Mechanical Engineering Dept. Department

Syllabus
ME 472: Corrosion Engineering (3-0-3)

Course Catalog Description:

Technical and economic aspects of corrosion problems. Types of corrosion; pitting, crevice, intergranular, galvanic and stress corrosion cracking. Mechanisms and prevention of corrosion failures. Cathodic protection of pipelines and submerged structures. Principles of inhibition of corrosion in process industries. Behavior of iron, copper, aluminum and their alloys in corrosive environments. Metallurgical aspects of corrosion. Design considerations in prevention of corrosion failures.

Course Pre-requisites:

- ME 216: Materials Science and Engg.

Course Objectives:

1. This course introduce the basic concepts of corrosion engineering. These concepts will help the students in understanding the fundamental nature of corrosion problems and applying the knowledge of corrosion protection to mitigate the corrosion

Course Learning Outcomes:

CLO1. Demonstrate basic understandings of causes of corrosion based on corrosion thermodynamics and Kinetics.

CLO2. Classify and describe characteristic features of different corrosion types and their causes in different materials.

CLO3. Classify and describe characteristic features of corrosion protection techniques and their application to mitigate corrosion.

CLO4. Evaluate basic materials corrosion failures and related case studies

CLO5. Work in small teams to apply materials failure analysis and be able to present the main findings

Learning Resources:

- Corrosion and Corrosion Control” by R.W. Revie and H.H. Uhlig
- i) Principle and Prevention of Corrosion, 2nd edition, by D.A.Jones ii) Corrosion Engineering by Fontana, McGraw-Hill (1986) iii) ASM Metals Handbook, vol. 13

Lecture Assessment Plan:

Assessment Task	Week Due	Weight
Homework Assignments	3, 6,9,12,14	7.0%
Quizzes	3, 6,9,12,14	10.0%
Major exams	6, 11	50.0%
Final Exam	During FE period	33.0%

Lecture Weekly Schedule:

Week#	Topics
1	1. Economic importance of corrosion.
	2. Thermodynamics
2	2. Thermodynamics (Continue)
3	2. Thermodynamics (Continue)
4	2. Thermodynamics (Continue)
	3. Kinetics
5	3. Kinetics (Continue)
6	3. Kinetics (Continue)
7	4. Corrosion Types
8	4. Corrosion Types (Continue)
9	4. Corrosion Types (Continue)
10	4. Corrosion Types (Continue)
11	4. Corrosion Types (Continue)
	5. Cathodic Protection
12	5. Cathodic Protection (Continue)
13	5. Cathodic Protection (Continue)
	6. Coatings
14	6. Coatings (Continue)
	7. Inhibitors
15	7. Inhibitors (Continue)
	8. Design for corrosion