Course Information

Build Content | Assessments | Tools | Partner Content

Textbooks

1) J. Anderson, *Fundamentals of Aerodynamics* + supplement that Bookstore has taken from the Compressible flow book

2) Flack, *Fundamentals of Jet Propulsion with Applications* – Cambridge University

Other Reference Texts

-- J. Anderson, *Modern Compressible Flow,* 3rd Ed. McGraw-Hill, 2003
-- Kuethe and Chow, *Foundations of Aerodynamics*, 4th Ed. McGraw-Hill, 1986
-- Mattingly, *Elements of Gas Turbine Propulsion*
-- Hill and Peterson, *Mechanics and Thermodynamics of Propulsion* - 2nd Ed. , Addison Wesley
-- Archer and Saarlas, *An Introduction to Aerospace Propulsion* – Prentice Hall
-- Sutton and Biblarz, *Rocket Propulsion Elements*, 7th ed. – Wiley (and other older editions by Sutton)
-- Flack, *Fundamentals of Jet Propulsion with Applications* – Cambridge University

Library reserve books

Must click to see list

Topics

- Governing Equations of fluid motion. Chaps. 2&7 (JA)
- Transonic flows, numerical methods. Chap. 11.6&11.10 (JA) + notes
- 1-D flow, definitions, Normal shocks. Chaps 8 (JA)
- 1-D flows with heat and friction. Notes+ JA compressible book
- Oblique shocks and expansion waves. Chaps. 9 (JA)
- Quazi 1-D flows, nozzles, rockets, supersonic inlets, wind tunnels. Chap. 10 (JA)

- Thermodynamic cycles, thrust. Chap 1 (RF)
- Ideal cycle analysis, Non-ideal cycle analysis. Chaps 2,3 (RF)
    - Ramjet: diffuser, burner, nozzle.
    - Turbojet: compressors, turbines, afterburner.
    - Turbofan: fan, bypass.
- Off design air-breathing. Chap 11 (RF)

Projects and labs

There is one computational lab associated with this course. The lab will take place at the beginning of the semester. Instructions for the lab write-up will be provided when the lab is assigned. Access to the CAD Lab or ECL is necessary in order to complete the lab.

There are several computational projects in the course:
1) Students will develop a matlab code for computing the lift around a supersonic double wedge airfoil.
2) Students will develop a matlab code for computing the profiles for viscous internal flow, using finite difference approximations to the differential equations of motion.
3) Students will develop a suite of matlab codes for performing cycle analysis for various engines.

Approximate Grading Scale

10% Homework

25% Projects (computer based assignments)
10% Computational lab
25% Midterm
30% Final
Remember: THE PROFESSOR DOES NOT GIVE GRADES, THE STUDENTS EARN A GRADE

Computer usage

Many homeworks and projects will require the use of MATLAB, and/or EXCEL. The Lab will require MATLAB usage.

General course information

Exams will be closed book and held in class. The final exam will be comprehensive. You can bring on 8.5" X 11" sheet written on one side with helpful formulae etc. to the first exam and two such sheets to the final exam.
Homework, which will be assigned in class and noted on the course web page is due at the beginning of the designated class period (unless otherwise noted.) All homework will be graded and returned. The top of the first page of the homework should have: your name and the course number. Every page should have the problem number on the top right corner. There should be no frayed edges and multiple pages must be stapled. You should briefly restate the problem (some even make a photo copy and tape the problem statement to the

page). Give a sketch if helpful. List the basic assumptions. Give all necessary analysis. If asked to plot something, you must create a computer generated graph with appropriate axis labels and legend. Place a box around the final answer. Correct units should accompany all numerical answers. **Any answer that is not of the correct order of magnitude, with no accompanying explanation, will be given no points, even if the method used to do the problem is correct.** Homework solutions will be accessible after the assignment is due.

Honesty policy: Adherence to the Student Academic Code of Conduct is expected. I encourage you to freely discuss the homework amongst one another as you formulate your solutions individually.*Your* written work should represent *your* understanding of the problem.

In practice this means that copying (in whole or in part) another student's homework, exam, computer program, or paper is not permitted. If you choose to discuss your work with a colleague, it should be a discussion in which one teaches another or both work to a mutual understanding. As a counter-example, it is not acceptable to give a friend your homework five minutes before class so that your friend can copy your work. I also consider it unacceptable to copy work from a student who was in the class a previous year. In your written reports, be careful to correctly use quotation marks for words that did not originate with you. Also, be sure to properly cite all sources you used. As is done in the scientific literature, you should *briefly* acknowledge in writing any significant discussion or interactions you had regarding the work you submit. As a general principle, I do not accept the justification that you were not sure of my intentions. If you feel you may be in an ethical gray area, then you should consult with me *before* acting.