

1.	Title of the course	Fracture and Fatigue
2.	Course number	ME517L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To ME5032/11
6.	To be offered by	Department of Mechanical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	<b>Course Objective(s):</b> To study the principles and mechanics of failure of solids by nucleation and growth of cracks under external loadings. To be able to calculate the stresses, energy release rate, stress intensity factor near a crack tip etc. To know the design principles of materials and engineering structures using the approach of fracture mechanics and fatigue.	
10.	<b>Course Content:</b> Fundamentals of fracture and fatigue; Modes of fracture; Linear elastic fracture mechanics: Griffith's and Irwin-Orowan's theory, stress and deformation fields at crack tip, energy release rate, stress intensity factor, R-curve, fracture toughness, mixed mode fracture; Elastic-plastic fracture: plastic zone model at crack tip, crack opening displacement, J integral; Crack growth under dynamic loading; Fatigue fracture: crack nucleation and growth, fatigue damage analysis, fatigue life and its estimation, S-N curves, piecewise constant life diagrams.	
11.	<b>Textbook(s):</b> 1. Anderson T L, <i>Fracture Mechanics - Fundamentals and Applications</i> , 3rd Edition, Taylor and Francis Group (2005). 2. Kumar P, <i>Elements of Fracture Mechanics</i> , 1st Edition, Tata McGraw Hill (2009).	
12.	<b>Reference(s):</b> 1. Broek D, <i>Elementary Engineering Fracture Mechanics</i> , 4th Edition, Springer (2012). 2. Dowling N E, <i>Mechanical Behavior of Materials</i> , 4th Edition, Prentice Hall (2012). 3. Maiti S K, <i>Fracture Mechanics</i> , 1st Edition, Cambridge University Press (2015). 4. Suresh S, <i>Fatigue of Materials</i> , 2nd Edition, Cambridge University Press (1998).	