

Design and Manufacturing Laboratory

EML2322L

Lecture: Monday, Period 9 (4:05 – 4:55 PM) **Location:** CSE A101

Labs: (see *one.uf* for registered section) **Location:** MAE-C 002

Academic Term: Fall 2025

Instructor(s):

Dr. Sean R. Niemi

srn@mae.ufl.edu

352-294-3381

Office: Room 132, MAE-C

Hours: Tuesdays 9:30 – 11:00 am

Wednesdays 11:00 am – 12:30 pm

Note: All official course communication must include **BOTH** course instructors and use **email** or **MS Teams**.

Canvas messages are not actively monitored throughout the semester and may go several days/weeks without a response.

Dr. Jack Famiglietti

jackfamiglietti@ufl.edu

TBD

Office: Room 429, NEB

Hours: Tuesdays 2:30 – 4:30pm

Course Description

Study and application of design; problem formulation; conceptual design, evaluation & prototype development; study of common manufacturing processes. Credits: 2

Course Pre-Requisites / Co-Requisites

- EML2023 – Computer Aided Graphics/Design,
- EG-ME, EG-ASE major, or UES (undecided) major if seats are available after drop/add

Course Objectives

This course will require working in groups, preparing engineering documentation, and the manufacturing and inspection parts to ensure they meet engineering specifications. You will learn design techniques, the integration of design analysis, and apply engineering knowledge and processes to solving a variety of open-ended design challenges.

Throughout this course, you will develop the ability to assess the functionality of the components making up a design and determine tolerances and manufacturing procedures to simplify prototyping and production of an assembly. You will also learn to create an integrated design and present quantitative justifications for a mechanical system.

The principal goals of the MAE Design and Manufacturing Laboratory are fourfold:

- Educate students in the fundamentals of both traditional and modern manufacturing processes;
- provide an understanding of how manufacturing time, cost, and performance are influenced by manufacturing processes and dimensional tolerancing;
- teach students to consider manufacturing and assembly processes in the design process from concept generation to prototyping; and,
- instruct students on the engineering design process and develop an understanding of how to develop quantitative assessment/evaluation methods for design concepts.

Specifically, at the end of this course every student should:

- Understand how to allocate their time and effort to complete a large-scale, open-ended project.
- be familiar with common traditional manufacturing equipment and processes,
- have a strong understanding of the interplay of dimensions and tolerances and how tolerances affect manufacturing quality and time,
- understand common metrology tools, their applications, and be able to conduct basic quality/manufacturing inspection processes,

- be able to properly dimension and tolerance part drawings with a focus on improved manufacturability and component interchangeability,
- understand the function of additive manufacturing and CNC machine tools (programming, operation, flexibility) and where they fit into the prototyping and production phases of design,
- understand the fundamental methods of electric arc welding,
- be able to identify and apply the steps of the design process, emphasizing quantified analysis, and data driven justifications,
- generate proper design documentation, with a focus on quantitative design analysis/selection,
- understand the importance of efficient project (time & resource) management.

Materials and Supply Fees

Course Fee: \$139.04

Relation to Program Outcomes (ABET):

The table below is an example. Please consult with your department's ABET coordinator when filling this out.

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex 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	High
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	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives	High
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

*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

- [Cutting Tool Applications](#) by George Schneider Jr., CMfgE (available for free via download)
- **SolidWorks CAD** software is *required* for this class; installation information will be provided *after drop/add*; the software is provided exclusively for academic use.
- **Fusion360** will be used to supplement SolidWorks for this course. Fusion360 is free to use with an educational account. Instructions will be provided after drop/add.

Recommended Materials

- A **CAD reference text** is highly recommended; students are responsible for solid CAD knowledge from EML2023 (open-source references are available online, so don't buy another one if you already sold yours)
- The [Legacy DML Website](#) is a treasure trove of resources related to design, manufacturing, and other facets of engineering. Many documents for the class will be linked to this site. You are strongly encouraged to browse the site, particularly the material under the "course info" and "design guides" tabs.
- **Machinery's Handbook** (any edition) is a phenomenal resource for any mechanical or aerospace engineering student with an interest in manufacturing or mechanical system/component design.

