

**Metallurgy Lab**  
EMA 4020L Section 4021  
Wednesday: Periods 10 & 11 (5:10-7:05 pm)  
Rhines Hall 125  
Spring 2022

**Please wear closed-toe shoes and pants during the lab sessions**

***Instructor:***

Dr. Burton R Patterson  
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Office phone: 352-846-3794  
Office Hours: TBD

***Teaching Assistant:***

Mr. Ramon Padin

***Course Description***

Laboratory aspects of metals processing. Science and Technology of metal and manufacturing processing.

***Course Co-requisite:***

EMA 4120 (Phys. Met I) and EMA 4623 (Process Metallurgy)

***Course Objectives***

To introduce the student to microstructure-properties-processing inter-relationships in structural materials.

**Approach:** Demonstrate connections between processing, microstructures and properties in metals. Use laboratory experiments to illustrate effect of processing on microstructures and properties.

***Materials and Supply Fees***

\$80

**Contribution of Course to Meeting the Professional Component:** This is a 1 credit course which counts for engineering sciences.

***Relation to Program Outcomes (ABET):***

This course addresses the following MSE Program outcomes (Note: Numbers refer to the list of MSE Program Outcomes)

1. Apply knowledge of mathematics, science and engineering principles to materials science and engineering.
2. Design and conduct materials science and engineering experiments and analyze and interpret the data.
3. Design a materials science and engineering system, component or process to meet desired needs within realistic economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability constraints.
4. Communicate technical data and design information effectively in speech and in writing to other materials engineers.

**ABET**

- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multidisciplinary teams
- (g) an ability to communicate effectively

### **Required Textbooks and Software**

None required

### **Recommended Materials**

Course presentations and reference material to be provided to the students

### **Tentative Schedule:**

<b>Week</b>	<b>Date</b>	<b>Topic</b>
1	Jan.5	Introduction, Course background/overview, Microstructural interpretation Background on precipitation strengthening.
2	Jan 12	Precipitation strengthening experiments, hardness testing
3	Jan 19	Reports and presentations on pptn. strengthening
4	Jan.26	Background on types and heat treatments of steel, steel microstructures
5	Feb. 2	Austenitizing, quenching, tempering experiments
6	Feb. 9	Metallography of heat-treated steels
7	Feb. 16	Reports and presentations on steel heat treating
8	Feb. 23	Background on aluminum cold work and annealing tempers. Background on annealing processes: Recovery, recrystallization and grain growth
9	Mar. 2	Cold rolling of pure iron and an aluminum alloy for annealing experiments
10	Mar.9	<b>Spring Break!</b>
11	Mar.16	Recovery of aluminum- experiments
12	Mar.23	Reports and presentations on recovery
13	Mar.30	Recrystallization of iron- experiments
14	Apr. 6	Reports and presentations on recovery
15	Apr.13	Grain growth- experiments
16	Apr. 20	Reports and presentations on grain growth

### **Course Grading:**

Written reports 70%, Oral presentations 30%

### **Grading Scale:**

93-100 A, 90-92 A-, 87-89 B+, 83-86 B, 80-82 B-, 77-79 C+, 73-76 C, 70-72 C-, 67-69 D+, 63-66 D, 60-62 D-, < 60 E

- 1.) No exams will be given during the course.
- 2.) All grading based on curve.
- 3.) The reports must be original work and will be evaluated for any evidence of plagiarism (All work will be run through TurnItIn.com). If there is any evidence of plagiarism, the paper will be given an "F" and zero-points.

### **Students Requiring Accommodations**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. 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 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.ua.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.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.ua.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 Conduct Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. 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
- Jennifer Nappo, Director of Human Resources, 352-392-0904, [jpennacc@ufl.edu](mailto:jpennacc@ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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:** <https://counseling.ufl.edu>, 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](mailto: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/>.

**COVID-19**

- You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated.
- If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 (or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu)) to be evaluated for testing and to receive further instructions about returning to campus.
- If you are withheld from campus by the Department of Health through Screen, Test & Protect, you are not permitted to use any on campus facilities. Students attempting to attend campus activities when withheld from campus will be referred to the Dean of Students Office.
- UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website](#) for more information.
- Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

*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://career.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://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>; <https://care.dso.ufl.edu>.

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