Instructors:

- W.D. Henshaw (henshw@rpi.edu, Amos Eaton 304)
  Office hours: Wednesdays 1:30–3:00pm, Fridays 9:30–11:00am, or by appointment.
- D.W. Schwendeman (schwed@rpi.edu, Amos Eaton 306)
  Office hours: Wednesdays 1:30–3:00pm, Fridays 9:30–11:00am, or by appointment.

Class web page: See link from www.rpi.edu/~henshw (homework will be posted here).

Reference Texts: Here are some suggested reference text books, a more comprehensive list is available on the class web page.


2. Peyret (Editor) *Handbook of Computational Fluid Mechanics*.

Outline:

1. Preliminaries, 4 lectures
   
   Topics: Finite difference and finite volume methods; difference operators; consistency, stability and convergence; Lax theorem; basic time-stepping methods.

2. Inviscid Compressible Gas Dynamics, 9 lectures
   
   Topics: Euler equations (and reduced forms); quasi-linear and conservation forms; characteristics, shock waves and contact discontinuities; Riemann problems; shock-capturing methods; Godunov methods and approximate Riemann solvers; high resolution schemes; multidimensional problems.

3. Solid Mechanics, 5 lectures
   
   Topics: Elasticity equations; Eulerian and Lagrangian forms; constitutive relations; linear elasticity; numerical methods for first-order and second-order forms.

4. Viscous Incompressible Flow, 7 lectures
   
   Topics: Navier-Stokes equations; staggered grid approximations; projection schemes; pressure-Poisson schemes.

5. Fluid-Structure Interactions, 3 lectures
   
   Topics: Conjugate heat transfer; coupling fluids and solids; interface conditions.

Grading Policy:

Course grades will be based on homework assignments (analysis and computing problems) and a Final Exam. The weights for these are 70% and 30% approximately.