Credit		
RESOURCE PERSON	MUHAMAD RIDZUAN BIN ARIFIN		
CONTACT / E-MAIL	019-7454803 / ridzuanarifin@uitm.edu.my		
COURSE DESCRIPTION:			
The course covers stresses and strains of deformable bodies in tension, compression, bending, and torsion. Topics covered include axial stresses and strains; thermal stress; simple statically determinate and indeterminate systems; torsional stresses; power transmission in shafts; bending stresses in beams; transformation of plane stresses; and elastic buckling in columns.			
COURSE LEARNING OUTCOMES, ASSOCIATED PROGRAMME OUTCOMES, LEVEL OF TAXONOMY DOMAIN:			
At the end of the course, students should be able to: CO1. Apply the basic concepts and fundamental principles in strength of materials (PO1) (C3) CO2. Identify and analyse mechanical members problem using concepts and fundamental principles of strength of materials. (PO2) (C4) CO3. Evaluate and compare the loads and stresses in the mechanical members using the knowledge of strength of materials. (PO3) (C5)			
MAPPING OF COURSE OUTCOME (CO), PROGRAMME OUTCOME (PO) WITH KNOWLEDGE PROFILE (DK) AND WELL-DEFINED ENGINEERING PROBLEM (DP)			
CO-PO	PO STATEMENT	DK	DP
CO1-PO1	Apply knowledge of applied mathematics, applied science, computing and engineering fundamentals and mechanical engineering specialisations specified in DK1 to DK4, respectively, to wide practical procedures and practices	DK1,DK2,DK3,DK4	DP1,DP3,DP4
CO2-PO2	Identify and analyse well-defined mechanical engineering problems in reaching substantiated conclusions using codified methods of analysis specific to their field of activity. (DK1 to DK4).	DK1,DK2,DK3,DK4	DP1,DP3,DP4
CO3-PO3	Design solutions for solving well-defined technical mechanical engineering problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety as well as cultural, societal, and environmental considerations as required (DK5).	DK5	DP1,DP3,DP4
A.D.A.B MODEL DELIVERY		VALUE & ELEMENT CODE	
DIGEST	Give students access to content; read, watch, observe, summarize	B1	Nilai Bertuhan
SYNTHESIZE	Get students to put info/facts together, relate and make conclusions.	B3	Nilai Berbuat Kebajikan
CREATE	Get students to create content, illustrate ideas or deliver facts/info etc.	B5	Hubungan Dengan Tuhan
ASSESSMENT (TOTAL 100%)			
1. Continuous Assessments (CA = 50%) Assignment 1 : 15 % Assignment 2 : 15 % Test : 20 %		2. Final Assessments (FA = 50%) Final Exam (FA) : 50 %	

Cognitive Learning Domain	
C3	Application : Use learnt information in another familiar or new situation
C4	Analysis : Break information into parts to explore understandings and relationships
C5	Synthesis : Put together parts of learnt information to form new whole
Dublin Knowledge Profile (DK)	
DK1	Natural sciences
DK2	Mathematics
DK3	Engineering fundamentals
DK4	Specialist knowledge
DK5	Engineering design
Well-Defined Engineering Problems (DP)	
DP1	Depth of knowledge
DP2	Depth of analysis required
DP4	Familiarity of issues
RECOMMENDED TEXT	
1. Russell Hibbeler, Mechanics of Materials, 11th, Pearson, 2023, ISBN: 9781292725734	
2. Barry J. Goodno, James M. Gere, Mechanics of Materials, Enhanced Edition, 9th edition, Cengage Learning, 2020, ISBN: 9780357377840	
3. Roy R. Craig, Eric M. Taleff, Mechanics of Materials, 4th edition, John Wiley & Sons Incorporated, 2020, ISBN: 9781119603757.	

ASSESSMENT

Test (20%)

- Chapter 2 [CO2, PO2, C4] [DK1, DK2, DK3, DK4]
- Chapter 3 [CO2, PO2, C4] [DK1, DK2, DK3, DK4]

Assignment 1 (15%)

- Chapter 1 [CO1, PO1, C3] [DK1, DK2, DK3, DK4/DP1, DP3, DP4]
- Chapter 2 [CO2, PO2, C4] [DK1, DK2, DK3, DK4/DP1, DP3, DP4]
- Chapter 3 [CO2, PO2, C4] [DK1, DK2, DK3, DK4/DP1, DP3, DP4]

Assignment 2 (15%)

- Chapter 4 [CO1, PO1, C3] [DK1, DK2, DK3, DK4/DP1, DP3, DP4]
- Chapter 5 [CO1, PO1, C3] [DK1, DK2, DK3, DK4/DP1, DP3, DP4]
- Chapter 4 [CO3, PO3, C5] [DK5 /DP1, DP3, DP4]
- Chapter 5 [CO3, PO3, C5] [DK5 /DP1, DP3, DP4]

Final Examination (50%)

- Chapter 1, 2 & 3 [CO1, PO1, C3] [DK1, DK2, DK3, DK4]
- Chapter 4 [CO2, PO2, C4] [DK1, DK2, DK3, DK4]
- Chapter 5 [CO3, PO3, C5] [DK5]
- Chapter 6 [CO2, PO2, C4] [DK1, DK2, DK3, DK4]

WEEKLY LESSON PLAN

Session September 2026 - February 2027

Week	Date	Syllabus Content		Hour	Activities
1	28 Sept – 02 Oct	Chapter 1: General Concept of Stress and Strain (3 hours)			Entrance Survey
		Introduction to course outline		1	
		1.1	Normal stress and strain		
		1.2	Shear stress and strain	1	
		1.3	Materials behaviour: Hooke's Law Elastics Constants Poisson's ratio	1	
2	06 – 09 Oct	Chapter 2: Axial Load (8 hours)			Entrance Survey
		2.1	Elastic deformation of an axially loaded member	3	
3	12 – 16 Oct	2.2	Statically determinate and statically indeterminate axially loaded member	3	Entrance Survey
4	19 – 23 Oct	2.3	Thermal stress	2	Entrance Survey
		Chapter 3: Torsion of Solid and Hollow Circular Section (8 hours)			
		3.1	Torsional deformation of a circular shaft	1	
5	26 – 30 Oct			1	Entrance Survey <i>Until: 01 Nov 2026</i>
		3.2	Torsion formula Angle of twist	2	
6	02 – 06 Nov	3.3	Statically determinate and statically indeterminate shafts	2	
		3.4	Power transmission shafts	1	
7	09 – 13 Nov	3.4	Power transmission shafts	1	Test
		Chapter 4: Bending in Straight Beam (8 hours)			
		4.1	Shear force and bending moment diagram	2	
8	16 – 20 Nov	4.1	Shear force and bending moment diagram	2	
		4.2	The Flexure Formula – Bending stress	1	
9	23 – 27 Nov	4.2	The Flexure Formula – Bending stress	1	Assignment 1
		4.3	The Shear Formula – Shear stress	2	
10	30 Nov – 04 Dec	Chapter 5: Two Dimensional Stress System (9 hours)			
		5.1	Plane stress transformation	1	
		5.2	General equations of plane stress transformation	2	

11	07 – 11 Dec	5.3	Principal stress and maximum in-plane shear stress	2	
		5.4	Mohr's circle for plane stress – according to scale	1	
12	14 – 18 Dec	5.4	Mohr's circle for plane stress – according to scale	1	
		5.4	Mohr's circle for plane stress – not to scale (analytical solution)	2	
21 – 27 Dec		Mid-Semester Break [Christmas - 24 & 25 Dec]			
13	28 Dec – 01 Jan 2027	Chapter 6: Buckling of Column (6 hours)			Assignment 2
		6.1	Critical load and Euler's equation	3	SuFO, Exit Survey
14	04 – 08 Jan	6.2	Type of columns and various types of column supports	3	SuFO, Exit Survey
11 – 17 Jan		Revision Week			SuFO, Exit Survey
18 Jan – 07 Feb		Final Assessment			SuFO, Exit Survey Until 31 Jan 2027
					Final Test

LESSON PLAN SEPTEMBER 2026 – FEBRUARY 2027

Week / SAM Block	Date	Syllabus Content		Hour	Mapping	A.D.A.B	Activities	
1	28 Dec – 02 Oct	Chapter 1: General Concept of Stress and Strain (3 hours)			1	CO1-PO1 (C2)	DIGEST-B1	Brief Explanations on the synopsis of the course, the structure of course evaluations, how the course is mapped to CO-PO & its significance and the course syllabus Do's and Don'ts in class Recite pray before class Ice breaking related to the course Using the correct terms, concept principles and examples clearly. Interactive Lecture Revision of previous lectures (eg: Gamification) Using the correct terms, concept principles and examples clearly. Using a suitable platform / system / software / teaching application for students' condition. Interactive Lecture
		Introduction to course outline		1				
		1.1	Normal stress and strain					
		1.2	Shear stress and strain	1				
		1.3	Materials behaviour: Hooke's Law Elastics Constants Poisson's ratio	1				

		Chapter 2: Axial Load (8 hours)					
2	06 – 09 Oct	2.1	Elastic deformation of an axially loaded member	3	CO1-PO1 (C2) CO2-PO2 (C4)	DIGEST-B1 SYNTHESIZE-B3	Revision of previous lectures (eg: Gamification) Using the correct terms, concept principles and examples clearly. Using a suitable platform / system / software / teaching application for students' condition. Interactive Lecture
3	12 – 16 Oct	2.2	Statically determinate and statically indeterminate axially loaded member	3			Students relate topic 2.1 and 2.2 and try to relate/establish/solve the problem on statically indeterminate axially loaded member.
4	19 – 23 Oct	2.3	Thermal stress	2			Students summarize the fundamental of Chapter 2.1 and 2.2 and use the knowledge learned to solve the problem in Chapter 2.3.

		Chapter 3: Torsion of Solid and Hollow Circular Section (8 hours)			CO1-PO1 (C2) CO2-PO2 (C4)	DIGEST-B1 SYNTHESIZE-B3	Revision of previous lectures on basic concepts of Stress and Strain. Using the correct terms, concept principles and examples clearly. Using a suitable platform / system / software / teaching application for a student's condition. Interactive Lecture and tutorials Students relate topic 3.1, 3.2 and 3.2 and try to relate/establish/solve the problem on statically indeterminate axially loaded member Students summarize the fundamental knowledge of torsion and use the knowledge learned to solve the problem related to power transmission shafts.
		3.1	Torsional deformation of a circular shaft	1			
5	26 – 30 Oct			1			
		3.2	Torsion formula Angle of twist	2			
6	02 – 06 Nov	3.3	Statically determinate and statically indeterminate shafts	2			
		3.4	Power transmission shafts	1			
7	09 – 13 Nov	3.4	Power transmission shafts	1			

		Chapter 4: Bending in Straight Beam (8 hours)			CO1-PO1 (C2) CO2-PO2 (C4)	DIGEST-B1 SYNTHESIZE-B3	Revision of previous lectures (eg: Gamification) Using the correct terms, concept principles and examples clearly. Using a suitable platform / system / software / teaching application for students' condition. Interactive Lecture
		4.1	Shear force and bending moment diagram	2			
8	16 – 20 Nov	4.1	Shear force and bending moment diagram	2	CO1-PO1 (C2) CO2-PO2 (C4)	DIGEST-B1 SYNTHESIZE-B3	Revision of previous lectures (eg: Gamification) Using the correct terms, concept principles and examples clearly. Using a suitable platform / system / software / teaching application for students' condition. Interactive Lecture
		4.2	The Flexure Formula – Bending stress	1			
9	23 – 27 Nov	4.2	The Flexure Formula – Bending stress	1	CO1-PO1 (C2) CO2-PO2 (C4)	DIGEST-B1 SYNTHESIZE-B3	Using a suitable platform / system / software / teaching application for a student's condition. Interactive Lecture and tutorials Students summarize the fundamental knowledge and use the knowledge learned to solve the problem related to the chapter.
		4.3	The Shear Formula – Shear stress	2			

10	30 Nov – 04 Dec	Chapter 5: Two Dimensional Stress System (9 hours)			CO3-PO3 (C5)	CREATE-B5	Revision of previous lectures (eg: Gamification) Using the correct terms, concept principles and examples clearly.
		5.1	Plane stress transformation	1			
		5.2	General equations of plane stress transformation	2			
11	07 – 11 Dec	5.3	Principal stress and maximum in-plane shear stress	2	CO3-PO3 (C5)	CREATE-B5	Using a suitable platform / system software / teaching application for a student's condition. Interactive Lecture
		5.4	Mohr's circle for plane stress – according to scale	1			
12	14 – 18 Dec	5.4	Mohr's circle for plane stress – according to scale	1			
		5.4	Mohr's circle for plane stress – not to scale (analytical solution)	2			

21 – 27 Dec		Mid-Semester Break [Christmas - 24 & 25 Dec]					
13	28 Dec – 01 Jan 2027	Chapter 6: Buckling of Column (6 hours)					Revision of previous lectures (eg: Gamification) Using the correct terms, concept principles and examples clearly. Using a suitable platform / system software / teaching application for a student's condition. Interactive Lecture and tutorials Students summarize the fundamental knowledge and use the knowledge learned to solve the problem related to the chapter. Get the students to reflect on what they have learned within 14 weeks of lesson.
		6.1	Critical load and Euler's equation	3			
14	04 – 08 Jan	6.2	Type of columns and various types of column supports	3	CO2-PO2 (C4)	SYNTHESIZE-B3	
15	11 – 17 Jan	Revision Week					SuFO, Exit Survey
16-17	18 Jan – 07 Feb	Final Assessment					SuFO, Exit Survey Until 31 Jan 2027
							Final Test

