

**Department of Materials Science and Engineering**  
**MET E 435 Metallurgical Engineering**  
**Corrosion Laboratory (1 credit)**

**Catalog description:**

Laboratory experiences in application of physical chemical principles to the reaction of material with their environments. To accompany 432.

**Prerequisites:** Background knowledge in materials science and engineering; co-requisite, registration in Met E 432.

**Reference texts:** Dennis A. Jones, Principles and Prevention of Corrosion, 2<sup>nd</sup> Edition, Simon & Schuster, 1996. Mars G. Fontana, Corrosion Engineering, 3<sup>rd</sup> Edition, McGraw-Hill, 1986.

**Course Objectives:** The student will be able to

1. Show the existence and location of anodes and cathodes in corrosion processes using color indicators.
2. Illustrate the displacement of an ion in solution by a more active metal as predicted by the electromotive series.
3. Demonstrate the use of hydrogen electrode to measure the electrochemical potential of several metals and to determine the metal ion concentration.
4. Illustrate the manner in which a simple galvanic series can be constructed, the effect of different environments on the galvanic potential between materials and the differences and similarities with the electromotive series
5. Investigate parameters which control the rate of corrosion. Specifically: (1) the influence of anode/cathode area ratio on the magnitude of galvanic corrosion, (2) metal ion concentration cells, (3) and oxygen concentration cells.
6. Apply electrochemical measurements for the study of corrosion behavior.

**Class Schedule:** One, 3 hour periods weekly  
Specific course outline shown in the following section.

**Contribution of course to meeting professional component:**

This lab focuses on corrosion processes and properties of materials as related to corrosion and oxidation. Students develop experience with corrosion problems and processes through hands-on activities and projects.

**Contribution of course to meeting objectives:**

This course meets several department objectives related to properties / processing / applications relationships, hands on learning, and assists in preparing the students for professional work in real engineering environments.

**Prepared by:** Alain A. Adjorlolo, Instructor, April 2001