COURSE OUTLINE

Department & Faculty: Dept. of Mechanical Engineering, Centre for Diploma Studies, SPACE, UTM International Campus.	**Page : 1 of 5**
Course Code: DDPJ 2103 **Total Lecture Hours: 42 hours**	**Semester:** **Academic Session:**

Lecturer	:	
Room No.	:	
Telephone No.	:	
E-mail	:	
Synopsis	:	This course presents the stress analysis in simple structures. Since the existence of stress is due to internal loading, the determination of internal loading in structures is given. The concepts of simple stress and strain are introduced for the case of rods with axial load. Both simple normal and shear stress are considered. Further the concept of structural failure that depends on the applied stress and the material strength is given. The tensile test is then studied. The axial deformation formula is developed. The stress analysis is also conducted on the statically indeterminate structures. The stress analysis is then conducted on beams. The construction of the shear force – bending moment diagram of beams are given and the flexural formula is derived and applied. The shear stress analysis on shaft under torsional loading is then studied where the shear formula is derived and applied. The stress in thin cylinder is studied before the concept of the combined stress and stress transformation are given.

Prepared by: **Name: Mohamed Azlan Suhot** **Signature:** **Date:**	**Certified by: (Course Panel Head)** **Name:** **Signature:** **Date:**

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LEARNING OUTCOMES

By the end of the course, students should be able to:

No.	Course Learning Outcome	Programme Learning Outcome(s) Addressed	Taxonomy Level and Generic Skills	Assessment Methods
1.	Explain the concept of simple stress and strain in rods and the stress-strain curve of the tensile test.	PO1	C3	Assignment, Quiz, Test, Final
2.	Determine the normal stress and strain in rods and the shear stress and strain in pins and the support forces in the statically indeterminate cases and thermal stress case.	PO3	P3 CTPS1,CTPS2	
3.	Draw the shear force – bending moment diagram and determine the shearing stresses in common types of beams	PO3	P3 CTPS2	
4.	Determine the maximum deflection of a beam under a given loading and apply the torsional formula and the angle of twist formula in simple shafts.	PO3	P3 CTPS1,CTPS2	
5.	Determine the hoop and longitudinal stresses in thin cylinders and stresses in structures loaded with combined loading.	PO3	P3 CTPS2	
6.	Convey ideas clearly and effectively in	PO2	P2	Discussion of

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	class			assignments

STUDENT LEARNING TIME

Teaching and Learning Activities.	Student Learning Time (hours)
1. Face-to-Face Learning	
a. Lecturer-Centered Learning	
i. Lecture	42
b. Student-Centered Learning	
i. Tutorial	14
ii. Student-Centered Learning activities	-
2. Self-Directed Learning	
a. Non Face-to-Face or Non Student-Centered Learning (SDL) such manual, assignment, module, e-learning	40
b. Revision	12
c. Assessment Preparations	7
3. Formal Assessment	
1. Continuous Assessment	2
2. Final Exam	2.5
Total (SLT)	**119.5**

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative Learning, Independent Study

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WEEKLY SCHEDULE

Weeks 1-2 :
Quiz 1

1.0 The Concept of Stress
1.1 Internal loading
1.2 The simple normal stress and strain in rods
1.3 The tensile test
1.4 The Hooke's Law
1.5 The elongation of rods

Weeks 3-4 :
HW 1
Assignment 1

2.0 The shear stress
2.1 The simple shear stress and strain
2.2 The simple shear strain
2.3 The shear stress in pins
2.4 The factor of safety
2.5 The statically indeterminate case
2.6 The thermal stress

Week 5-6
Quiz 2

3.0 Beams
3.1 Introduction to beams
3.2 The shear force – Bending moment diagrams
3.3 The contra-flexure point
3.4 The flexural formula
3.5 The parallel axis theorem

Week 8 — **SEMESTER BREAK**

Week 7-9
HW 2

4.0 Shafts
4.1 Introduction to shafts
4.2 The torsional formula
4.3 The angle of twist
4.4 The shafts in the gearing system
4.5 The statically indeterminate case

Week 10-11
Quiz 3
HW 3

5.0 Beam - Transverse shear stress
5.1 Shear on the horizontal face of a beam element
5.2 Determination of the shearing stresses in a beam
5.3 Shearing stresses τ_{xy} in common types of beams

Week 12-13
HW 4

6.0 Beam- Deflection
6.1 Deformation of a beam under transverse loading
6.2 Equation of the elastic curve
6.3 Direct determination of the elastic curve from the load distribution
6.4 Statically indeterminate beams
6.5 Singularity functions

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7.0 The Combined Stress
7.1 Introduction to thin cylinders
7.2 The hoop and longitudinal stresses
7.3 The principle of superposition
7.4 The structures with combined loading
Quiz 4 7.5 Constructing stress element

: ***Assignment is due at 12:00 pm a week after it is assigned.**

REFERENCES :

Main Text:
R.C.Hibbeler , "*Mechanics of Materials*", Prentice Hall ltl., 2005.

Other References:
F. P. Beer & E .R. Johnston, "*Mechanics of Materials*", McGraw Hill, 1992.

GRADING

No.	Assessment	Number	% each	% total	Dates
1	Assignments	3	5	15	
2	Quizzes	3	5	15	
3	Tests	2	15	30	
4	Final Exam	1	40	40	
	Overall Total			**100**	

Prepared by: **Name:** **Signature:** **Date:**	**Certified by: (Course Panel Head)** **Name:** **Signature:** **Date:**