



UNIVERSITY OF JORDAN
School of Engineering
Chemical Engineering Department

- 1. Course Number and Name:** 0905425 Corrosion Engineering
- 2. Course Prerequisite:** 0905421 Chemical Reaction Engineering (1), 0915331 Materials Science and Engineering
- 3. Credits, Contact Hours and Categorization:** 3 Credit hours, 3 Contact hours weekly, Elective Engineering course.
- 4. Syllabus URL:** To be added to the University of Jordan e-learning portal (Sep 2025).
- 5. Instructors Name:**
- 6. Textbook:** Ahmad, Z. Principles of Corrosion Engineering & Corrosion Control, IChemE / Elsevier, Amsterdam, 2006.

References:

- 1) Roberge, P. Corrosion Engineering: Principles and Practice, McGraw-Hill, 1st Edition, 2008.
- 2) Jones, D.A. Principles and Prevention of Corrosion, Macmillan, New York, 1995.
- 3) Fontana, M.G. Corrosion Engineering, McGraw-Hill, 3rd Edition, 1986.
- 4) Course Notes and Handouts

7. Live Stream Platform: Microsoft Teams

Live Stream URL:

<https://teams.microsoft.com/l/channel/19%3ac51642727780464d84c9f0ae06c96020%40thread.tacv2/General?groupId=be8e9ab9-1b5f-46a6-b935-c2dd6dfc1945&tenantId=05405dba-373c-4e20-a30e-3e6fcf507cfe>

8. Specific Course Information:

▪ Catalog Description:

Fundamental, principles and laws of electrochemistry. Thermodynamics and kinetics of electrochemical cells. Heat and Mass transfer in electrochemical reactors. Theory of corrosion. Types and mechanisms of corrosion processes. Corrosion control by preventative methods, chemical additives, and electrical techniques.

- Prerequisite: 0905421 Chemical Reaction Engineering (1), 0915331 Materials Science and Engineering
- Required or Elective: Department Elective Course

9. Specific Goals of the Course:

- Specific Outcomes of Instruction related to Criterion-3:

- 1) Understand the basic concepts of corrosion science including chemistry, thermodynamics, and kinetics (**O1**)
- 2) Familiar with technical methodologies in testing and interpreting corrosion processes, including visual observation and corrosion rate measurement (**O1**).
- 3) Explore types of metal corrosion with respect to materials and environment, especially those important in industry (**O1, O2**)
- 4) Understand and familiar with the application of surface coating, chemical inhibition, and cathodic protection in metal corrosion cases (**O1, O2**).
- 5) Understand and able to apply preventative corrosion control by equipment design and material selection to selected cases (**O2**).

10. List of Topics to be Covered:

- 1) Overview and introduction to corrosion, including socioeconomic impacts.
- 2) Basic concepts: electrode potentials, corrosion cells and thermodynamics.
- 3) Kinetics: corrosion currents and rates, Tafel equation, Evans diagrams, polarization, and passivity.
- 4) Corrosion forms (types) applied to different materials and environments.
- 5) Corrosion Control by cathodic and anodic protection, inhibition, and coating.
- 6) Corrosion prevention by equipment design and materials selection.

Prepared by:

22/09/2025

ABET Criterion 3 Students Outcomes

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.