

MME 4309 CORROSION

SYLLABUS

SPRING 2023

MME 4309 CRN 20594

MME 5390 CRN 26538

INSTRUCTOR:

Dr. Stella A. Quinones

Office Hours: Mondays: 4 – 5 pm or by appointment

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COURSE DESCRIPTION

Application of electrochemistry and engineering principles to the corrosion, passivity and protection of metals and alloys. This course includes an introduction to materials corrosion and focuses on the scientific theory associated with corrosion, the prevention and/or minimization of corrosion, and the different forms of corrosion in engineering applications. The first half of the course is an overview of the electrochemical background necessary to understand the corrosion process. This includes the potential measurement of electrochemical cells, construction of Pourbaix Diagrams, polarization diagrams, corrosion rates and factors affecting corrosion. The second part of the course is a review of the different types of corrosion and corrosion prevention.

PREREQUISITES

MME 2303 and MME 3308

LEARNING OUTCOMES

Students will be able to:

- Recognize and recall basic electrochemistry terms and processes related to oxidation and reduction reactions, thermodynamics, kinetics and passivity
- Understand aqueous corrosion related to passivation/depassivation, localized corrosion, galvanic corrosion and cathodic protection
- Discuss the different forms of corrosion
- Identify materials and the environments in which they are susceptible to corrosion
- Explain how corrosion can be controlled by design, environment modifications, inhibitors, coatings, anodic protection, and cathodic protection
- Calculate corrosion rates under different conditions

TEXTBOOK

[Introduction to Corrosion Science by E. McCafferty, Springer, New York, 2010 \(ISBN 978-1-4419-0454-6\)](#)

(Optional Resource) Principles of Corrosion Engineering and Corrosion Control by Zaki Ahmad (ISBN: 0750659246)

GRADE

MME 4309 - Undergraduates	MME 5390 – Graduate Students
Homework – 10%	Homework – 10%
Exams – 80%	Exams – 80%
Paper – 10%	Paper and Presentation – 10%

COURSE STRUCTURE

The course structure is organized as weekly modules which include: (1) a reading assignment, (2) problem solving assignments, and (3) occasional assignments related to the semester project. Each reading assignment should be completed before each lecture. Homework is used to emphasize the material covered in the weekly module. Assignments related to the development of the paper will be given every couple of weeks to help students explore topics of interest. Students are encouraged to start the research for their paper after week 4 and to work consistently throughout the semester. This will enhance the student's general knowledge about corrosion and its importance, and will provide relevance for the concepts covered in class.

Activity	Quantity	Due Dates
Lectures	Twice per week	Mondays and Wednesdays, noon – 1:30 pm
Reading	1-2 hour per week	Before each lecture
Homework	1-3 homeworks/week	Due in class or at start of next lecture
Exams	Four per semester	During class (1 hour 20 minutes)
Project	One per semester	Electronic copy of paper: Friday, April 21th, noon

LECTURE

This course is fast paced, and critical concepts are covered during every lecture. Students should prepare for lecture by reading/reviewing the assigned reading material. Concepts are emphasized by in-class problem solving assignments. Assignments completed in class are due at the end of class or at the beginning of the next lecture.

HOMEWORK

The points assigned to each assignment will vary, and the homework grade will be equal to the total points earned divided by the total possible homework points. Homework grades will be uploaded to Blackboard with the homework number, description and possible points. Homework will be completed on engineering paper using the standard format for the course. Problem solving and units will be emphasized. Each student is expected to use the standard format and to turn in legible work. Work turned in that is illegible will not be graded and will be returned with a zero grade.

EXAMS

Exams are scheduled on the dates shown below:

Exam I : February 27th

Exam II: March 22nd

Exam III: April 17th

Exam IV: May 3^d

Each exam is worth 20%, for a total of 60% of the final grade.

PROJECT

The project will consist of a paper worth 10% of the final grade for undergraduate students and a paper and a presentation also worth 10% of the final grade for graduate students. The paper will consist of a double spaced 6-page report (not counting figures, tables and references) with a minimum of 10 sources. The presentation given by graduate students will include a 10-minute PowerPoint presentation due on May 1st. It is recommended that students look up corrosion failures to begin looking for a topic that interests them, and to ensure that there are enough useful refereed journal articles (minimum of 6) that supports their research. Journal articles are different from news articles.

