Syllabus

MSE 466 Materials in Electrochemical Systems
Instructor – Shen Dillon
Course Schedule – Monday, Wednesday, Friday – 9:00-9:50 AM

A. DESCRIPTION

This course examines materials issues in electrochemical systems. It introduces fundamental thermodynamics, kinetics and electrode processes in electrochemical systems and considers materials specific issues in materials design, materials in energy storage and conversion systems, and electrochemical corrosion. Essential concepts in these systems are introduced and emphasis will be placed on issues of materials selection, microstructure, systems design, materials limitations, and data analysis. This course is intended for graduate students and undergraduates

B. ORGANIZATION

This course will integrate two aspects of electrochemistry. The first part relates to basic electrochemistry and electrochemical methods. The second will discuss specific electrochemical systems that are of interest to materials scientists and the importance of materials in those systems. The two will be integrated where appropriate.

C. COURSE OBJECTIVES

To introduce students to Electrochemistry and electrochemical methods
To introduce students to various materials systems that function via electrochemistry

D. COURSE TOPICS OUTLINE

Topics Covered	*Contact Hours*
Basics of electrochemical cells	5 hours
Potential step/sweep methods	5 hours
Controlled current Methods	4 hours
Impedance techniques	4 hours
Materials for energy storage	5 hours
Electrodeposition	4 hours
Corrosion and anodization	4 hours
Electrochemical sensors	2 hours
Ion conductors	2 hours
Fuel cells	4 hours
Photocatalysts	4 hours
	43 hours

E. REQUIRED TEXT AND SUPPLIES

Suggested: Bard and Faulkner: Electrochemical Methods

F. GRADING PLAN
25% Mid-term assignment
25% Final exam
25% Homework
25% In-class (10% quizzes, 10% iclicker, 5% participation Attendance)

G. Credit
3 undergraduate hours or 3 graduate hours.

H. MEETING SCHEDULE/CONTACT HOURS
One 50-minute lecture, three times per week