



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Corrosion Science and Materials Electrochemistry

MATSCEN 6735

Credit Hours:

2.00 - 2.00

Course Levels:

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

Electrochemistry fundamentals, corrosion thermodynamics and kinetics, experimental approaches, corrosion phenomenology, corrosion control strategies, nonmetallic material degradation, electrochemistry of batteries, fuel cells, and electrodeposition.

Prerequisites and Co-requisites:

Prereq: Grad standing in MatScEn, or permission of instructor.

Course Goals / Objectives:

- Provide fundamental knowledge of electrochemistry
- Provide understanding of controlling factors for metal corrosion
- Provide understanding of experimental approaches for measuring corrosion rate
- Provide awareness and understanding of forms of corrosion and corrosion phenomenology such as passivity and localized corrosion, galvanic corrosion, dealloying, environmental cracking
- Provide approaches for corrosion prevention and control such as coatings, inhibitors, cathodic protection, alloying
- Provide knowledge of degradation of non-metallic materials, such as polymers, ceramics, and semi-conductors
- Use electrochemical understanding to discuss aspects of electrodeposition, batteries, and fuel cells

Course Topics:

- Fundamentals of Electrochemistry
 - Corrosion Thermodynamics
 - Electrochemical Kinetics
 - Mixed potential theory and corrosion rate
 - Corrosion rate measurement methods
 - Corrosion phenomenology
 - Corrosion prevention and control approaches
 - Nonmetallic material degradation
 - Batteries, Fuel Cells, Electrodeposition
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Designation:

Elective