Physical Metallurgy II
EMA 4224 Section 2979 (13035)
Class Periods: M, W, F: Period 3 (9:35 am – 10:25 am)
Location: WEIL 0238
Academic Term: Spring 2022

Instructor:
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352-294-1789
Office Hours: TBA

Course Description
An in-depth discussion of fundamentals of physical metallurgy, microstructure evolution and alloy selection/design. Credits: 3 hours.

Course Pre-Requisites / Co-Requisites
EMA4120 - Physical Metallurgy I and EMA 4223 – Mechanical Behavior of Materials

Course Objectives

a. to familiarize the student with those terms, concepts, and definitions (i.e. jargon) used to describe the properties and processes of common engineering metals.
b. to learn how mechanical properties are measured and to develop an understanding of how testing parameters affect these properties.
c. to develop a fundamental understanding of the relationships between material composition, structure, and properties resulting from synthesis, processing or service.
d. to develop an understanding of the testing procedures used to characterize some of the more common physical properties for engineering metals, and how these properties should be used when specifying conditions where optimum performance without failure can be expected.
e. to develop an understanding of the solidification processes, and how they result in the microstructure and influence the properties of metals.
f. to develop an understanding of the processes occurring in metals during heating and plastic forming that influence the microstructure and properties of alloys.
g. to develop an understanding of the effects of alloying of metals upon the microstructure and properties.

Materials and Supply Fees
NA

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

Relation to Program Outcomes (ABET):

Outcome	Coverage*
1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	Low
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare,	High

as well as global, cultural, social, environmental, and economic factors.	
3. An ability to communicate effectively with a range of audiences	Medium
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	Low
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	Low
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.

Required Textbooks and Software

a. Title: *Physical Metallurgy Principles,4th Edition*
b. Authors: Reza Abbaschian, Lara Abbaschian, Robert E. Reed-Hill,
c. Publisher: Cengage Learning
d. Publication date and edition: 2010/1994, Fourth Edition
e. ISBN number: 13: 978-0-495-43851-9; 10:0-495-43851-0

Course Schedule

Below is the intended/tentative schedule of classes and exams.

Week 1: Introduction and Chapter 12 (Diffusion in Substitutional Solid Solutions)
Week 2: Chapter 12 and Chapter 13 – Interstitial Diffusion
Week 3: Chapter 13 and Chapter 14 – Solidification of Metals
Week 4: Chapter 14 – Solidification of Metals
Week 5: Chapter 15 – Nucleation and Growth Kinetics
Week 6: Exam 1 (Chapters 12-14) and Chapter 15
Week 7: Chapter 16 – Precipitation Hardening
Week 8: Chapter 17 – Deformation Twinning and Martensite Reactions
Week 9: Chapter 18 – Iron Carbon Alloy Systems
Week 10: Chapter 18 – Iron Carbon Alloy Systems
Week 11: Exam 2 (Chapters 15-17) and Chapter 19 (Hardening of Steel)
Week 12: Chapter 19 – Hardening of Steel
Week 13: Chapter 20 – Nonferrous Alloy Systems
Week 14: Review
Week 15: Exam 3 (Chapters 18-20)

The instructor reserves the right to make changes to the syllabus as needed. Any changes will be clearly announced on CANVAS and in class.

Course Format
This course uses a ***team-based learning approach*** that uses pre-class preparation materials (including reading assignments) and active learning activities during class time. Your completion and involvement in all these aspects of the course is critical to success.

Pre-Class Preparation Materials

Reading assignments will help you prepare for the active learning activities and are another critical aspect of learning the course content.

Active Learning Activities

Attendance to Live Classes is not required but highly encouraged since there will be group discussions, individual and group work on In Class Exercises. Students are encouraged to ask questions and participate. The fundamental concepts will be repeated as required.

In Class Exercises (ICE) will be given during the live classes. These exercises will be counted for credit.

Homework and Quizzes

Homework problems for each module will be assigned, submitted, and graded through the E-Learning website. Group discussions towards homework solving and teamwork are encouraged but all answers that are turned in should be the result of your own work. In addition, you should keep records of the work leading to your answers throughout the semester, as they will be randomly requested for grading clarification.

Exams

There will be three exams throughout this semester each worth 20% of the grade.

Course Communication
E-Learning will be the primary avenue for communication and course management. All announcements for the course will be made using the announcement system on the E-Learning site. Make sure and change your E-Learning settings so that you get notifications about announcements, assignment changes, etc. in a timely manner.
I prefer to be emailed directly at aroba.saleem@ufl.edu instead of CANVAS mail but you can choose either.

Evaluation of Grades

Assignment	**Percentage of Final Grade**
Homework Sets	10%
Quiz	5%
Midterm Exams (3)	60%
In-Class Exercises and Group Discussions	25%
Total	100%

Grading Policy

Percent	Grade	Grade Points
92.0 - 100	A	4.00
88.0 - 91.9	A-	3.67
84.0 – 87.9	B+	3.33
80.0 – 83.9	B	3.00
76.0 - 79.9	B-	2.67
72.0 – 75.9	C+	2.33
68.0 – 71.9	C	2.00
65.0 – 67.9	C-	1.67
62.0 – 64.9	D+	1.33
59.0 – 61.9	D	1.00
56.0 – 58.9	D-	0.67
0.00 – 55.9	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 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/.

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://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.

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

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