Catalogue Description: (3-0-3)

Status in Curriculum (Required or Elective): Elective (offered Fall & Spring)

Prerequisites: ME 215


References:

Instructor: Dr. Ihsan Ul Haq Toor

Goals: (general objectives)
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 Outline (Lecture Topics):

Topics Covered:
1. Economic importance of corrosion. Mechanisms of corrosion (2 classes)
3. The phenomena of polarization. Types and causes of polarization. Hydrogen over-voltage. Influence of polarization on corrosion rate. Calculation of corrosion rate from polarization data (5 classes)
4. Major forms of corrosion: uniform, pitting, crevice, fretting, and cavitation (5 classes)
5. Intergranular corrosion and stress corrosion cracking. (4 classes)
7. Stainless steels. Classification of steels. Intergranular corrosion of ferritic, austenitic, and martensitic steels. Pitting and crevice corrosion (3 classes)
10. Inhibitor corrosion control (3 classes)
11. Design of corrosion prevention. Principles and important case histories (3 classes)

Design Activities/Projects:
Term paper will be assigned to give the student hands on experience.

Computer Usage:
Students are encouraged to solve some assigned homework problems using the available engineering software’s such as Gamry software and MS office.

Laboratory:
None

Assessment Tools:
1- 1st Major and 2nd Major
2- Homework Assignments
3- Quizzes
4- Final Exams

Course Learning Outcomes:
1- Students will learn clear knowledge about some of the basics of corrosion science such as
thermodynamics and kinetics.

II- Students will be able to calculate polarization diagrams with given corrosion data and to predict the spontaneity of corrosion reaction based on cell EMF calculations.

III- Students will be able to identify different forms of corrosion and their root causes in different environments.

IV- Students shall be able to understand different corrosion protection strategies and will be able to use them in appropriate situations.

V- Students will be able to design for corrosion, based on their knowledge of type of corrosion and corrosion protection methods.

VI- Students will learn about different metallic alloys such as stainless steels and their corrosion problems and application for the industry.

**Course Learning Outcomes mapped to Student Outcomes:**

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<th>Course-to-Student outcome mapping</th>
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**Status of Continuous Improvement review of this Course:**

**Date reviewed:** Dec. 20, 2014

**Prepared by:** Dr. Ihsan ul haq Toor