Overarching Educational Objectives
Upon completion of EGR 271, each student should have

- A conceptual understanding of what a fluid is and how it behaves
- An expert ability to set up, analyze, and solve engineering problems
- The analytical skills to use conservation laws and constitutive relationships to understand and predict the behavior of fluids
- A comprehension of dimensional analysis
- An awareness and knowledge of additional topics such as open-channel and pipe flows
- Facility with verbal, visual, and mathematical means of communicating fluid mechanics ideas and concepts

Specific Topics Covered
- Thermophysical properties of Fluids
  - Pressure
  - Density
  - Viscosity
  - Vapor pressure
  - Surface tension
- The meaning of Continuum mechanics and flow representation
- Fluid statics
  - Pressure variation within a fluid
  - Manometers
  - Pressure forces on flat and curved surfaces and the resulting moments
  - Buoyancy
  - Pressure distribution in a uniformly accelerating fluid
- Methods of flow analysis: control volume, differential, experimental
- Conservation of mass
  - Reynolds transport theorem and control volume analysis
  - Differential analysis
- Conservation of linear momentum
  - Reynolds transport theorem and control volume analysis
  - Differential analysis
- Conservation of angular momentum
  - Reynolds transport theorem and control volume analysis
- Conservation of energy
  - Reynolds transport theorem and control volume analysis
  - Differential analysis
  - Bernoulli’s equation
- Dimensional Analysis and Buckingham Pi
• Similarity and extrapolation of experimental results
• Turbulence, compressibility, and boundedness
• Flow around immersed bodies
  o Boundary layers
  o Transition from laminar to turbulent flow
  o Lift and drag
• Duct flow
  o Fully developed flow
  o Head loss for laminar and turbulent flow
  o The Moody diagram
  o Minor losses due to pipe fittings
  o Pipe networks
• Open-channel flow
  o Manning’s equation
  o Froude number
  o Hydraulic jump

Skills developed
(under construction)