Required Computer

Recommended Computer Specifications: <https://it.ufl.edu/get-help/student-computer-recommendations/>

HWCOE Computer Requirements: <https://www.eng.ufl.edu/students/advising/fall-semester-checklist/computer-requirements/>

If your computer does not meet the requirements to run the current version of Solidworks, do not take this course.

Course Schedule

The following table shows the weekly schedule for the semester. *Lecture topics may change as needed based on changes to the course coming into effect. Reference Canvas for specifics on assignment due dates.* Any changes to the schedule, and further details on exam times, will be announced on Canvas.

Wk.	Wk. of:	Live Lecture Topic	Video Lecture Topic	HW / Exam Schedule	Design Project Assignment Due	Lab
0	8/18		Design Process Overview	No Assignments Due		
1	8/25	Course Intro Project Discussion		HW 1 - CAD / Drawing Review		Introduction Air Engine Discussion
2	9/1	Holiday: No Live Lecture	Functional Design / Air Engine Assembly	HW 2 - Turning, Milling, & Drilling		Safety Training
3	9/8	Fasteners	Fasteners pt. 2		Safety Training Quiz 100% Required	Lathe / Mill Parts
4	9/15	Tolerances		Concept Sketches		Lathe / Mill Parts
5	9/22	Cutting Tool Geometries	TBD	Objective Definitions	HW 3 - Fasteners and Threading	Lathe / Mill Parts
6	9/29	Designing for Manufacturability	TBD	Production Drawings	DR 1	Lathe / Mill Parts; Drawing Reviews
7	10/6	Sheet Metal Processes	TBD	Midterm Exam	Revised Production Drawings	Lathe / Mill Parts; Welding / Sheetmetal Project Build
8	10/13	Welding	TBD	HW 4 - Designing for Manufacturability		Welding / Sheetmetal Project Build
9	10/20	CNC Machining / CAM			DR 2	Project Build
10	10/27	Cutting Feeds and Speeds	TBD			Project Build
11	11/3	2D Cutting	TBD	HW5 - Speeds and Feeds Bonus: CAM	DR3 - Progress Check	Project Build
12	11/10	Additive Manufacturing	TBD			Project Build
13	11/17	Casting / Forging / Extrusion	TBD	HW 6 - Review	DR3	Air Engine Assembly and Documentation
14	11/24	THANKSGIVING BREAK				
15	12/1	Final Exam Review	NO LABS; STUDY FOR FINAL EXAM			
16	12/8	FINAL EXAM				

Evening Examination	Due Sunday at midnight
Due before lab	Due at start of lab

**Assignments in italics do not directly count towards your final grade; however, failure to complete them will result in severe grade penalties on the associated graded assignments.*

Important Dates

10/7/2025 Midterm Exam (8:20-9:35 PM, CAR 100)

12/10/2025 Final Exam (5:30-7:30 PM, CSE A101)

Attendance:

Attendance is mandatory for both lecture and laboratory sessions. On occasion, there will be pre-recorded video lectures to supplement the in-person lectures. You are expected to watch these videos **as they are assigned** as they are relevant to the upcoming deliverables and lecture activities / content. Weekly lecture quizzes may be assigned to ensure students are current on the required materials for the course. **You cannot be successful in the lab if you are repeatedly behind on lecture content.**

Starting the week after drop/add (Week 2), attendance will be taken for each lab session. **Students who arrive more than 5 minutes late will be marked tardy (2 tardies = 1 absence).** **Students who accrue more than two unexcused absences (or equivalence in tardies) will receive a zero for their participation and safety grade.** **Students with three or more unexcused laboratory absences (or equivalence in tardies) will receive a failing grade (E) in the course.**

