Subject Description Form

Subject Code	ME6302
Subject Title	Solid Mechanics
Credit Value	3
Level	6
Pre-requisite/ Co-requisite/ Exclusion	Prerequisite: Students should have basic knowledge in Calculus, Linear Algebra, Engineering Materials, and Mechanics of Materials.
Objectives	To provide students with knowledge of mathematical treatments of small and large deformation, constitutive relations, elasticity, plasticity, fracture mechanics.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Understand the mathematical treatment of linear and non-linear mechanical behaviour of materials. b. Understand the broad applications of advanced theories in various engineering problems. c. Recognize the frontier of research in solid mechanics.
Subject Synopsis/ Indicative Syllabus	**Elasticity:** Stress and strain in 3D space and their tensor representations**,** theory for small deformation and large deformation, tensor analysis, viscoelasticity, rubber elasticity, contact mechanics, micromechanics. **Plasticity:** Yield criteria, Convexity of yield surface and the associated flow rule, Bauschinger effect and back stress, Incremental theories of plasticity, Slip-Line Field Solutions, Crystal plasticity. **Fracture Mechanics:** Stress intensity factor K, Energy release rate**,** Griffith theory, criterion for brittle materials, J-Integral. **Finite element modelling**: Constitutive models and user subroutine, Implicit and Explicit methods.

Teaching/Learning Methodology

1. The teaching and learning methods include lectures, laboratory sessions, homework assignments, test, mini-project, and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for advanced topics in solid mechanics.
3. Technical/practical examples and problems are raised and discussed in class.
4. The mini project could be a numerical simulation project or literature survey on a given topic.

Teaching/Learning Methodology	Intended Subject Learning Outcomes		
	a	b	c
1. Lecture	√	√	√
2. Homework assignment	√	√	
3. Mini-project	√	√	√

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)		
		a	b	c
1. Homework assignment	20%	√	√	
2. Test	20%	√	√	
3. Mini-project	20%	√	√	√
4. Examination	40%	√	√	
Total	100 %			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Overall Assessment:
0.40 × End of Subject Examination + 0.60 × Continuous Assessment

The continuous assessment consists of three components: homework assignments, test, mini-project report & presentation. They are aimed at evaluating the progress of study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

The examination is used to assess the knowledge acquired by the students

	for understanding and analysing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.	
Student Study Effort Expected	Class contact:	
	• Lecture	39 Hrs.
	Other student study effort:	
	• Self-study	39 Hrs.
	• Mini-project	28 Hrs.
	Total student study effort	106 Hrs.
Reading List and References	1. YC Fung, *Foundations of solid mechanics*, latest edition, Prentice Hall 2. JD Ferry, *Viscoelastic Properties of Polymers*, latest edition, Wiley 3. R Hill, *The Mathematical Theory of Plasticity*, Clarendon Press 4. TL Anderson, *Fracture Mechanics, Fundamentals and Applications*, latest edition, Taylor & Francis, CRC Press *5.* S Nemat-Nasser M Hori, *Micromechanics: Overall Properties of Heterogeneous Materials*, North-Holland 6. K.L. Johnson, *Contact Mechanics*, Cambridge University Press	

(Implemented from 2019/20 academic year.)

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