Students will be required to turn in the following parts of the project based on the timeline below:

Project Activity Timeline (Due Dates)

Project Activity	Timeline (Due Dates)
1. Topic Selection	Feb 27 th
2. Paper	April 21 st
6. Presentation	May 1 st (Graduate Students only)

The grading structure for this course is shown below:

100-90 A

80-89 B

70-79 C

60-69 D

59-0 F

COMMUNICATION

Communication will be through Blackboard as follows:

Email: Please use the Email option on the course Blackboard shell to contact me. I will make every attempt to respond to your e-mail every Monday and Wednesday by the end of the day.

Announcements: Check your email and the Blackboard announcements frequently for any updates, deadlines, or other important messages.

It is important that you communicate with your professor regarding any personal issues that might impact your attendance or performance in this course (or any other course). This will ensure that you have the resources you need to succeed in your course(s).

COURSE DROP POLICY

Students who fail to turn in 5 assignments will be dropped from the course. The student withdrawal deadline with an automatic 'W' is March 30th. After March 30th, students may drop the course, and will

receive a grade of W or F. To drop this class, please contact the Registrar's Office to initiate the drop process. If you cannot complete this course for whatever reason, please contact me. If you do not, you are at risk of receiving a grade of "F" for the course.

INCOMPLETE GRADE POLICY

Incomplete grades may be requested only in exceptional circumstances after you have completed at least half of the course requirements and if the student has a passing grade at the time of the request. Talk to your professor immediately if you believe an incomplete is warranted. If granted, we will establish a contract of work to be completed with deadlines.

OTHER USEFUL INFORMATION:

You will be expected to bring a laptop to class occasionally to complete in class assignments. If you do not own a laptop, please contact your professor as soon as possible.

TECHNICAL ISSUES:

I strongly suggest that you submit your work with plenty of time to spare in the event that you have a technical issue of any kind. If you are experiencing difficulties with email or blackboard, please contact the UTEP Help Desk.

NETIQUETTE:

- Always consider your audience.
- Respect and courtesy must be provided to classmates and to instructor at all times. No harassment or inappropriate communications will be tolerated.
- When reacting to someone else's question or comments, address the ideas, not the person.
- Blackboard is not a public internet venue; all postings to it should be considered private and confidential. Whatever is posted on in these online spaces is intended for classmates and professor only. Please do not copy documents and paste them to a publicly accessible website, blog, or other space. If students wish to do so, they have the ethical obligation to first request the permission of the writer(s).

ACCOMODATIONS POLICY

The University is committed to providing reasonable accommodations and auxiliary services to students, staff, faculty, job applicants, applicants for admissions, and other beneficiaries of University programs, services and activities with documented disabilities in order to provide them with equal opportunities to participate in programs, services, and activities in compliance with sections 503 and 504 of the Rehabilitation Act of 1973, as amended, and the Americans with Disabilities Act (ADA) of 1990 and the Americans with Disabilities Act Amendments Act (ADAAA) of 2008. Reasonable accommodations will be made unless it is determined that doing so would cause undue hardship on the University. Students requesting an accommodation based on a disability must register with the UTEP Center for Accommodations and Support Services.

COVID-19 PRECAUTIONS: Please STAY AT HOME and REPORT if you (1) have been diagnosed with COVID-19, (2) are experiencing COVID-19 symptoms, or (3) have had recent contact with a person who

has received a positive coronavirus test. Reports should be made to COVIDaction@utep.edu. If you are feeling unwell, please let me know as soon as possible, and alternative instruction will be provided.

SCHOLASTIC INTEGRITY

Academic dishonesty is prohibited and is considered a violation of the UTEP Handbook of Operating Procedures. It includes, but is not limited to, cheating, plagiarism, and collusion. Cheating may involve copying from or providing information to another student, possessing unauthorized materials during a test, or falsifying research data on laboratory reports. Plagiarism occurs when someone intentionally or knowingly represents the words or ideas of another as ones' own. Collusion involves collaborating with another person to commit any academically dishonest act. Any act of academic dishonesty attempted by a UTEP student is unacceptable and will not be tolerated. All suspected violations of academic integrity at The University of Texas at El Paso must be reported to the Office of Student Conduct and Conflict Resolution (OSCCR) for possible disciplinary action. To learn more HOOP: Student Conduct and Discipline.

COPYRIGHT STATEMENT FOR COURSE MATERIALS

All materials used in this course are protected by copyright law. The course materials are only for the use of students currently enrolled in this course and only for the purpose of this course. They may not be further disseminated.