

Manufacturing Engineering

EML 4321 Section 2G60 Class # 13565

Class Periods: MWF, Period 6, 12:50-1:40 pm

Location: Online (access via <https://elearning.ufl.edu/>)

Academic Term: Spring 2021

Instructor:

Name: Yong Huang

Email Address: yongh@ufl.edu

Office Phone Number: 352-392-5520

Office Hours: MW 1:40 -2:30 pm, Zoom meeting (access via <https://elearning.ufl.edu/>) and by appointment

Teaching Assistants:

Please contact through the Canvas website

- Bing Ren, bing.ren@ufl.edu
- Changxiao Liang, liangchangxia@ufl.edu

Access via <https://elearning.ufl.edu/>, 9:30-11:00 am, Tuesdays and Thursdays and by appointment

Course Description

Traditional and nontraditional manufacturing processes and equipment. Application of engineering analysis tools to manufacturing.

Course Pre-Requisites / Co-Requisites

Pre-req: EMA 3010 (Materials), EML 2322L (Design & Manufacturing Lab), and EML 3005 (Mechanical Engineering Design)

Course Outline

- Mechanical Behavior of Materials, Structure of Materials, Surface and Tribology
- Casting
- Conventional and non-Traditional Machining
- Bulk Deformation Processes
- Sheet Metal Forming Processes
- Polymer Processing/Additive Manufacturing
- Electronic Fabrication/Packaging
- Topics in Advanced Manufacturing

Course Objectives

Upon completion of this course, students should be able to demonstrate

- a) A descriptive and qualitative understanding of traditional and non-traditional manufacturing processes;
- b) The ability to use engineering science tools such as advanced mathematics, stress analysis, vibrations, control theory, and heat transfer to analyze manufacturing processes and machines;
- c) The ability to rapidly and accurately perform manufacturing engineering evaluations and analyses; and
- d) The ability to create computational simulations of manufacturing processes and machines.

Materials and Supply Fees

N/A

Professional Component (ABET):

- a) EML 4321 supports the following program outcomes as listed in the Mission Statement of the Department of Mechanical and Aerospace Engineering: (1) using knowledge of chemistry and calculus based physics (**ME Program Outcome M1**), (2) using knowledge of advanced mathematics through multivariate calculus and differential equations (**ME Program Outcome M2**), and (4) possessing the ability to work professionally in both thermal and mechanical systems (**ME Program Outcome M4**).

b) Mathematical sciences (15%), physical sciences (15%), engineering sciences (55%), engineering design (15%).

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	M1, M2, M4 (high coverage, 50% of course grade, assessment based on homework and 3 exams)
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	M4 (medium coverage, 15% of course grade, assessment based on homework and 3 exams)
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	Low coverage, 10% of course grade, assessment based on homework, 3 exams, and in-class discussion
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	M4 (medium coverage, 25% of course grade, assessment based on homework and 3 exams)

Required Textbooks and Software

- Manufacturing Processes for Engineering Materials
- S. Kalpakjian and S.R. Schmid
- 2017, 6th Ed., Pearson Education
- ISBN-10: 0134290550 / ISBN-13: 978-0134290553



Websites

- Required: E-Learning (<http://elearning.ufl.edu/>)
- Supplementary: <http://plaza.ufl.edu/yongh/EML4321.htm>
- Other: Society of Manufacturing Engineers (<http://www.sme.org/>)

Recommended Materials

- Fundamentals of Modern manufacturing: Materials, Processes, and Systems
- Mikell P. Groover
- 2016, 6th Ed., Wiley
- ISBN-10: 1119128692 / ISBN-13: 978-1119128694

- Manufacturing Processes and Equipment
- George Tlusty
- 1999, 1st Ed., Prentice Hall
- ISBN-10: 0201498650 / ISBN-13: 978-0201498653

- Handbook of Manufacturing
- Yong Huang, Lihui Wang, and Steven Y. Liang
- 2019, World Scientific Publishing
- ISBN-10: 9813271019 / ISBN-13: 978-9813271012

Course Schedule

Tentative teaching schedule is on the last two pages.

Online Course Recording

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. 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.

Attendance Policy, Class Expectations, and Make-Up Policy

Class policies

- Attendance in class is expected. If one has a conflict with the scheduled office hours, he/she should make an appointment with the instructor/TA(s) as needed. If one has a documented and excusable absence for a sustained period (> 1 week), please contact the professor to make any special arrangements.
- Students are responsible for all announcements, assignments, etc., made during lectures, including changes in the scheduling of lecture topics, homework assignments, and exams. Class absence is not a valid excuse for being unprepared.
- Homework assignments, homework solutions, class handouts, sample exams and other course-related postings will be available on Canvas. Any changes in the schedule or assignments will also be announced on Canvas. Check for updates on the website before every class and monitor your Canvas-related mailbox regularly. Solutions to homework will be posted on the website.

Homework policies

- Homework must be on any type of 8.5" × 11" paper, and all work must be shown. Multiple sheets must be stapled in a proper order. Homework must have the homework assignment number, your name, your assigned sorting number (to be given on Canvas) and the date of submission in the upper right corner of the first page.
- Homework must have the page number in the bottom right corner of every page.
- Homework is due in class exactly a week from the assignment date (unless announced otherwise). **Homework should be submitted via Canvas before the start of class on the due date.**
- Working in groups is permitted and encouraged. However, copying homework is NOT permitted. *Use of solution manuals to complete homework is considered cheating and a violation of the honor policy, and it will be fully enforced.*
- *Only one or two problems* from each homework assignment may be graded, and each homework assignment will be given a score of 0 to 10: 5 points for completeness and 5 points for correctness of and effort for the graded problems. No homework assignment drop policy is honored.

