STANFORD UNIVERSITY
Department of Aeronautics and Astronautics
AA 210A Fundamentals of Compressible Flow

Instructor: Brian Cantwell, 250A Durand, x 3-4825, cantwell@stanford.edu
Class hours and location: TTh 10:30-11:50, Gates B1
Instructor office hours: TTh 1:00-2:00, open door and by appointment
Required Text: Course Reader, *Fundamentals of Compressible Flow* (available online)

Reserve Book List
Liepmann and Roshko, *Elements of Gasdynamics*, Dover
Thompson, *Compressible-Fluid Dynamics*, Rensselaer Polytechnic Institute Press
Schlichting and Gersten, *Boundary Layer Theory*, Springer

List of Topics
1. Fluid flow patterns
2. Thermodynamics of gases
3. Control volumes, vector calculus
4. Kinematics of fluid flow
5. Conservation equations in integral and differential form, the Navier-Stokes equations
6. Alternate forms of the equations of motion, rotational and irrotational flow
7. Entropy generation and transport
8. Viscous flow along a wall
9. Quasi-one-dimensional flow, shock waves
10. Gasdynamics of nozzles
11. Channel flow with area change, friction and heat addition
12. Steady waves, oblique shocks, Prandtl-Meyer expansion
13. Unsteady wave motion, acoustics, centered expansions, the shock tube
14. Linearized potential flow, thin airfoil theory

Exam Dates: Mid Term Exam - Thursday Nov 1, 10:30-11:50
Final Exam - Wednesday Dec 12, 12:15 - 3:15

Grading: Homework - 25%; Mid Term Exam - 25%; Final Exam - 50%

Exam policy - Exams are taken in class during the assigned time. Students are permitted to bring books, notes and tables as well as a graphing calculator to the exams. A laptop and/or smart phone is allowed to access the class notes or use as a calculator. Exams will not be provided at any other time than that indicated above.

Homework policy - The understanding gained through solving problems is absolutely crucial to learning the course subject matter and demonstrating proficiency on the exams. Indeed, most of the homework problems contained in the class notes were exam problems at some time in the past. You are not expected to work on homeworks in total isolation; seek out your peers, the course assistants and the instructor when you need help on the problems. This is a fundamental part of the learning experience. Just be sure that whatever you hand in is your own work. Homeworks that are turned in by 5:00 PM on the date due will be carefully examined, graded and returned. There is a considerable effort required to grade the homeworks. Please be considerate of the course assistants and make every effort to turn your homework in on time. Late homeworks will not be graded. They will be assigned up to 3/5 credit depending on effort and returned without examination.