

Physical Metallurgy II
EMA 4224 Section 2979 (13532)
Class Periods: M, W, F: Period 4 (10:40 am – 11:30 am)
Location: 100% Online
Academic Term: Spring 2021

Instructor:

Aroba Saleem
aroba.saleem@ufl.edu
352-294-1789
Office Hours: TBA

Teaching Assistant

Please contact through the Canvas website
[Hale, Cameron Russell \(cameronhale@ufl.edu\)](mailto:cameronhale@ufl.edu)

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, as well as global, cultural, social, environmental, and economic factors.	High
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

- Title: *Physical Metallurgy Principles*, 4th Edition
- Authors: Reza Abbaschian, Lara Abbaschian, Robert E. Reed-Hill,
- Publisher: Cengage Learning
- Publication date and edition: 2010/1994, Fourth Edition
- 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.

Online Teaching

Although rarely, our class sessions may be audio visually recorded. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

The university syllabi policy, including the information regarding COVID impacts can be found on the following website:

<http://www.syllabus.ufl.edu/syllabus-policy/>

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/scsr/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](mailto:title-ix@ufl.edu), 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>.

UNIVERSITY OF FLORIDA
Student Honor Code (Abridged)

Preamble: In adopting this Honor Code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the University community. Students who enroll at the University commit to holding themselves and their peers to the high standard of honor required by the Honor Code. Any individual who becomes aware of a violation of the Honor Code is bound by honor to take corrective action. Student and faculty support are crucial to the success of the Honor Code. The quality of a University of Florida education is dependent upon the community acceptance and enforcement of the Honor Code.

The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty 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."***

Violations of the Student Honor Code include (in part):

(a) **Plagiarism**, in the form of quoting oral or written materials including but not limited to those found on the internet, whether published or unpublished, without proper attribution; or submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student.

(b) **Unauthorized use of Materials or Resources ("Cheating")**. A student shall not use unauthorized materials or resources in an academic activity. Unauthorized materials or resources shall include:

1. Any paper or project authored by the student and presented by the student for the satisfaction of any academic requirement if the student previously submitted substantially the same paper or project to satisfy an academic requirement.
2. Any materials or resources prepared by another student and used without the other student's express consent or without proper attribution to the other student.
3. Any materials or resources that the faculty member has prohibited.
4. Use of a cheat sheet when not authorized to do so or use of any other resources or materials during an examination, quiz, or other academic activity without the express permission.

(c) **Prohibited Collaboration or Consultation**. A student shall not collaborate or consult with another person on any academic activity unless the student has the express authorization.

1. Prohibited collaboration or consultation shall include but is not limited to:
 - Collaborating when not authorized to do so on an examination, take-home test, writing project, assignment, or course work.
 - Collaborating or consulting in any other academic or co-curricular activity after receiving notice that such conduct is prohibited.
 - Looking at another student's examination or quiz during the time an examination or quiz is given. Communication by any means during that time, including but not limited to communication through text messaging, telephone, e-mail, other writing or verbally, is prohibited unless expressly authorized.
2. It is the responsibility of the student to seek clarification on whether or not use of materials or collaboration or consultation with another person is authorized prior to engaging in any act of such use, collaboration or consultation.