AME 511 Syllabus - Spring 2013 [Last updated: November 27, 2012]

Thursdays 6:40-9:20 pm, RTH 115.

Instructor: Prof. Veronica Eliasson, eliasson@usc.edu.

Textbook: John D. Anderson, Modern Compressible Flow, 3rd Ed. McGraw-Hill, Inc.

Grading: 30% Homework 30% Midterm 40% Final Exam All exams are open book.

Lecture	Day	Suggested Reading	Homework
1	01/17	Continuity equation; Euler equation; principles of classical	
		thermodynamics. Ch: 1.1-1.7, 2.1-2.5	
2	01/24	Energy equation; enthalpy and entropy equation; adiabatic and	HW1 Due
		isentropic processes. One-dimensional compressible flow; Mach number.	
		Ch: 1.4.2-1.4.6, 2.6-2.7, 3-3.5	
3	01/31	Normal shock relations, oblique shock relations	HW2 Due
		Ch: 3.6, 3.10, 3.11, 4.1-4.3.	
4	02/07	Oblique shocks; reflections of shocks at rigid boundaries and	
		shock interactions. Ch: 4.4-4.6, 4.7-4.11	
5	02/014	Expansion waves; Prandtl-Meyer relation; shock-expansion	HW3 Due
		procedure. Quasi-one-dimensional flows in converging-diverging	
		ducts. Nozzles; choked flow; overexpanded and underexpanded nozzles.	
		Ch: 4.14-4.17, 5.1-5.10,	
6	02/21	Nozzle example continued. Moving shocks. Ch 5, 7.1-7.3	HW4 Due
7	02/28	Reflected shocks, shock tube relations. One-dimensional flow with friction.	HW5 Due
		Differential form of conservation equations. Ch: 3.9, Ch: 6, Ch 7.3, 7.7	
8	03/07	Midterm: 6:40-8:40pm	
9	03/14	Velocity potential equation; linearized flow. Ch: 8, 9	
10		Spring break!	
11	03/28	Method of characteristics; numerical techniques for compressible	HW6 Due
		flows. 2-week project: to be announced. Ch: 11	
12	04/04	Transonic flow, Physical properties of hypersonic flow;	
		hypersonic shock relations Ch 14, Ch: 15	
13	04/11	Forces on bodies in hypersonic flow; Statistical thermodynamics of high-temperature	Project Due
		gases; translational, rotational, vibrational degrees of freedom; dissociation. Ch: 15, 16	
14	04/18	Chemical reactions; gases in statistical nonequilibrium. Ch: 16	
15	04/25	Flows of high temperature gases Ch. 17	HW7 Due
16	05/02	Current research topics. Review.	
17		Final: Thursday May 9, 7-9pm. Location TBA	

* Refer to class notes.