

Course Syllabus
EMA 4324 (Section 3009), Environmental Stability of Materials
Fall 2022
Period 8 (3:00-3:50pm), MWF, LEI 0207

1. Course Description – This is an undergraduate course in environmental degradation and stability of materials. Topics covered include the mechanisms, energetics and kinetics of environmental degradation of materials as well as the economic impact, prevention and mitigation strategies, and contemporary issues (3 credit hours).
2. Pre-requisites and Co-requisites – EMA 4314.
3. Course Objectives Include:
 - a. to develop an understanding of environmental conditions and degradation mechanisms that drive the deterioration of engineering materials and what is necessary for prevention or control;
 - b. to become familiar with traditional terminology, conventions and sources of materials degradation;
 - c. to be able to identify contemporary issues in environmental degradation of materials and how to go about understanding degradation mechanisms, rates, control, etc. in these novel problems;
 - d. to develop an understanding of the environmental and economic impact of materials and their degradation throughout their life cycle;

Professional Component (ABET): 3 credits of engineering topics. Relation to Program Outcomes (ABET): The table below is an example. Please consult with your department's ABET coordinator when filling this out.

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 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.	

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

4. Instructor – Gerhard E. Fuchs
 - a. Office location: 116 Rhines
 - b. Telephone: 352-846-3317
 - c. E-mail address: gfuch@mse.ufl.edu
 - d. Course website:
 - e. Office hours: regular times TBD, based on undergraduate and lecturer schedules and by appointment (email a request).
5. Teaching Assistant – TBA
 - a. Office location: TBA
 - b. E-mail address: TBA
 - c. Office hours: TBA
6. Meeting Times – MWF, Period 8th (3:00pm-3:50pm).
7. Meeting Location – LEI 0207
8. Final Exam – Per the University pre-assigned schedule, the OPTIONAL final exam is scheduled for Friday, December 14th, 10am-12pm.
9. Textbook Required –
 - a. Title: Principles and Prevention of Corrosion, 2nd edition
 - b. Author: Denny A. Jones
 - c. Publication: Prentice Hall, 1996
 - d. ISBN: 0-13-359993-0
10. Other Reading Materials and Resources –
 - a. “Handbook of Environmental Degradation of Materials,” by Myer Kutz; William Andrew Publ. (2005).

- b. "Principles of Corrosion Engineering and Corrosion Control," by Zaki Ahmad; Elsevier (2006).
- c. Various handouts throughout the course.

11. Grading –

Without Optional Final:

Approximately weekly homework: 25%

3 Mid-term exams (25% each): 75%

With Optional Final:

Approximately weekly homework: 20%

3 Mid-term exams (20% each): 60%

Optional Final exam: 20%

No extra credit work accepted.

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.

Tentative Schedule

Week 1: Introduction & Chemical Equilibrium /Ch. 1

Week 2: Chemical Thermodynamics/ Ch 2.1

Week 3: Pourbaix Diagrams/ Ch 2.2

Week 4: Pourbaix Diagrams & Faradays Law/ Ch 2.2, 3.1

Week 5: Chemical Kinetics/ Ch 3.1.2

Week 6: Exam 1, Chemical Kinetics and Tafel Diagrams/ Ch. 3.2, 3.3

Week 7: Evans Diagrams & Oxidizers / Ch 3.3, 3.4

Week 8: Passivation /Ch 4.1-4.4

Week 9: Passivation and Anodic Protection /Ch. 4.3

Week 10: Corrosion Experiments

Week 11: Exam 2, Corrosion Experiments & Impedance Spectroscopy

Week 12: Galvanic, Pitting and Crevice Corrosion

Week 13: High Temperature Corrosion and Ellingham Diagrams

Week 14: Oxidation Mechanisms; Cathodic Protection

Week 15: Anodic/Cathodic Protection

Week 16: Exam 3, Anodic/Cathodic Protection

Week 17: Optional Final Exam (12/15/20, 12:30pm-2:30pm)

Tentative Schedule for Mid-term Exams:

September 26, 2022

October 31, 2022

December 7, 2022

Homework assignments are given approximately bi-weekly, due within 1 week of assignment. Late homework accepted until solutions handed-out, but penalized 10% per day after due date. All work must be shown for full/partial credit. Once a solution set has been posted, late homework can not be accepted for a grade.

12. Grading Scale -

Percentage	≥92	≥88	≥84	≥80	≥76	≥72	≥68	≥65	≥62	≥59	≥56	<56
Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Grade Points	4.0	3.67	3.33	3.0	2.67	2.33	2.0	1.67	1.33	1.0	0.67	0

(Grade percentages containing decimals will be rounded upwards).

13. Honesty Policy – UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

14. Accommodation for Students with Disabilities –

Students Requiring Accommodations Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

15. *Commitment to a Safe and Inclusive Learning Environment* The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:
Your academic advisor or Graduate Program Coordinator

Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.ufl.edu
Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943,
nishida@eng.ufl.edu

16. **Software Use** – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy - There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see:
<https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care: Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the Office of Title IX Compliance, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS) Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601.

Career assistance and counseling. <https://www.crc.ufl.edu/>. Library Support, <http://cms.uflib.ufl.edu/ask>.

Various ways to receive assistance with respect to using the libraries or finding resources. Teaching Center, Broward Hall, 392-2010 or 392-6420.

General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138.

Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus:

https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.

Covid-19:

- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.