

Formal Topics Covered

- Fundamental Fluid Concepts (Ch. 1)
- Fluid Flow Classification (Ch.2)
- Fluid Statics (Ch.3)
- Inviscid flows: Euler & Bernoulli equations (Ch. 6)
- Reynolds Transport Equation (Ch. 4)
- Integral Form: Conservation of Mass
- Integral Form: Conservation of Momentum
- Integral Form: Conservation of Energy
- Navier Stokes Equations (Ch. 5 & 8)
- Dimensional Analysis & Similitude (Ch.7)
- Energy Analysis of Pipe Flow Problems (Ch. 8)
- Boundary Layer Fundamentals – Integral & Differential Analysis(Ch.9)
- External Flow – Lift & Drag (Ch. 9)
- Computational Fluid Dynamics
- Compressible Flow (Ch. 11 & 12)

External Flows

- Forces on External Flows
 - Bluff Bodies – Pressure drag & Skin Friction (relative importance)
 - Turbulent Boundary layers & separation & importance of streamwise pressure gradient
- Dimensional Analysis – C_d , C_L
- Methods of Drag Reduction
- Airfoils – Lift & Drag (Induced Drag)
- Vorticity and Circulation

Computational Fluid Dynamics

- Why is it useful? Why important?
- Classification of Differential Equations
- Numerical Integration: Blasius Solution
- Finite Difference Techniques
- Poisson Equation Numerical Solution

Compressible Flow

- Variable density along a streamline
- Two new variables (density and Temperature)
- Thermodynamics Review
- Control Volume Analysis
- Isentropic Duct flow
