Exam Topic Area: Fluid Mechanics

Questions on the exam will be thought-provoking, but can be solved with a thorough understanding of the <u>foundations</u> of the topic area. Question difficulty will generally be at the level of challenging undergraduate material, and often require understanding and application of multiple concepts to come to the correct solution.

Questions will test the student's ability to derive and apply fundamental fluid mechanics principles. Students will be allowed to bring a one page (front and back) equation sheet which must be submitted with the exam. On the equation sheet can be equations, notes about the equations, etc. but worked-out solutions to problems will not be allowed. Non-programmable calculators will be provided but may not be needed. Any necessary tables or figures will be provided with the exam.

Reference List:

- Munson, Okiishi, Huebsch, and Rothmeyer, "Fundamentals of Fluid Mechanics", 7th Edition, Wiley, (Chapters 1-9, 11)
- Pritchard and Mitchell, "Fox and McDonald's Introduction to Fluid Mechanics", 9th Edition, Wiley (Chapters 1-9, 12)

Questions will be drawn from the following list of topics:

- Fluid Statics
- Bernoulli Equation
- Fluid Kinematics
- Finite Control Volume Analysis (Mass Conservation, Linear Momentum, Angular Momentum, Energy Equation)
- Differential Analysis of Fluid Flow (Navier-Stokes Equation, Potential Flow)
- Dimensional Analysis, Similitude and Modeling
- Viscous Flow in Pipes
- Flow Over Immersed Bodies (Boundary Layers, Drag and Lift)
- Compressible Flow (Ideal Gas Relations, Isentropic Relations, Normal Shock Relations)

Undergraduate courses offered in this area:

Courses listed here are for your reference only and may be helpful for relearning/reviewing the material. Questions on the exam are limited by the topics list and reference list, <u>not</u> by the material covered in this (these) course(s):

- ME 330 – Fluid Mechanics