Instructors:

- W.D. Henshaw (henshw@rpi.edu, Amos Eaton 304)
  Office hours: Wednesdays 1:30–3:00pm, Fridays 1:30–3:00pm, 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/~schwed (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.
   Topics: Equations of fluid dynamics; flow regimes; canonical forms of the governing equations; numerical approximations; consistency, stability and convergence; Lax theorem; basic time-stepping methods.

2. Linear Hyperbolic PDE’s, Acoustics.
   Topics: First-order systems; characteristics and discontinuities; domain of dependence; upwind and centered schemes; modified equations.

3. Inviscid Compressible Gas Dynamics, Euler equations.
   Topics: Systems of conservation equations, Burger’s equation; quasi-linear and conservation forms; characteristics, rarefaction, shock waves and contact discontinuities; Riemann problems; shock-capturing methods; Godunov methods and approximate Riemann solvers; high resolution schemes; multidimensional problems; reactive Euler equations.

   Topics: Navier-Stokes equations; staggered grid approximations; projection schemes; pressure-Poisson schemes.

5. Conjugate heat transfer
   Topics: coupling fluids and solids; interface conditions.

Grading Policy:
Course grades will be based entirely on homework assignments (a combination of analysis and computing problems).