Mechanical Engineering Dept. Department

Syllabus
ME 475: Mechanical Behavior/Materials (3-0-3)

Course Catalog Description:

Elements of theories of elasticity and plasticity. Dislocations and plastic deformation. Behavior of materials under static loading. Fracture and fracture mechanics. Fatigue, creep, impact, and wear failures. Environmentally induced cracking. Basic metallurgical failure analysis. Laboratory demonstrations and experimental projects. Use of relevant software for data analysis

Course Pre-requisites:

- ME 216: Materials Science and Engg.

Course Co-requisites:

- ME 307: Machine Design I

Course Objectives:

1. Study and analyze yielding and fracture of smooth and cracked ductile and brittle materials.
2. Study and analyze fatigue due to cyclic loading and its effect on crack initiation and crack growth.
3. Study and analyze creep, wear, and environmentally induced cracking
4. Conduct theoretical/experimental projects on engineering materials and applications

Course Learning Outcomes:

CLO1. CLO 1

CLO2. CLO 4

CLO3. CLO 2

CLO4. CLO3

Learning Resources:

- Mechanical Behavior of Materials, Norman E. Dowling, 4th edition, Pearson International, 2013.

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Report	15	10.0%
HWK	Every 3 weeks	10.0%
Quizzes	Every 3 weeks	10.0%
Exams	every 5 weeks	70.0%

Lecture Weekly Schedule:

Week#	Topics
1	Elastic and plastic stress-strain relationships and behavior
2	Elastic and plastic stress-strain relationships and behavior (Continue)
3	Complex and Principal States of Stress and Strain
4	Yielding and Fracture under Combined Stresses
5	Fracture of Cracked Members
6	Fracture of Cracked Members (Continue)
7	Fatigue of Materials: Stress and strain-Based Approach
8	Fatigue of Materials: Stress and strain-Based Approach (Continue)
9	Fatigue of Materials: Stress and strain-Based Approach (Continue)
10	Fatigue Crack Growth
11	Fatigue Crack Growth (Continue)
12	Creep and wear
13	Creep and wear (Continue)
14	Creep and wear (Continue)
15	Creep and wear (Continue)