Excused absences must be consistent with [university policies in the undergraduate catalog](#) and require appropriate documentation. If you are absent, or know that you will need to be absent, it is **your responsibility to notify the course instructor and your TA in a timely manner.**

Turn off or silence cell phones during lab periods. Students who use their cell phones in lab for non-course-related activities will be asked to leave their phone with their backpack for future labs. **Repeated incidents will result in the student being asked to leave the lab and they will be marked as absent for that lab session.**

Laboratory Safety and Preparedness:

Students are required to wear proper personal protective equipment (PPE) **at all times** in the lab. The minimum required PPE includes **safety glasses, closed-toed shoes, and long pants** (pajama pants or leggings are insufficient protection). Use of specific equipment may cause a change in the required PPE for a given task. Safety glasses, facemasks, and equipment specific PPE are available for students who do not have their own. **Failure to wear appropriate lab attire will result in you being sent home and receiving an unexcused absence.**

When in lab, students are required to follow TA instructions with regard to safe machine operation and proper laboratory conduct. **Students who ignore safety instructions and lab protocols will be removed from the lab and receive an unexcused absence. Repeat offenders will be permanently barred from the lab and will receive a failing grade in the course.**

When working on the assigned parts for the course, students are required to bring **safety sheets, part manufacturing outlines, and part drawings**, along with a **writing utensil**. While manufacturing, it is encouraged that you take notes on the associated documents to use as reference materials for future assignments. **Failure to bring the required documents to the lab will result in you being prohibited from participation for the week and receiving an unexcused absence.**

Make-up / Late Assignment Policy:

If you must miss a lab due to an officially excused absence, or have an emergency requiring an assignment extension, **EMAIL** the course instructors and copy your TA to discuss options for a makeup lab period.

Late submissions for assignments will receive a grade of zero. It is your responsibility to allocate adequate time to complete long-term assignments in advance of their due date. This policy holds true for the workplace and academia. You need to get used to late submissions being invalid before the real world catches up.

Group Dynamics

A significant portion of this course relies on working with a group, which reflects most of the real engineering work in industry, as well as in academia. Students are expected to respect their fellow groupmates, listen to each other's ideas and feedback, collaborate to establish deadlines, and work professionally. Keep in mind that **peer evaluations in this course are taken seriously** and can have a substantial impact on your grade. **Failure to collaborate effectively by providing timely and good quality contributions to the project work may result in students being removed from their group receiving a zero for the affected assignments.**

Evaluation of Grades

All assignments required for laboratory activities are due 15 minutes prior to the start of your lab unless otherwise specified. Other assignments are due as specified in Canvas. *It is your responsibility to be aware of all assignment due dates.*

If you have an issue with the grade you earned on an assignment, please contact the grading TA before reaching out to the course instructors. The TAs are largely here to provide you with constructive feedback and help you to learn; they are not "out to get you." If no suitable explanation can be provided and/or your request is not being considered, then contact Dr. Niemi and Dr. Famiglietti via **email**. Grade discussions initiated **more than seven days after receiving feedback or grades posting will not be considered.**

Assignment	Grade %	Notes
Participation & Safety*	15.0%	Lecture quizzes, lab attendance & preparedness, following proper safety protocols. Being unprepared for lab (improper PPE, no safety sheets, etc.), not paying attention, disregarding TA instructions, and/or not following safe machine operating practices will result in you being told to leave lab and receiving an unexcused absence for that week.
Design Report 1*	10.0%	Conceptual design generation for device powered by Air Engine.
Design Report 2	10.0%	Down-selection of designs; engineering calculations and justifications for design selection.
Design Report 3	10.0%	Detailed design, manufacturing plan, and inspection documentation for down-selected design
Revised Production Drawings	5.0%	Generation of new part drawings for air engine parts to improve manufacturability and interchangeability of manufactured parts along with justification for tolerances selected at each critical interface.
Air Engine Documentation	5.0%	Finalized air engine assembly and part drawings; manufacturing inspection reports; engineering change notices.
Air Engine Assembly	5.0%	2.5% - Individual air engine assemblies 2.5% - Air engine part interchangeability between assemblies
HW & Quizzes*	10.0%	
Midterm Exam*	10.0%	Earning failing grades on both the Midterm Exam and the Final Exam will result in failure of the course.
Final Exam*	20.0%	Earning failing grades on both the Midterm Exam and the Final Exam will result in failure of the course.
Peer Evaluations	var.	Students who do not contribute meaningfully to their groups will receive severe grade penalties on the associated assignments. Students who do significantly contribute to their group's efforts can expect a corresponding bonus.
Total	100.0%	Breakdown of work for course: 65% individual / 35% group

