ME 5710/6710: Aerodynamics

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Office Hours: Monday, Wednesday: 2:30-3:30 (except 2nd Monday of each month)
Other times by appointment (Unavailable Tuesday, Thursday)

Some course material (like this) available at
http://www.mech.utah.edu/~mcmurtry/Notes

1. Fluid Mechanics Review and Intro to Aero (Chapter 1 & 2)
    - Forces (Lift and Drag)
    - Modeling
    - Flow Regimes
        - Inviscid, viscous
        - Compressible, incompressible
        - Laminar, turbulent
        - Mach number
    - Mathematics and Equations
        - Scalars and vectors
        - Vector operations
        - Vector calculus
        - Control volumes
    - Governing Equations
        - Continuity (mass)
        - Momentum (Navier-Stokes)
        - Energy
    - Total Derivative
    - Flow Descriptions
        - Pathlines, streamlines, streaklines
        - Vorticity and strain
        - Circulation
        - Stream function, velocity potential
    - Solution Approaches

2. Ideal Flow – Inviscid, Incompressible (Chapter 3)
    - Bernoulli Equation
        - Review of examples and aero applications
    - Irrotational Flows
        - Laplace's equation
            - Elementary flows
            - Superposition
            - General conditions for generation of lift
            - Overview of panel methods
    - Real vs. Ideal Flows
        - Circular cylinder

3. Incompressible Flow Over Airfoils (Chapter 4)
    - Terminology and Characteristics
    - Basic Airfoil Theory
    - Some Aspects of Airfoil Design

4. Some Finite Wing Effects (Chapter 5)
5. Compressible Inviscid Flow
    - Thermodynamics Review (Chap. 7)
    - Stagnation Properties (Chap. 7)
    - Governing Equations (Chap. 7)
    - Shock Waves (Chapter 8)
        - Normal shock equations and jump conditions
        - Pressure measurement in compressible flows
        - Oblique shock waves (Chap. 9)
            - Shock reflections
            - Mach lines
    - Expansion Fans (Chap. 9)
    - Flow Through Nozzles and Diffusers (Chapt. 10)
        - Quasi 1-D flow
        - Shocks in nozzles
        - Shocks and expansions

6. Viscous Flow (Chapter 15)
    - Navier Stokes Equations

7. Boundary Layer Flows (Chapter 17)
    - Properties and Definitions
    - Boundary Layer Equations
    - Laminar Boundary Layers (Chapter 18)
    - Turbulent Boundary Layers (Chapter 19)

Exams:
	Exam 1:	Monday, March 18
	Exam 2:	Wednesday, April 17
	Final Exam:	Friday, May 3, 1:00-3:00 PM

Homework: Approximately weekly
Late homework not accepted (Lowest homework dropped)

Grading:
- Exam 1: 20%
- Exam 2: 20%
- Final: 35%
- Homework: 20%
- Other: 5%

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