

EAS 4132/EML5714: Compressible Flow/Intro to Compressible Flow Syllabus -- Spring 2024

(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.)

1. **Catalog Description:** One-dimensional and quasi one-dimensional compressible fluid flows. Includes Mach waves, normal shocks, oblique shocks, Prandtl-Meyer expansions, isentropic flow with area change, Fanno flow and Rayleigh flow. Credits: 3
2. **Pre-requisites:** EAS 4101 and EGN 3353C.
3. **Course Objectives:** This course provides an introduction level coverage of compressible flow. At the end of this course, the student will be able to analyze one-dimensional and quasi-one-dimensional compressible flows and to study phenomena including Mach waves, normal shocks, oblique shocks, Prandtl-Meyer expansions, isentropic flow with area change, Fanno flow and Rayleigh flow.
4. **Contribution of course to meeting the professional component:** This course is designed primarily for students of mechanical and aerospace disciplines. The course content is 100% engineering science.
5. **Student Outcomes (for ABET purposes):** 1 - H, 3 – L (H-Strong support, L-Minimal support)
6. **Instructor:**
Corin Segal.
Office location: 320 MAE-A
Telephone: 392-6132
Web site: <http://elearning.ufl.edu> (e-learning in canvas system)
Office hours: MWF 9:30 – 10:30 am

E-mail is an inefficient means of communication for our purpose; therefore, we shall not use it.

7. **Meeting Times and Location:**
 - MWF 2 Period (8:30 – 9:20) in Williamson 100
8. **Textbooks Required:** *Gas Dynamics* by John and Keith, Prentice Hall; 3rd Edition.
Notes:
 1. This text book is required; other editions may not have the same problems on the same pages, therefore, cannot be used as substitutes.
 2. NACA Report 1135. It contains the shock wave functions required to solve compressible flow problems. It will be required every time we solve compressible flow problems. It can be downloaded free at:
<https://www.grc.nasa.gov/www/k-12/airplane/Images/naca1135.pdf>
9. **Course Outline:**
 - Basic Equations of Compressible Flow (Chapter 1)
 - Wave Propagation, Isentropic Flow, Normal and Oblique Shocks, Expansion Waves (Chapters 2-7)
 - Applications involving Shocks and Expansion Waves (Chapter 8)
 - Fanno flow (Chapter 9)
 - Rayleigh flow (Chapter 10)
 - Special topic: Characteristics (Chapter 14)
10. **Attendance and Expectations:** 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 announcement prevail in case there are discrepancies.

11. Assessment Methods and Grading:

- a. Homework will be assigned periodically during the semester. Homework will not be graded. Selected solutions will be posted online. **PLEASE REGARD THE ASSIGNED HOMEWORK AS MINIMUM NECESSARY TO PREPARE YOU FOR EXAMINATION. ADDITIONAL PROBLEMS FROM THE BOOK OR OTHER SOURCES ARE RECOMMENDED.**

Please submit your solutions ONLY via Canvas. The lowest grade for the HW problems will be dropped. Late assignments will not be accepted.

- b. There will be four exams during the semester in class. Exams will emphasize the most recently covered material. The exams will take place during the regular class period. Exam dates will be announced at least two weeks ahead.
- c. Your lowest score on an exam will be dropped with your exam grade being based on the other three exams. The final exam will take place at the date and place announced by the registrar. The final exam covers the entire material taught during the semester.

Dropped exam and HW grades are designed to mitigate exceptional conditions; Consequently, there will be NO make-up exams – see below for more details.

EXAMS:

There will be four exams during the semester in class. All exams will emphasize the most recently covered material. The exams will be during the regular class period. Exam dates will be announced at least two weeks ahead.

