

**Aerospace Propulsion**  
**EAS 4300**  
**Class Periods:** MWF 5<sup>th</sup> period, 11:45am – 12:35pm  
**Location:** 303 MAE-A  
**Academic Term:** Spring 2025

**Instructor:**

William E. Lear  
 Office: MAE-A 318    [lear@ufl.edu](mailto:lear@ufl.edu)  
 Office Hours: Monday 12:50-1:40 pm and Friday 10:30-11:30 am

**Course Description**

Basics of air-breathing and rocket engines used in flight systems. 3 credits.

**Course Pre-Requisites**

*EGN 3353C (Fluid Mechanics), EML 3100 (Thermodynamics), EAS 4132 (Compressible Flow).*

**Course Objectives**

1. Utilize the fundamental principles of fluid mechanics and thermodynamics to analyze aircraft engines.
2. Understand the common gas turbine aircraft propulsion systems and be able to determine the applicability of each.
3. Be able to perform system studies of aircraft engine systems for specified cruise conditions at the preliminary design level.
4. Be able to perform preliminary aerothermal design of turbomachinery components.
5. Perform mission-level rocket analysis for common rocket engine cycles.

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

1 - H, 3 - L (H-Strong support, L-Minimal support)

**Required Textbook**

*Mechanics and Thermodynamics of Propulsion*, Hill & Peterson, Addison-Wesley, 1992, 2<sup>nd</sup> Edition.

Available as pdf at:

<https://soaneemrana.com/onewebmedia/MECHANICS%20AND%20THERMODYNAMICS1.pdf>

**Required Computer**

UF student computing requirement: <https://news.it.ufl.edu/education/student-computing-requirements-for-uf/>

**Course Schedule**

Period	Date	Subject	Text Ref.
1	1/13	Introduction	1.1 – 1.3
2	1/15	Conservation Eqns	2.1 – 2.3
3	1/17	""	
4	1/22	UF closed due to weather	
5	1/24	Combustion	2.4
6	1/27	Equilibrium Combustion w/ dissociation	
7	1/29	Review of Gasdynamics	3.1 – 3.2
8	1/31	""	3.3 – 3.5
9	2/3	""	3.6
10	2/5	Review	
	2/5	<b>Test #1</b> 8:20-10:20 pm	
11	2/7	Thermo of jet engines	5.1 – 5.2
12	2/10	Ramjets	5.3

13	2/12	Gas turbine engines	5.4 – 5.6
14	2/14	""	
15	2/17	Engine/aircraft performance	5.7 – 5.8
16	2/19	""	
17	2/21	Inlets, combustors & nozzles	6.1
18	2/24	Inlets	6.2 – 6.3
19	2/26	Combustors	6.4 – 6.6
20	2/28	""	
21	3/3	Nozzles	6.7
22	3/5	Review	
	3/5	<b>Test #2 8:20-10:20 pm</b>	
23	3/7	Axial compressors	7.1 – 7.3
24	3/10	Single and multi-staging	7.4 – 7.5

25	3/12	Instabilities	7.6
26	3/14	Efficiency	7.7 – 7.8
27	3/24	Radial equilibrium	7.9
28	3/26	Centrifugal compressors	9.1 – 9.2
29	3/28	Axial turbines	8.1 – 8.3
30	3.31	Example problems	
31	4/2	Turbine cooling and performance	8.5 – 8.6
32	4/4	Matching compressor & turbine	8.7
33	4/7	Review	
	4/7	<b>Test #3 8:20-10:20 pm</b>	
34	4/9	Design project assignment & Rocket Vehicle Perf.	
35	4/11	Rocket Vehicle Performance	Chap 10
36	4/14	Intro to chemical rockets	""
37	4/16	""	Chap 11
38	4/18	Design project discussion	
39	4/21	Chemical rockets	Chap 11
40	4/23	Electric rockets	
	4/25	Design project due, 4:30 pm (in lieu of exam)	

### **Attendance Policy, Class Expectations, and Make-Up Policy**

Lecture attendance is imperative. Although attendance will not be taken or used in assigning grades, students will be held responsible for knowing all changes made to scheduling and all class announcements.

**Note:** Although information will be posted on the website, class announcements prevail in case there are discrepancies.

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies:

<https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

### **Evaluation of Grades**

Homework	10%
Project	20%
Tests	30% Best score
	15% Worst score
	25% Other score

The final grade will be determined using the breakpoint method. The class averages will be sorted and the appropriate gaps selected for the breaks between grades. The judgment of the instructor will be the determining factor in the placement of the breaks, influenced by such things as difficulty of exams and overall quality of the class. The traditional break system would be the most severe case, e.g. a final average of 85% guarantees at least a B, but it could be as high as an A. The guaranteed ranges are: >92 A, 90-92 A-, 88-90 B+, 82-88 B, 80-82 B-, 78-80 C+, 72-78 C, 70-72 C-, 68-70 D+, 62-68 D, 60-62 D-, <60 E.

#### HOMEWORK POLICIES:

1. You are encouraged to work with your classmates in this course, e.g. discussing concepts or approaches to problems. However, the homework papers and project report which you submit must be your own individual work. Copying or comparing final answers is not permitted. The University of Florida honor code is in force for this course.
2. Homework is due in Canvas at the beginning of the period without prior arrangements with the instructor or a written medical excuse.

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 <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.aa.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.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

#### ***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 educational 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 delivered by any 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 presentations 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 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.

### ***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://sccr.dso.ufl.edu/process/student-conduct-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 varied perspectives and lived experiences within our community and is committed to supporting the University’s core values, including the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of race, creed, color, religion, age, disability, sex, sexual orientation, gender identity and expression, marital status, national origin, political opinions or affiliations, genetic information, and veteran status.

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 Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, [student-support-hr@eng.ufl.edu](mailto:student-support-hr@eng.ufl.edu)
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, [pld@ufl.edu](mailto:pld@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/>.

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://elearning.ufl.edu/>.

**Career Connections 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:** <https://distance.ufl.edu/getting-help/>; <https://distance.ufl.edu/state-authorization-status/#student-complaint>.