Exam policies

- All exams will be held using Zoom via <https://elearning.ufl.edu/>. The first two midterm exams will be held during the regular class periods. The final exam will be held at the time assigned by the Registrar (12:30 - 2:30 pm, Wednesday, April 28, 2021). **You will need a computer/laptop with a camera to take the exams and should be able to adjust your camera for Dr. Huang and TA(s) to see you and your working area during each exam. Extra 30 minutes will be provided for you to scan your exam materials and upload them via Canvas.**
- A scientific calculator is required for exams. Calculators with communications capabilities will not be allowed.
- **All exams will be closed book and notes. Use of 8.5" × 11" formula sheet(s) (one-sided, one for each midterm and three for the final exam) is permitted.** Note: You are not allowed to have verbose descriptions/explanations and figures on the formula sheet(s). Only equations and definitions of variables appearing in the equations and **velocity/force diagrams** are allowed. Formula sheet(s) should be turned in with your test.

- It is the students' responsibility to demonstrate their knowledge on exams with all work shown. *Partial credit* may be given for work that can be followed and where the nature and magnitude of the mistake can be identified. *No credit* will be given for correct answers with insufficient indication of how they were obtained.
- Absence from a scheduled exam without prior consent of the instructor will result in zero credit for that exam. In the event of a last minute emergency, you need submit appropriate official documentation of the emergency (e.g., illness, accident, etc.) as soon as possible.

Re-grading Policy

Any re-grade requests must be communicated with the instructor within one week after return of the graded paper. If needed, a written request may be provided to explain in detail what you want the grader to do and where you believe he/she has made a mistake in grading. The request must have a date on the top of the first page, your name, sorting number, and e-mail address.

Make-up Exam Policy

The dates and times for the exams are announced in advance. Except for valid medical reasons, no make-up exams will be given. Please schedule your other activities accordingly.

Miscellaneous Policies

Students will be held responsible for knowledge of all scheduling and policy announcements made in class. *Modifications to this syllabus may be required during the semester. Any changes to the syllabus will be posted on the course web site and announced in class.*

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (11)	10 each	20%
Midterm Exam (2)	50 each	40%
Final Exam	100	40%
		100%

Grading Policy

Percent	Grade	Grade Points
93.0 - 100	A	4.00
90.0 - 92.9	A-	3.67
87.0 - 89.9	B+	3.33
83.0 - 86.9	B	3.00
80.0 - 82.9	B-	2.67
77.0 - 79.9	C+	2.33
73.0 - 76.9	C	2.00
70.0 - 72.9	C-	1.67
67.0 - 69.9	D+	1.33
63.0 - 66.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

The instructor may adjust individual grades according to a holistic evaluation of the student's performance, improvement, and effort. 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 who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting 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 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.

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:

<http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

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 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>.

EML 4321 Tentative Class Schedule (Spring)

Index	Date		Topic
1	Jan 11	Mon	Introduction to Manufacturing Processes
2	13	Wed	Mechanical Behavior of Materials (Review)
3	15	Fri	Mechanical Behavior of Materials (Review)
	18	Mon	M.L.K Holiday
4	20	Wed	Mechanical Behavior of Materials (Review)
5	22	Fri	Structure of Materials (Review)
6	25	Mon	Structure of Materials (Review)
7	27	Wed	Surfaces & Tribology
8	29	Fri	Surfaces & Tribology
9	Feb 1	Mon	Casting
10	3	Wed	Casting
11	5	Fri	Casting
12	8	Mon	Casting
13	10	Wed	Casting
14	12	Fri	Casting
15	15	Mon	Conventional Machining
16	17	Wed	Conventional Machining
17	19	Fri	Conventional Machining
18	22	Mon	Conventional Machining
19	24	Wed	Conventional Machining (Career Fair)
20	26	Fri	Exam 1 (covers all materials through Casting)
21	Mar 1	Mon	Conventional Machining
22	3	Wed	Conventional Machining
23	5	Fri	Conventional Machining
24	8	Mon	Non-Traditional Machining
25	10	Wed	Bulk Deformation Processes
26	12	Fri	Bulk Deformation Processes
27	15	Mon	Bulk Deformation Processes
28	17	Wed	Bulk Deformation Processes
29	19	Fri	Bulk Deformation Processes
30	22	Mon	Bulk Deformation Processes
31	24	Wed	Recharge Day
32	26	Fri	Bulk Deformation Processes
33	29	Mon	Sheet Metal Forming
34	31	Wed	Exam 2 (covers all materials since Exam 1)
35	Apr 2	Fri	Sheet Metal Forming
36	5	Mon	Sheet Metal Forming
37	7	Wed	Sheet Metal Forming
38	9	Fri	Polymer Processing

39	12	Mon	Polymer Processing
40	14	Wed	Additive Manufacturing/3D printing
41	16	Fri	Electronic Fabrication/Packaging
42	19	Mon	Other Topics in Advanced Manufacturing
43	21	Wed	Teaching Evaluation and Review

IMPORTANT DATE:

April 28 (Wednesday) Final exam, 12:30 - 2:30 pm, Zoom via <https://elearning.ufl.edu/>.