

## **Materials of Chemical Engineering**

ECH 4824 Section: NS01

**Class Periods:** Tue, Period 2-3 (8:30 am – 10:25 am)

**Location:** regular classroom (CHE 316)

**Academic Term:** Fall 2024

### **Instructor:**

Name: Fan Ren

Email Address : fren@che.ufl.edu

Office Phone Number: 352-392-4727

Office Hours: Zoom meeting (Code:915-365-77133 and password: 838314) Thurs (8:30 am – 10:25 am)

### **Grader:**

Zhu, Hao-Chen [zhu.haochen@ufl.edu](mailto:zhu.haochen@ufl.edu) Please prepare the answers of your homework in **Word file** and email it to Hao-Chen Zhu.

### **Course Description**

Relations between microscopic structure and macroscopic mechanical, thermal and electrical properties of organic and inorganic solid materials. Engineering applications, including corrosion. (Credit: 2)

### **Course Pre-Requisites / Co-Requisites**

ECH 3023 (Materials and Energy Balances) and ECH 4123 (Phase and Chemical Equilibria)

### **Course Objectives**

Upon completion of this course, a student should be able to:

- Have a broad technical understanding of material properties, behavior, and processing
- Define the mathematical expression to explain material behavior
- Qualitatively describe how material performance can be enhanced by controlling the atomic and molecular structure and composition of the material
- Apply chemical engineering science (e.g., thermodynamics, transport, and kinetics) to the understanding of material processing, properties, and failure (corrosion)
- Estimate how much force can be applied before a specific material fails
- Identify modes of failure and conditions that trigger material failure
- Describe methods for characterizing the structure and properties of materials
- Give examples of the importance of material properties as they benefit humanity
- Give examples of the material failure that has played in technological disasters

### **Materials and Supply Fees**

Course materials, homework assignments, and important announcements and grading policies will be posted on Canvas. Check it regularly

### **Required Textbooks and Software**

No textbook required

### **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	High
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	Medium

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

### Course Schedule

Wk	Date	Topic	HW
1	1/9	Crystal and Amorphous Structure in Materials	
2	1/16	Defects and x-Ray	
3	1/23	Oxidation	HW Crystal
4	1/30	Oxidation/Diffusion in Solid	HW Oxidation
5	2/6	Diffusion in Solid	
6	2/13	Exam 1 (Crystal/Oxidation)	
7	2/27	Polymer	HW Diffusion
8	3/5	Mechanical Property	HW Polymer
9	3/12	Spring Break	
		Exam 2 (Diffusion in Solid/Polymer)	
10	3/19	Surface Analysis	HW Mech Prop
11	3/26	Surface Analysis/Corrosion	HW Surface Analysis
12	4/2	Exam 3 (Mechanical Properties/Surface Analysis)	
13	4/9	Corrosion/Semiconductors	HW corrosion
14	4/16	Semiconductors	HW Semiconductor
15	4/23	Exam 4 (Corrosion and Semiconductor)	

### Attendance Policy, Class Expectations, and Make-Up Policy

State whether attendance is required and if so, how will it be monitored? What are the penalties for absence, tardiness, cell phone policy, laptop policy, etc. What are the arrangements for missed homework, missed quizzes, and missed exams? This statement is required: Excused absences must be consistent with university policies in

the [Graduate Catalog](#) and require appropriate documentation. Additional information can be found in [Attendance Policies](#).

### **Evaluation of Grades**

<b>Assignment</b>	<b>Percentage of Final Grade</b>
Homework Sets	80%
Exam (4)	20%
Total	100%

Students are encouraged to discuss the homework assignments within the study group, but each student needs to prepare and submit his/her own homework.

### **Grading Policy**

The following is given as an example only.

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

[UF Graduate Catalog](#)  
[Grades and Grading Policies](#)

### **Students Requiring Accommodations**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the [Disability Resource Center](#). It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### **Course Evaluation**

Students are expected to provide feedback on the quality of instruction in this course by completing [online evaluations](#). Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students on the [Gator Evals page](#).

### **University 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](#) 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.

### **Software Use**

All faculty, staff, and students 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 the [Notification to Students of FERPA Rights](#).

### **Campus Resources:**

#### **Health and Wellness**

##### **U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** [counseling.ufl.edu/cwc](http://counseling.ufl.edu/cwc), and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

##### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or [police.ufl.edu](http://police.ufl.edu).

#### **Academic Resources**

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto: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**, Various ways to receive assistance with respect to using the libraries or finding resources.  
<http://cms.uflib.ufl.edu/ask>.

**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://care.dso.ufl.edu>

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