# THE OHIO STATE UNIVERSITY

COLLEGE OF ENGINEERING

# Corrosion

# MATSCEN 5951

# **Credit Hours:**

3.00 - 3.00

## **Course Levels:**

Undergraduate (1000-5000 level) Graduate (5000-8000 level)

#### **Course Components:**

Lecture Lab

#### **Course Description:**

Introduction of basic principles underlying the electrochemical corrosion degradation of metals, role of corrosion in material failures, and experimental corrosion evaluation approaches. An understanding of the fundamental thermodynamics and kinetics of electrochemical corrosion processes will be developed and serve as scientific foundation for understanding these topics.

## Prerequisites and Co-requisites:

Prereq: Sr or Grad standing in Engineering, or permission of instructor.

#### **Course Goals / Objectives:**

- By the end of this course, the successful student will be knowledgeable about the role corrosion plays in material failures
- be knowledgeable about electrochemical corrosion mechanisms
- be knowledgeable about environment assisted cracking
- be able to calculate from first principles and experimentally determine a materials corrosion performance
- understand the factors controlling galvanic corrosion and be able to assess the tendency of a metal to suffer galvanic corrosion in a mixed material system
- be aware of the different forms of corrosion and details of corrosion phenomenology
- knowledgeable about corrosion and environment assisted cracking mitigation strategies
- be able to perform electrochemical experiments to characterize corrosion performance
- have improved technical written and oral communication skills

Corrosion - 2/2

#### **Course Topics:**

- Corrosion principles and the impact of corrosion
- Electrochemical thermodynamics (how probable)
- Electrochemical kinetics (how fast)
- Experimental techniques for determining kinetics
- Galvanic corrosion
- Passivity
- Localized corrosion
- Environmentally assisted cracking (stress + corrosion)
- Atmospheric corrosion and corrosion prevention

## **Designation:**

Elective