Catalog Description

Failure of engineering materials in aggressive environments. Chemical and electrochemical mechanisms of corrosion. Influence of chemical composition and microstructure on corrosion behavior. Types of corrosion and chemical attack, including uniform corrosion, galvanic corrosion, pitting and other forms of localized corrosion, stress corrosion cracking, and corrosion fatigue. Methods of corrosion mitigation including cathodic protection, coatings, passivation, and corrosion inhibitors. Corrosion in nuclear reactors and nuclear waste repositories.

Prerequisites

CHME 361

Course Objectives

To provide engineering students with a fundamental understanding of the causes and prevention of materials degradation in chemically aggressive environments.

This course addresses the following student outcomes from ABET Criterion 3:

(a) Ability to apply knowledge of mathematics, science, and engineering;

(e) Ability to identify, formulate, and solve engineering problems;

(h) The broad education necessary to understand the impact of engineering solutions in a global, economic, and societal context;

(i) Knowledge of contemporary issues.

Students successfully completing this course will demonstrate the ability to do the following:

1. Basic Concepts. Write and explain the basic principles related to the corrosion and chemical degradation. [ABET Outcome 3(a)]

2. Problem Solving. Solve problems involving chemical and electrochemical processes in materials exposed to aggressive environments. [ABET Outcomes 3(a)(e)]

3. Environmental, Social, and Economic Effects. Discuss the global environmental, social, and economic implications of materials failures. [ABET Outcomes 3(h)(i)]

Topics Covered

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<th>Structure and Composition of Materials</th>
<th>Corrosion Rates</th>
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<td>Materials Properties</td>
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<td>Electrochemical Processes</td>
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Class/Laboratory Schedule
Meeting times: Tuesdays and Thursdays, 4:00–5:15 PM, in BC 106.

Instructor
P. K. Andersen
Department of Chemical and Materials Engineering
Institute for Energy and the Environment
EC III Room 331
646-8153

Office Hours
To be announced (see course Canvas site).

Grading Policies
The following weighting scheme will be used to assign final course grades:
• In-class quizzes: approximately 80%
• Online discussions: 20%
Grades will be assigned according to a straight scale: 90 to 100% earns an A, 80–90% a B, and so on.
Late work will not be accepted for a grade except in cases of illness, accidents, or other emergencies.

Canvas Site
Please check the course Canvas site daily for announcements and course material. Also use the Canvas site to communicate with the course instructor.

Syllabus Preparation Date
Revised on 20 August 2015 by P. K. Andersen

The NMSU Department of Chemical Engineering maintains a syllabus addendum containing course requirements common to all courses with the CH E: prefix online. This document is accessible at the URL: http://chemeng.nmsu.edu/che_courses.htm