(*) Denotes an individual assignment. These should not be worked on in collaboration with other students.

Grading Policy

	A: 93-100	A-: 90-92.99
B+: 88-89.99	B: 83-87.99	B-: 80-82.99
C+: 78-79.99	C: 73-77.99	C-: 70-72.99
D+: 68-69.99	D: 63-67.99	D-: 60-62.99
E: 0-59.99		

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.

Academic Policies & Resources

To support consistent and accessible communication of university-wide student resources, instructors must include this link to academic policies and campus resources: <https://go.ufl.edu/syllabuspolices>. Instructor-specific guidelines for courses must accommodate these policies.

- Requirements for class attendance and make-up exams, assignments, and other work in the course are consistent with university policies. [See UF Academic Regulations and Policies for more information regarding the University Attendance Policies.](#)
- Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center. [See the "Get Started With the DRC" webpage on the Disability Resource Center site.](#) 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.
- Information on current UF grading policies for assigning grade points. This may be achieved by including [a link to the University grades and grading policies.](#)
- Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online. Students can complete evaluations in three ways:
 1. The email they receive from GatorEvals
 2. Their Canvas course menu under GatorEvals
 3. The central portal at <https://my-ufl.bluer.com>

Guidance on how to provide constructive feedback is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

The University's Honesty Policy regarding cheating, plagiarism, etc.:

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 specifies a number of behaviors that are in violation of this code and the possible sanctions. [See the UF Conduct Code website for more information.](#) If you have any questions or concerns, please consult with the instructor or TAs in this class.

In-Class Recording:

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 education 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 deliver by an 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 presentation 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 guest 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.

Academic Resources:

- E-learning technical support: Contact the [UF Computing Help Desk](#) at [352-392-4357](#) or via e-mail at helpdesk@ufl.edu.
- [Career Connections Center](#): Reitz Union Suite 1300, [352-392-1601](#). Career assistance and counseling services.
- [Library Support](#): Various ways to receive assistance with respect to using the libraries or finding resources. Call [866-281-6309](#) or email ask@ufl.libanswers.com for more information.
- [Academic Resources](#): 1317 Turlington Hall, Call [352-392-2010](#), or to make a private appointment: [352-392-6420](#). Email contact: teaching-center@ufl.edu. General study skills and tutoring.
- [Writing Studio](#): Daytime (9:30am-3:30pm): 2215 Turlington Hall, [352-846-1138](#) | Evening (5:00pm-7:00pm): 1545 W University Avenue (Library West, Rm. 339). Help brainstorming, formatting, and writing papers.
- Academic Complaints: Office of the Ombuds; [Visit the Complaint Portal webpage for more information](#).
- Enrollment Management Complaints (Registrar, Financial Aid, Admissions): [View the Student Complaint Procedure webpage for more information](#).
- UF Student Success Initiative: Visit <https://studentsuccess.ufl.edu/> for resources that support your success as a UF student.

Campus Health and Wellness Resources:

- UF Whole Gator Resources: Visit <https://one.ufl.edu/whole-gator/discover> for resources that are designed to help you thrive physically, mentally, and emotionally at UF.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University’s core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu