Stability of Materials

EMA 4324 Section 12243
Class Periods: M, W, F | Period 8 (3:00 – 3:50PM)
Location: Florida Gym 0265
Academic Term: Fall 2025

Instructor:
Dr. Yijia Gu
y.gu@ufl.edu
352 273-0292
Office Hours: Monday, 10:40 - 11:30AM, 178 Rhines Hall (and other times by appointment)

Supervised Teaching Student:
Please contact through the Canvas website

- TBA

Course Description
Stability, corrosion, and electrochemical processes in materials. Topics covered include degradation of materials, electrochemical thermodynamics, electrochemical kinetics, electrochemical systems, and industrial electrochemical processes.

Course Pre-Requisites / Co-Requisites
EMA 4314

Course Objectives

a. To develop an understanding of degradation processes in a range of materials systems
b. To develop a qualitative and quantitative understanding of the thermodynamics and kinetics of electrochemical processes in materials
c. To develop an understanding of aqueous corrosion and high-temperature oxidation processes
d. To develop an understanding of physical and chemical processes in electrochemical energy systems, including representative contemporary technologies

Materials and Supply Fees
None

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	Medium
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	Medium

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative 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	

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Principles and Prevention of Corrosion
  Denny A. Jones
  1996, 2nd Edition
  ISBN 0-13-359993-0

- Electrochemical Energy Storage
  Petrovic, Kurzwell and Garche
  2022, 1st Edition, e-book
  https://ufl-flvc.primo.exlibrisgroup.com/discovery/fulldisplay?docid=alma9938400527690659 7&context=L&vid=01FALSC_UFL:UFL&lang=en&search_scope=MyInst_and_CI&adaptor=Local%20Search%20Engine&tab=Everything&query=any,contains,slobodan%20petrovic&offset=0

Recommended Materials

- Corrosion Engineering: Principles and Solved Problems
  Branko N. Popov
  2015, 1st Edition
  ISBN 978-0-444-62722-3

You will also find your thermodynamics book (DeHoff; Atkins, Physical Chemistry or similar) useful, particularly in the early part of the course.

Course Schedule

Important Dates (Please note dates are tentative and subject to change)
September 19th Exam 1
October 24th Exam 2
December 3rd Exam 3

Attendance Policy, Class Expectations, and Make-Up Policy
Attendance is ***strongly*** encouraged as we will have multiple graded in-class activities; some may be announced in advance in class, others may not. Cell phones should be turned off, or muted, prior to the start of class. Reading of newspapers, work on assignments for this or other classes, or other activities that are not part of the class are not allowed during lecture. Students who do not comply with these requirements or who behave disrespectfully or in a disorderly manner may be asked to leave the classroom and will not be allowed to make up quizzes or other assignments. It is acceptable to work together on HW; however, all solutions submitted must be the work of the student and may not be copied from another student or other resource. Late HW will be accepted after the deadline and until the solutions are posted, with the overall score reduced by 30%. No HW

will be accepted after the solutions are posted. There will be multiple in-class activities (hands-on activities, guided problem solving, quizzes, …) with one (absent or lowest score) to be dropped from the in-class activity score; make-ups will only be available with excused absences. Missed exams will be scored as zeros unless an excused absence has been given by the instructor prior to the exam. Excused absences must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Evaluation of Grades

Assignment	Total Points
Homework Sets (~10; drop 1)*	20%
In-class activities (drop 1)	20%
First Exam	15%
Second Exam	15%
Third Exam	15%
Report(s)	15%
	100%

* Each HW problem or appropriate part of problem will be given a score between 0 and 4: 4 (correct or essentially correct; A quality work); 3 (very substantially correct; B quality work); 2 (largely correct; C quality work); 1 (some progress made; D quality work); 0 (minimal progress or question not attempted; E quality work). Score for the entire HW will be scaled to 10, so each HW set counts equally.

Grading Policy

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Academic Policies & Resources
To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies. Instructor-specific guidelines for courses must accommodate these policies.

Commitment to a Positive Learning Environment
The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:
• Your academic advisor or Undergraduate Coordinator
• HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
• Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu