1. ME 5344, Thermodynamics of Fluid Flow with Applications

2. 4 credits, 4 contact hours.

3. Instructors: C. Dutcher, L. Shen, E. Sparrow, P. Strykowski

4. Textbooks: Instructor prepared notes

5. Specific course information:
   b. Prerequisites: ME 3331, ME 3332, ME 3333, CSE upper division or grad student.
   c. Elective for ME students.

6. Course outcomes (related ABET student outcomes indicated in square brackets):
   a. An ability to apply mass, momentum, energy and entropy balances to systems of ideal gases with constant specific heats. [1]
   b. An ability to apply mass, momentum, energy and entropy balances to systems of real fluids. [1,2]
   c. An understanding of the importance of pressure boundary conditions in determining the flow characteristics of gas handling systems. [1,2]
   d. An ability to apply compressible gas dynamics to subsonic and supersonic nozzle design. [1,2]
   e. An ability to apply compressible gas dynamics to long subsonic and supersonic gas pipes. [1,2,4]
   f. An understanding of the importance of and limitations to the presence of choking. [1,2]
   g. An understanding of the deleterious effects of shocks on system performance and how to eliminate or minimize their presence. [1,2]
   h. An ability to work on an engineering team. [5]
   i. An ability to explain a compressible flow problem by means of a written or oral report. [3]

7. Course topics:
   a. Review of thermodynamics & fluid mechanics.
   b. Conservative principles of mass, momentum, energy, and entropy balances for gas systems.
   c. Sound speed and Mach number.
d. Stagnation state of a fluid.
f. Consequences of choking.
h. Frictional constant-area flow of a compressible gas; Fanno flow with and without shocks.
i. Generalized flow of a compressible gas through passages including area change, friction, heat transfer, mass addition. Applications.
j. Two-dimensional compressible gas dynamics.