Design and Manufacturing Laboratory

EML2322L

Lecture (Sections 26728 – 26737): Monday, Period 3 (9:35 AM – 10:25 AM) ***Location:*** Weil 270
Lecture (Sections 26740 – 26753): Wednesday, Period 3 (9:35 AM – 10:25 AM) **Location:** Weil 270
Labs: (see *ONE.UF* for registered section) ***Location:*** MAE-C 002
Academic Term: Spring 2026

Instructor:
Dr. Jack Famiglietti
jackfamiglietti@ufl.edu
Office: MAE-C 104
Hours: Tuesdays 9:30 – 11:00 AM & Wednesdays 11:00 AM – 12:30 PM

Note: All official course communication must use **Gatorlink email** or **MS Teams**. *Canvas messages are not actively monitored throughout the semester and may go several days/weeks without a response.*

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.
- 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. Failure to have a functional computer cannot be accommodated in 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.

DML - Spring 2026

Wk.	Wk. of:	Monday: Live Lecture Topic	Video Lecture Topic	HW / Exam Schedule	Design Project Assignment Due	Lab
1	1/12	Course Intro Project Discussion	*Design Process Overview*	HW 1 - CAD / Drawing Review		Introduction Air Engine Discussion
2	1/19	**No Live Lecture. Watch Video Lecture.**	*Functional Design / Air Engine Assembly*	HW 2 - Turning, Milling, & Drilling		Safety Training
3	1/26	Fasteners	*TBD*		Safety Training Quiz *100% Required*	Lathe / Mill Parts
4	2/2	Tolerances	*TBD*	HW 3 - Fasteners and Threading	*Concept Sketches*	Lathe / Mill Parts
5	2/9	Cutting Tool Geometries	*TBD*		*Production Drawings*	Lathe / Mill Parts; Drawing Reviews
6	2/16	Designing for Manufacturability	*TBD*	Revised Production Drawings	DR 1	Lathe / Mill Parts;
7	2/23	Sheet Metal Processes	*TBD*	HW 4 - Designing for Manufacturability	*Objective Definitions*	Project Build
8	3/2	Welding	*TBD*	Midterm Exam		Welding; Sheetmetal; Project Build
9	3/9	CNC Machining / CAM	*TBD*		DR 2	Welding; Sheetmetal; Project Build
10	**3/16**	**SPRING BREAK**				
11	3/23	Cutting Feeds and Speeds	*TBD*		*DR3 - Progress Check*	Project Build
12	3/30	2D Cutting	*TBD*	HW5 - Speeds and Feeds Bonus: CAM		Project Build
13	4/6	Additive Manufacturing	*TBD*		DR3	Project Build
14	4/13	Casting / Forging / Extrusion	*TBD*	HW 6 - Review		Air Engine Assembly and Documentation
15	4/20	Final Exam Review	***Makeup labs for holidays/closures***			
16	4/27	**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

March 3rd, 2026	***Midterm Exam (8:20-10:10 PM, Room Locations to be Announced)***
April 29th, 2026	***Final Exam (3:00-5:00 PM, Room Locations to be Announced)***

Attendance:

Attendance is mandatory for both lecture and laboratory sessions. On occasion, there will 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 will not 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 (aka early or within 72 hrs. of the absence).**

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 the student 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**, 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.**

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 high-quality contributions to the project work may result in students being removed from their group and receiving a zero for the affected assignments**.

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 instructor 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.

Communication Policy:
As noted above, all course communication must use **EMAIL or MS Teams**. Canvas messages are not consistently monitored and using this method will result in delayed or missed responses.

Timely and effective communication is your responsibility. Most long-term assignments and reports are due on Sunday. If you have questions, requests, or need for clarification on an assignment, **DO NOT WAIT UNTIL THE LAST MINUTE. Course instructors and TAs will not respond to requests or questions sent within 48 hours of the deadline.**

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 and to allot sufficient time to complete all assignments before they are due.***

If you have an issue with the grade you earned on an assignment, please contact the grading TA before reaching out to the course instructor. 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. 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*	12.5%	Lecture quizzes, lab attendance & preparedness, following proper safety protocols. Completion of course surveys. **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*	12.5%	Conceptual design generation for a device powered by the 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

Note: A grade of D- or higher is considered passing for EML2322L.

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, use this link to academic policies and campus resources: https://go.ufl.edu/syllabuspolicies.

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