COURSE OUTLINE

Faculty & School: Faculty of Engineering, School of Chemical and Renewable Energy Engineering Department : Department of Energy Engineering	**Page 1 of 4**
Subject & Code: Strength of Materials (SKTN 2123) Total Contact Hours: 3 hours X 14 weeks	**Semester: 1 Academic Session: 2019/2020**

Lecturer	:	**Mohsin Mohd Sies**
Room	:	**N01-324**
Tel.	:	012-7119506
Email	:	**mohsin@utm.my**
Prerequisite	:	None
Synopsis	:	The course covers both the theory and application of the fundamental principles of mechanics of materials. Emphasis is placed on the importance of satisfying equilibrium, compatibility of deformation, and material behavior requirement. Topics being covered include stress and strain under axial loading, torsion, bending, combined loadings, stress transformation, design of beams and shafts, and deflection of beams and shafts.

Programme Learning Taxonomy

No.	Course outcome	PLO	Taxonomy	%	Teaching Method	Assessment methods
1	Apply concepts of stress, strain and elastic behavior of materials to solve problems involving structural members subjected to tension, compression, torsion, and bending.	PLO1	C3	32.5	Lecture	Test, Exam, Assignment
2	Analyze stress, state of stress, and plane stress under combined loading.	PLO1	C4	45	Lecture	Test, Exam, Assignment
3	Apply differential and superposition methods for beam deflection analysis.	PLO1	C3	12.5	Lecture	Exam
4	Able to perform collectively by leading team members in planning, coordinating, and presenting all ideas and efforts in analyzing beam or shaft analysis and designing problems.	PLO10	A4	10	Lecture	Group Project, Peer Assessment

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TOTAL STUDENT LEARNING TIME (SLT) BASED ON TEACHING-LEARNING

No.	Teaching and learning activity	SLT (hours)
1	Direct learning:	(42)
	(a) Lectures	34
	(b) Tutorials	8
2	Indirect learning:	(72)
	(a) Assignments/Project	20
	(b) Revision	32
	(c) Preparation for assessments:	
	(i) Test	4
	(ii) Final exam	6
3	Assessment:	(6)
	(a) Tests	3
	(b) Final examination	3
	Total	120
	No. of credits	120/40 = 3

TEACHING METHODOLOGY
Lecture and discussion, co-operative learning, independent study, assignments, lab visit, seminar, group project, presentation, etc.

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Chapter	Topic	Activities
1 (2 week)	Concept of Stress • What is Mechanics of Materials • Equilibrium of a deformable body • Concept of stress • Normal, bearing, and shearing stress in axial loading • Allowable and ultimate stresses • Factor of safety	Lecture and tutorial, co-operative learning, independent study, assignment, group project, presentation
2 (1 week)	Mechanical Properties of Materials • The tension and compression tests • The stress-strain diagramVarious forms of work especially the moving boundary work • Stress-strain behavior of ductile and brittle materials • Hooke's law	Lecture and tutorial, co-operative learning, independent study, assignment, group project, presentation
3 (2 weeks)	Stress and strain under axial loading • Elastic deformation of axial loading member • Principle of superposition • Statically indeterminate structure	Lecture and tutorial, co-operative learning, independent study, assignment, group project, presentation
4 (2 weeks)	Torsion • Torsional deformation of a circular shaft • Torsional formula • Power transmission • Angle of twist • Statically indeterminate torque-loaded member	Lecture and tutorial, co-operative learning, independent study, assignment, group project, presentation
5 (2 weeks)	Bending, Beam and Beam Design • Bending deformation of a straight member • Stresses and deformations in elastic range • Shear force (V) and bending moment (M) diagrams • Graphical method for constructing shear and moment diagrams • Basis for beam design	Lecture and tutorial, co-operative learning, independent study, assignment, group project, presentation
6 (2 weeks)	Stress Transformation • Plane-stress transformation • General equations of plane-stress transformation • Principal stresses and maximum in-plane shear stress • Mohr's circle – plane stress	Lecture and tutorial, co-operative learning, independent study, assignment, group project, presentation

7 (2 week)	Deflection of Beams and Shafts • The elastic curve • Slope and displacement by integration • Method of superposition • Statically indeterminate beams and shafts (integration method and superposition method)	Lecture and tutorial, co-operative learning, independent study, assignment, group project, presentation

References :
1. **Mechanics of Materials, Beer, F.P., Johnston, J.R., DeWolf, J.T., Mazurek, D.F. 6th Edition, Mc Graw Hill. (2012)**
2. **Mechanics of Materials. Hibbeler, R.C.,8th Edition. Singapore: Prentice Hall.(2010).**
3. **Internet/websites**

Academic Integrity : Academic integrity forms a fundamental bond of trust between colleagues, peers, lecturers, and students, and it underlies all genuine learning. At UTM, there is no tolerance for plagiarism or academic dishonesty in any form, including unacknowledged "borrowing" of proprietary material, copying answers or papers, or passing off someone else's work as one's own.

A breach of ethics or act of dishonesty can result in:

• failure of a paper or exam within a course,
• failure of an entire course (blatant plagiarism, cheating on a test or assignment), and
• academic suspension or expulsion from the college.

GRADING

No.	Assessment	Number	% each	% total	Dates
1	Test s	2	15 % (Test 1) 15 % (Test 2)	30	Week 5 Week 10
2	Final examination	1	50	50	
3	Assignments, Quizzes			10	
4	Group project:	1	10	10	
	Total	8	-	**100**	

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