Materials of Chemical Engineering

ECH 4824 Section 01H8/NR17
Class Periods: Tue, Period 2-3 (8:30 am – 10:25 am)
Location: LAR 0330
Academic Term: Spring 2020

Instructor:
Prof. Yeongseon Jang
y.jang@ufl.edu
(352) 294-1289
Office Hours: ChE 215, Thurs (8:30 am – 10:30 am)

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

- No TA/ST assigned to this course. Please contact Dr. Jang directly through the Canvas Website.

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:

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

Professional Component (ABET):
State the contribution of the course to meeting the professional components of the ABET-accredited degree.

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	Assessed
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	Assessed

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	

*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

- Title: Foundation of Materials Science and Engineering
- Author: William F. Smith and Javad Hashemi
- Publication date and edition: 2010 and 5th Edition (The 6th Edition is also acceptable)
- ISBN number: 978-0-07-352924-0

Course Schedule (The schedule can be adjusted accordingly)

Wk	*Date*	*Topic*	*Reading*	*HW*	*Quiz*
1	1/7	Crystal and Amorphous Structure in Materials	Ch. 3		
2	1/14	Crystal and Amorphous Structure in Materials	Ch. 3	HW 1	
3	1/21	Solidification	Ch. 4		Quiz 1
4	1/28	Crystalline Imperfection, Thermally Activated Process	Ch. 4-5	HW 2	
5	2/4	Diffusion in Solids	Ch.5	HW 3	
6	2/11	Mechanical Properties of Materials	Ch. 6		Quiz 2
7	2/18	Mechanical Properties of Materials	Ch. 6		
8	2/25	Mechanical Properties of Materials	Ch. 6	HW 4	
9	3/3	NO CLASS – SPRING BREAK			
10	3/10	**MIDTERM**	**Covering Chapters 3, 4, 5, 6**		
11	3/17	Polymers	Ch. 10		
12	3/24	Processing of Materials & Types of Corrosion (On-line class)	Ch. 6, 10, 13	HW 5	
13	3/31	Corrosion	Ch. 13		Quiz 3
14	4/7	Corrosion	Ch. 13	HW 6	
15	4/14	Electrical Properties of Materials	Ch. 14		Quiz 4
16	4/21	Semiconductors & Bioinspired Materials	Ch. 14, 17	HW 7	
17	4/27	**FINAL (NOTE: Wed) 10 am – 12 pm**	**Covering Chapters 10, 13, 14, 17**		

Attendance Policy, Class Expectations, and Make-Up Policy

Attendance of all lectures is highly expected and recommended. Lecture notes will be only provided during the lecture on a blackboard. It is the students' responsibility to obtain lecture notes in class, which they may have missed during their absence. Repeated absences may lead to a lower grade in the class.

No make-up exams and quizzes will be given. Students who do not attend an exam at the scheduled time will receive a score of zero for that exam. Exceptions will be made only in extraordinary circumstances, such as religious holidays or emergencies. It is required that, whenever possible, the student notifies the instructor about the situation prior to the exam, preferably at least two weeks in advance. **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.
As a courtesy to the other students and to the instructor, the students should turn off the ringers for all cell phones during class and they should not answer incoming calls. If a student is expecting an emergency call, please notify the instructor prior to class.

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (7)	70 (10 each)	14 %
Quizzes (4)	80 (20 each)	16 %
Midterm	150	30 %
Final	150	30 %
Design Project	50	10 %
Total	500	100%

HOMEWORK: 7 homework sets will be assigned to every chapter. The homework must be prepared neatly and professionally. Write only on one side of paper and use a straightedge for diagrams. Staple all pages together. Students are encouraged to help each other on HW (but no copy!). The HW is due one week after the assignment and must be turned in at the beginning of class on the due date. No later credit will be issued on HW.

QUIZZES: 4 quizzes (20-25 minutes each) are equally weighted. All quizzes will be closed book and closed notes. In class quizzes will be announced at least 1 week in advance.

MIDTERM & FINAL: 2 hr will be assigned during the class period. The exams will be closed book. You will be allowed to bring one sheet of paper (8.5 × 11 inch, one-side only) for formulas. Partial credit will be assigned. No credit will be given for problems that have a solution only but all the work leading to this solution is not shown or wrong.

DESIGN PROJECT: This course involves a variety of materials (e.g. metals, polymers, and semiconductors), processing technologies, and analytical methods. Design project aims to assist students in gaining better insights into material processing-structure-property relationships, and in presenting these in such a way as to persuade a critical reviewer of both the merit of the design and the soundness of the method. The final report, which is limited to 2000 words, is due by May 1st (Friday). The report grading rubric includes both technical merit (70 %) and writing merit (30 %).

Grading Policy

Percent (%)	Grade	Grade Points
94 – 100	A	4.00
85 – 93.99	A-	3.67
80 – 84.99	B+	3.33
75 – 79.99	B	3.00
70 – 74.99	B-	2.67
65 – 69.99	C+	2.33
60 – 64.99	C	2.00

55 – 59.99	C-	1.67
50 – 54.99	D+	1.33
45 – 49.99	D	1.00
40 – 44.99	D-	0.67
0 – 39.99	E	0.00

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

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.

Course Evaluation
Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

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 (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-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.

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

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: 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 suppor*t*, 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://care.dso.ufl.edu.

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