

<b>Course Number and Name</b>	
BME008 - MECHANICS OF FRACTURE	
<b>Credits and Contact Hours</b>	
3&45	
<b>Course Coordinator's Name</b>	
Mr.Arun V Rejus Kumar	
<b>Text Books and References</b>	
<p><b>TEXTBOOKS:</b></p> <ol style="list-style-type: none"> <li>1. Jean Lemaitre and Jean Louis Chaboche "Mechanics of solid Materials," Cambridge university press, Cambridge, 1987.</li> <li>2. Prashant Kumar, Elements of fracture mechanics, Wheeler publishing, 1999.</li> </ol> <p><b>REFERENCES:</b></p> <ol style="list-style-type: none"> <li>1. John M. Barsom and Stanley T Rolfe, "Fracture and fatigue control in structures", Prentice Hall, Inc, USA, 1987.</li> <li>2. David Broek- "Elementary engineering fracture mechanics" Martinus Nijhoff publishers, 1982.</li> <li>3. <a href="https://apm.iitm.ac.in/smlab/kramesh/book_4.htm">https://apm.iitm.ac.in/smlab/kramesh/book_4.htm</a></li> </ol>	
<b>Course Description</b>	
The purpose is to give an introduction about fundamental theory in fracture mechanics. Knowledge of failure mechanisms and the fracture mechanics is important in many fields of research and industrial applications.	
<b>Prerequisites</b>	<b>Co-requisites</b>
MACHINE DESIGN I	MACHINE DESIGN II
required, elective, or selected elective (as per Table 5-1)	
Core Elective	
<b>Course Outcomes (COs)</b>	
CO1	The student will develop skills in deriving stress field and energy release rate around the crack tip and crack propagation under cyclic loading.
CO2	Learn about crack failures
CO3	Understanding of fracture mechanics and its application.
CO4	Learn about fatigue growth
CO5	Will learn about fracture failure modes
CO6	Learn fracture repair and analysis

Student Outcomes (SOs) from Criterion 3 covered by this Course													
COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l	
CO1	H												
CO2			H										
CO3							M				L		
CO4	H		H	H	M	M							L
CO5													L
CO6	H												L
List of Topics Covered													
<b>UNIT I INTRODUCTION &amp; ELASTIC CRACK</b> <span style="float: right;"><b>9</b></span>													
Introduction-Crack in a structure-Griffith criterion cleavage fracture, ductile fracture, fatigue cracking-Service failure analysis. Elastic crack-Elastic crack tip stress field- Solution to crack problems, Effect of finite size stress intensity factor-Special cases- Irwin plastic zone correction – Actual shape of plastic zone- plane stress- plane strain													
<b>UNIT II ENERGY PRINCIPLE</b> <span style="float: right;"><b>9</b></span>													
Energy release rate- criterion for crack growth- Crack resistance curve-Principles of crack arrest- Crack arrest in practice.													
<b>UNIT III FATIGUE CRACK GROWTH</b> <span style="float: right;"><b>9</b></span>													
Fatigue crack growth test, stress intensity factor, factors affecting stress intensity factor-variable amplitude service loading, retardation model.													
<b>UNIT IV ELASTIC PLASTIC FRACTURE MECHANICS</b> <span style="float: right;"><b>9</b></span>													
Elastic plastic fracture concepts- crack tip opening displacement- J using FEM.													
<b>UNIT V APPLICATIONS OF FRACTURE MECHANICS</b> <span style="float: right;"><b>9</b></span>													
Fracture design- selection of materials-Fatigue crack growth rate curve- stress intensity factor range- Use of crack growth law.													