EML 5714 Students only: One additional **Final Project** will be assigned due on **April 22. Project format is indicated below.**

The relative weighting of the HW Problems and Exams in the final grade will be as follows:

EAS 4132:

- | | |
|----------|-----|
| a. HW | 25% |
| b. Exams | 75% |

EML 5714:

- | | | |
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| a. HW | 25% | |
| b. Exams | 50% | |
| c. Final Project | 25% | - See project requirement below. |

In general, each exam will have two (2) problems each. Your lowest score on an exam will be dropped with your exam grade will be decided by the remaining three (3) exams.

Dropped exam and HW grades are designed to mitigate exceptional conditions; consequently there will be NO make-up exams. This policy applies to ALL possible situations.

If a student feels that an exam or homework is graded unfairly, or if there is an error in the grading, please bring it to the instructor attention within a week after the graded material is handed back. Scores will not be reconsidered beyond the one week period.

12. Grading Scale:

93 – 100: A	87 – 89.9: B+	77 – 79.9: C+	60 – 69.9: D	0 – 59.9: E
90 – 92.9: A-	83 – 86.9: B	73 – 76.9: C		
	80 – 82.9: B-	70 – 72.9: C-		

13. **Make-up Policy:** No late assignments will be accepted. Make-up exams will be allowed **only in exceptional conditions** as defined by UF policy **that are verifiably documented.**

Exceptional situations are those defined by the UF Provost office:

- Legal Impairment
- Life and Death Circumstances
- Participation in a University Required (i.e., **not voluntary**) Activity.
- Physical Illness or Injury that prevents your attendance or significantly impairs your performance.
- Physical Impairment - in addition to speaking with your instructor, you should see [The Dean of Students Office](#) (DSO). DSO *must* be notified of your situation as soon as possible if they and your instructor are going to be able to provide you with assistance. Many times they will give you paperwork, it is *your responsibility* to ensure this paperwork is completed correctly (signatures obtained, dates entered correctly, etc) and returned on time.
- Religious Holidays

You need to contact your instructor **before** the activity occurs to be considered for the exception. There are **very** few events which would impede your participation on an exam, quiz, etc warranting an exception, that you would not be aware of well before (at least a few hours) the start of the activity.

Note:

Depending on the severity of the problem, your instructor will determine whether a make up, dropping the course, or [Taking an Incomplete in the Course](#) is the appropriate action.

Things Not Qualifying as an Exception:

- Forgetfulness
- Interviews - Interviewers want you to be successful in your classes. They will reschedule interviews to accommodate your attendance of Exams, Quizzes, etc.
- Not Being Aware - The dates of Assignments, Exams, Quizzes, etc are discussed in class and listed within the course schedule online. These are things you **must** pay attention to.
- Oversleeping.
- Work - School requirements do not take a back seat to your performance on the job. You are expected to rearrange your work schedule to fit within the course requirements.
- Vacation Plans - School requirements do not take a back seat to your vacation plans. If you are leaving town *at any time* during the semester, you must first ensure there are no conflicts. Note the semester **does not end** until all final exams have been given in all courses.
- Personal or Family Plans - School requirements do not take a back seat to your personal plans. Something as severe as a funeral (Life and Death Circumstances) would be the only type of personal activity that fits within the valid exceptions.

14. **Honesty Policy and Ethical Considerations:** All students admitted to the University of Florida have signed a statement of academic honesty committing to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.
15. **Accommodation for Students with Disabilities:** Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.
16. **UF Counseling Services:** Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
 - UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
 - Career Resource Center, Reitz Union, 392-1601, career and job search services.

If I can help at any time let me know.

17. **Software Use:** All faculty, staff and student 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.

Project Format (EML 5714 only)

Select a technical publication that treats a problem of compressible flow. Examples of possible sources are the *AIAA Journal* or the *AIAA Journal of Propulsion and Power*.

Summarize the results in the following format:

1. Summary – one or two sentences summarizing the study content.
2. Introduction – a brief discussion of the technical issues.
3. Discussion of the study content and results.
4. Conclusions – MOST IMPORTANT PART OF THE REPORT – summarize the main findings of the study.

Note: Limit the report to five (5) pages including figures and references.

Please submit all reports via uploaded files on the course web site.