

## SYLLABUS CURRICULUM

<b>COURSE</b>	<b>Course Name : FRACTURE MECHANICS</b>
	<b>Course Code : TM184888</b>
	<b>Credit : 3 sks</b>
	<b>Semester : Optional</b>

### COURSE DESCRIPTION

Fracture Mechanics course provides understanding and understanding of the mechanisms of fractures on brittle and ductile materials and their relation to the stress / strain distribution around the defective part of the static load, and provides understanding and understanding of the propagation process cracks due to dynamic loads, and can apply the concept of fault mechanics in the planning and analysis of construction failures.

### LEARNING OUTCOMES

LO8	Able to implement mathematics, science and engineering principles to solve engineering problems in mechanical systems.
LO9	Able to find the source of engineering problems in mechanical system through research that includes identification, formulation, analysis, data interpretation based on engineering principles.
LO10	Able to formulate the solution of engineering problem in mechanical system by considering economy, safety, environment and energy conservation.
LO11	Able to design mechanical system and the necessary components through analytical approach based on science and technology by considering technical standard and reliability.

### COURSE LEARNING OUTCOMES

Students will be able to understand the mechanism of fracture in brittle and ductile materials. Students are also expected to relate mechanism of failure with stress-strain distribution around the defective parts due to static load. Students are expected to provide insight about crack propagation due to dynamic load and apply the concept of fracture mechanics in the construction planning and its failure analysis.

### MAIN SUBJECT

Main topics in this course are :

- Fundamentals of Linear-Elastic Fracture, Elastic-Plastic Fracture, Dynamic Fracture, and Time-Dependent Fracture
- Fracture Mechanism in Metal and Non-Metal and its application in Fracture Testing
- Fatigue Crack Propagation
- Cracking in Metals

- Computational Fracture Mechanics

And the sub-topics are :

- Tensile response of materials
- Theoretical cohesive strength
- Stress concentration factor
- Crack theory in brittle and ductile material
- Analysis of stress at the crack tip; Stress intensity factor (K) and Effective stress intensity factor (K<sub>eff</sub>)
- Plastic area prediction in crack tip
- Fracture toughness (K<sub>IC</sub>)
- Fatigue crack propagation, the mechanism of initial cracks, and crack propagation models.
- Environmental influence on material fatigue
- Crack stress corrosion

**PREREQUISITES**

- Metallurgy
- Mechanics of Material

**REFERENCE**

1. T.L. Anderson, Ph.D., Fracture Mechanics-Fundamentals and Applications, Third Edition, CRC Press LLC, Florida, 2005.
2. George E. Dieter, Mechanical Metallurgy, Second Edition, Mc Graw Hill Int. Book Company, Tokyo, 1981.
3. Richard W. Hertzberg, Deformation and Fracture Mechanics of Engineering Materials, John Wiley & Sons, Inc. New York, 1989.
4. Ralph I. Stephens, Ali Fatemi, Robert R. Stephens, Henry O. Fuchs, Metal Fatigue in Engineering, Second Edition, John Wiley & Sons, Inc. New York, 2001.