

AE 360–Aerodynamics II
Spring 1995

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Course time and location: Tu–Th 9:30–10:45, 118 DeBartolo Hall

Prerequisites: AE 350

Catalog description

“An intermediate course of the study of the dynamics and thermodynamics of compressible flow for both internal and external geometries. Further topics on boundary layers are included.”

Instructor’s emphases

The course will consider the fundamental science of compressible and viscous flows and its practical application to aerodynamics. Problem solving will be emphasized, including problem formulation, analytic and computational solutions. Additionally a design project will be required. Specific topics will include an overview of the governing equations, thermodynamics of non-ideal gases, isentropic flow with area change, normal shocks, flow with friction, flow with heat transfer, oblique shocks, two-dimensional steady supersonic flow, incompressible viscous duct flow, viscous boundary layer flow, and turbulence.

Texts available in bookstore

Liepmann and Roshko, *Elements of Gasdynamics*, Wiley: New York, 1957 (required).
Hughes and Brighton, *Theory and Problems of Fluid Dynamics*, McGraw-Hill: New York, 1991 (recommended).

Texts on reserve in the Engineering Library

Anderson, *Modern Compressible Flow with Historical Perspective*, McGraw-Hill: New York, 1990.
Courant and Friedrichs, *Supersonic Flow and Shock Waves*, Interscience: New York, 1948.
Shapiro, *The Dynamics and Thermodynamics of Compressible Fluid Flow*, Wiley: New York, 1953.
White, F. M., *Fluid Mechanics*, McGraw-Hill: New York, 1986.

Required Work and Grading

Exams will be closed book and held in class. The final exam will be comprehensive. You can bring one 8 1/2” x 11” sheet with notes on both sides to the first exam, two to the second, and three to the final.

Homework will be assigned regularly from the text and other sources. All homework will be graded and returned. Homework must be done on *one side only* of 8 1/2” by 11” *engineering* paper with no frayed edges. Multiple pages must be stapled. You should briefly restate the problem, give a sketch if helpful, give all necessary analysis, and place a box around your final answer. Correct units

must always accompany numerical answers. Neatness and effective communication are considered in grading as well as numerical answers.

Two short (one page maximum) critical reviews of works from the literature will be required. The first review will consider a topic of current interest in the aviation industry and must be taken from the magazine *Aviation Week and Space Technology*. The second must consider an article on fluid mechanics which has stood the test of time. It must be over fifty years old, written by a well-known fluid mechanician, and should have a proven lasting value. Your reviews should 1) summarize the article's major findings and 2) offer an argument why this paper is deserving of its recognition. The reviews are required to be written in a TeX format and will be checked primarily for style, format, grammar, and content.

Grades will be assigned based on students' performance on examinations, homework, and papers. The weights assigned to each are as follows:

Exam I	20	Tuesday, 21 February 1995
Exam II	20	Tuesday, 11 April 1995
Final Exam	35	Monday, 8 May 1995, 7:30-9:30 PM
Homework	15	
Design Project	8	
Reviews	2	Thursday, 16 February 1995; Thursday, 23 March 1995
Total	100	

Honesty Policy

Academic honesty is expected. When confronted with an apparant violation, I will enforce the honor code to the best of my ability. I will also try to make my expectations clear. By and large, though, these issues are out of my control and as such I do not seek out violations. Instead, I depend upon your basic integrity to prevent any problems.

In brief my expectations are as follows. 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 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 friend can copy your work. I also consider it unacceptable to copy work from a student who was in the class in 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 discussions 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 grey area, then you should consult with me *before* acting.