

Course Title	<b>Failure analysis application for engineering materials</b>	Course Code	<b>MEXXXX (will be allocated by the Academic – cell)</b>			
Dept./ Specialization	Mechanical Engineering / Materials and Design	Structure (LTPC)	3	0	0	3
To be offered for	UG / PG	Status	Core <input type="checkbox"/>		Elective <input checked="" type="checkbox"/>	
Faculty Proposing the course	Satish Gunturi, Venkata Timmaraju Mallina	Type	New <input checked="" type="checkbox"/>		Modification <input type="checkbox"/>	
Recommendation from the DAC		Date of DAC				
Pre-requisite		Submitted for approval				
Learning Objectives	<p>The objectives of this course are to train the students</p> <ul style="list-style-type: none"> <li>To perform failures analysis of engineering materials and systems</li> <li>understand causes and failure mechanisms</li> <li>techniques to mitigate failures</li> </ul>					
Learning Outcomes	<p>At the end of the course, the students are expected to be capable of</p> <ul style="list-style-type: none"> <li>Understanding failures and types in components &amp; systems</li> <li>applying various failure analysis methodologies</li> <li>recognizing failure modes and design against failures</li> </ul>					
Contents of the course <i>(With approximate break-up of hours for L/T/P)</i>	<p>Introduction to failure – components &amp; systems, Types of failures, safe-life &amp; fail-safe approaches. Systematic approaches to failure analysis - Procedures for handling failure investigations and various root cause analysis (RCA) techniques (fishbone diagrams, FMEA, Pareto etc) Tools for failure analysis (various Macro/Microscopy, spectral, chemical, Mech testing, NDT, SAM principles) (12)</p> <p>Mechanisms of failure (Mechanical, macroscopic/microscopic aspects) -Static, Impact, Fatigue &amp; Creep (10)</p> <p>Case studies with examples of failure analysis based design (Fracture mechanics, cumulative fatigue damage, parametric designs against creep) (15)</p> <p>Electronics package failures, package types, interconnect failures in semiconductor packages (5)</p>					
Text Book	1. C. Brooks and A. Choudhury, Failure Analysis of Engineering Materials, 1st edition, McGraw-Hill education, ISBN-13: 978-0071357586.					
Reference Books	<p>1. ASM handbook Vol 11 Failure analysis &amp; prevention</p> <p>2. Handbook of Materials Failure Analysis: With Case Studies from the Construction Industries, Abdel Salam Hamdy Makhoul; Mahmood Aliofkhaezai, Elsevier</p>					