Lampiran 1: Structure Assessment Mechanism (SAM) Semester September 2026 – Februari 2027 (20264)

		BLOK 1					BLOK 2					BLOK 3						BLOK 4	
Minggu / Aktiviti		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12		M13	M14		M15 - M17	
		28 September – 20 Disember 2026 *27 September – 19 Disember 2026 (12 Minggu)												28 Disember 2026 – 10 Januari 2027 *27 Disember 2026 – 9 Januari 2027 (2 Minggu)		18 Januari - 7 Februari 2027 Penilaian / Peperiksaan Akhir (3 Minggu)			
Pensyarah		- Menjelaskan hasil pembelajaran kursus - Memperincikan spesifikasi tugas dan permarkahan - Menjelaskan syarat komponen kursus mengikut kepada keperluan program standard, peraturan atau pekeliling yang berkaitan. - Menjelaskan tempoh tugas 1 atau 2 tugas telah dihantar oleh pelajar mengikut tarikh dan masa yang bersesuaian					- Pensyarah memberikan baki tugas bermula minggu ke-8 - Muat naik di sistem E-RES pada minggu ke-9 hingga ke-10. - Memantau prestasi pelajar secara berterusan - Pensyarah boleh melakukan intervensi bagi pelajar yang gagal <50% dengan bimbingan dan pemulihan awal. - Pensyarah boleh mengenalpasti pelajar berpotensi status Gagal Penilaian Berterusan (GC).					21 – 27 Disember 2026 Cuti Pertengahan Semester / [Krismas - 25 Disember]		- Memantau prestasi pelajar secara berterusan - Memastikan tugas diselesaikan oleh pelajar seperti yang dirancang.		Nota: Pentaksiran Akhir (Kod Kursus Tiada Peperiksaan Akhir) boleh dijalankan mengikut kesesuaian program akademik.			
Pelajar		- Memahami hasil pembelajaran dan keperluan kursus. - Mengikuti <i>scheme of work</i> yang disediakan. - Jelas dengan kaedah penilaian dan permarkahan - Mengetahui syarat lulus komponen kursus - Pelajar perlu melaksanakan tugas yang diberikan.					Menerima maklum balas dan menambahbaik tugas yang diberikan oleh pensyarah.							Penyusunan SAM tertakluk kepada Kalender Akademik UiTM yang diluluskan oleh Senat Universiti.					
														11-17 Januari 2027 [Cuti Ulangkaji]		Rujukan : Pekeling Akademik Bilangan 21 Tahun 2025 : Pelaksanaan Structured Assessment Mechanisme (SAM) sebagai Mekanisma Pengurusan Pentaksiran dan Penilaian UiTM			
																Kategori Pekeliling : Arahan			

Nota:

Rujuk Jadual Aktiviti Pengurusan Akademik (Aktiviti Perkuliahan)

[*] Untuk Negeri Kedah / Kelantan / Terengganu.

AKTIVITI PERKULIAHAN			
PERINGKAT PROGRAM	AKTIVITI	TARIKH	TEMPOH
Pre-Diploma / Diploma (Part 1 Students Only)	o <i>Interim Week</i>		
	o <i>Interim Week Break</i>		
o Semua Pelajar	o Kuliah 1	28 September – 20 Disember 2026 *27 September – 19 Disember 2026	12 Minggu
	o Proses Entrance Survey	28 September – 1 November 2026	5 Minggu
	o Cuti Pertengahan Semester/Cuti Perayaan	21 – 27 Disember 2026 [Krismas - 25 Disember]	1 Minggu
	o Kuliah 2	28 Disember 2026 – 10 Januari 2027 *27 Disember 2026 – 9 Januari 2027	2 Minggu
	o Proses Exit Survey	28 Disember 2026 – 31 Januari 2027	5 Minggu
	o Student Feedback Online (SuFO)	28 Disember 2026 – 31 Januari 2027	5 Minggu
	o English Exit Test (Speaking)	11 – 17 Januari 2027	1 Minggu
	o Cuti Ulangkaji	11 – 17 Januari 2027	1 Minggu
	o Penilaian / Peperiksaan Akhir/EET (Writing)	18 Januari – 7 Februari 2027	3 Minggu
	o Pengumuman Keputusan Penilaian / Peperiksaan Akhir	Akan dimaklumkan	
	o Peperiksaan / Penilaian Khas	Akan dimaklumkan	
	o Cuti Semester	8 Februari – 14 Mac 2027	4 Minggu
Nota: [*] Untuk Negeri Kedah / Kelantan / Terengganu Sahaja			
KEMASKINI 17 JULAI 2026 (BERDASARKAN KELULUSAN SENAT UiTM KE-328)			