EMA 3011 – Fundamental Principles of Materials – Spring 2021
Sections: 9765

1. **Course Description**: The fundamental principles of structure, reactivity and energies describing materials systems will be covered, directly relating individual principles to specific materials properties or functions. (3 credit hours)

2. **Course Objectives**: In this course the student is exposed to the materials tetrahedron and its relation to the fundamental properties of materials. The student is exposed to materials selection and design.

Specific Objectives:

- Become familiar with the fundamentals of materials science and to be able to apply them to metals, ceramics, and polymers
- Learn the fundamentals of materials design and selection

3. **Prerequisites**: CHM 2046 or CHM 2096

4. **Professional Component (ABET):** This is a 3 credit course. It provides 3 credits towards engineering topics.

5. **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.	High
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Medium

6. Instructor: **Dr. Jennifer Andrew (she/her/hers)**
   a. E-mail address: jandrew@mse.ufl.edu
   b. Office hours: **M 3:00 – 5:00p**
   c. Office hours location: Zoom (link in Canvas)
   d. Website: **https://elearning.ufl.edu/**

7. Teaching Assistant: **Lin Yang**
   a. E-mail address: lin.yang@ufl.edu
   b. Office hours: **TBD**
   c. Office hours location: Zoom (link in Canvas)

8. Meeting Times and Location: **T Period 2 8:30a-9:20a FLG 230**
   R Period 2 & 3 8:30-9:20a, 9:35a-10:25a PSY 130

9. Textbooks Required
   1a. Title: ***Fundamentals of Materials Science and Engineering: An Integrated Approach***
   1b. Author: **William D. Callister and David G. Rethwisch**
   1c. Edition: **5th**
   1d. ISBN: **9781119175483**

   2a. Title: ***Materials: engineering, science, processing, design***
   2b. Author: **Michael Ashby, Hugh Shercliff, David Cebon**
   2c: Edition: **4th**
   2d: ISBN: **9780081023761**

3a. Supplemental Readings

10. **On the Web**: This course will use Canvas extensively as a communication and archival tool. The students can access all relevant course information (course notes, homework and exam solutions, announcements, grades, etc.) via the Canvas entry link: https://elearning.ufl.edu/. Pertinent course information may also be announced via UFL e-mail address in addition to over Canvas.

11. **Conduct, Attendance and Expectations**: Proper behavior in class is always important and leads to a relaxed and productive educational environment. Thus, eating, drinking, texting, reading of newspapers, working on homework for this or other courses, or other activities that are not part of the class are not allowed. Students who do not comply with these requirements or who behave disorderly or disrespectfully may be asked to leave the classroom. Leaving your cell phone on, leaving early or arriving late can be VERY distracting. All electronic devices (cell-phones, etc.) should be turned off or in silent mode. While not directly enforced, attendance is strongly recommended for this course. While attendance does not make up a specific component of the course grade, it will be reflected in homework and exam grades. Excused absences must be in compliance with university policies in the Graduate Catalog (http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance) and require appropriate documentation.

12. **Grading and Grading Scale**: Your final grade will be allocated based on the following distribution:

Homework:	25%
Two In-Class Exams:	25% each
Final Design Project:	25%

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

The instructor reserves the right to adjust the grade distributions, however grades **will not** be adjusted for individuals.

Exams. You will be given 2 exams throughout the semester, the exam content may change but the dates will not. **There will be no final exam**. Each exam is weighted equally and will be worth 25% of your final grade. Requests for re-grading must be made in writing and within one week after an assignment has been returned. **Make-up exams** will be provided only with the ***prior approval of the instructor or excused absence***. In general, acceptable reasons for excused absence include illness, serious family emergencies, special curricular requirements, military obligation, court-imposed legal obligations, religious holidays and participation in official university activities such as music performances, athletic competition or debate.

Final Design Project: You will have a final design project which will involve materials selection for a given application and/or type of material. This project will include a written report.

Homework. Homework problems will be assigned, together with due dates, through e-Learning. These homework questions are ***essential*** to your study and some exam questions will be adapted from them. Homework will be posted through the Canvas web site. Assignments are due **online through Canvas in pdf. format** on the due date, unless otherwise stated. **Late homework assignments will not be accepted and will receive a grade of zero**. The lowest homework score will be dropped.

13. **Course Outline**: Below is the tentative schedule of topics, activities, reading assignments, and exams.

Week of	**Topic**	**Reading (Ashby)**	**Reading (Callister)**
3-Jan	Introduction to Materials Selection and Design	**Ch.2-3**	
10-Jan	Introduction to Design, Crystal Structures	**Ch. 3**	**Ch. 3**
17-Jan	Materials Tetrahedron and Materials Design via Elasticity and Plasticity	**Ch. 4**	**Ch. 7**
24-Jan	Composites		**Ch. 15**
31-Jan	Electronic Properties	Ch. 15	**Ch. 12**
EXAM 1	**Thursday February 10**		
14-Feb	Thermal Properties, Magnetic Properties	Ch. 12, 16	**Ch. 17-18**
21-Feb	Magnetic Properties	Ch. 16	**Ch. 18**
28-Feb	*Spring Break (No Class)*		
7-Mar	Corrosion		**Ch. 16**
14-Mar	Materials Design via Elasticity and Plasticity	**Ch. 5**	
21-Mar	Materials Design via Elasticity and Plasticity	**Ch. 6-7**	
EXAM 2	**Thursday March 31**		
4-Apr	Materials Design via Service Condition	**Ch. 8-9**	
11-Apr	Materials Design via Electronic, Optical, and Thermal Properties	**Ch. 12-14**	
18-Apr	**DESIGN PROJECTS**		

14. **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://www.dso.ufl.edu/sccr/process/student-conduct-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.

15. **Course Evaluation** - Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu/evals. 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 at https://evaluations.ufl.edu/results/.

16. **In Class Recordings -** Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.
A "class lecture" is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a

University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To "publish" means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

17. **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.

18. **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

19. **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.

20. **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

21. **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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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