

Fluid Flow — ChE 260

Syllabus

Term:	2009 Fall
Course title:	Fluid Flow
Course description:	This course considers the principles of molecular and turbulent transport of fluids, particularly as they apply to pressure drop calculations in piping systems, packed columns and other flow devices. Flow around submerged objects is also considered.
Course number:	ChE 260, Sect 001
Course instructor:	Angelo J. Perna
Office/lab location:	Tiernan 376/308
Telephone:	973 596-3616
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Office hours:	R 2:00-3:00 & F 2:00- 3:00
Course hours & location:	T 8:30 – 9:55 Kupf 103 & R 4:00 – 5:25 Kupf 103
Prerequisite:	ChE 230 Thermodynamics (which includes having taken ChE 210 Material balances)
Co requisites:	ChE 240 Energy balances and Math 222 Differential equations
Course textbook:	Geankoplis, C.J., <i>Transport Processes and Separation Process Principles</i> , 4 th Ed. Prentice Hall, ISBN 0-13-101367-X Other references as specified by Instructor

Course outcomes:

1. Provide students with the knowledge to understand the basic principles of fluid mechanics and the tools needed to design complex flow systems, including packed and fluidized beds
2. Teach students how to develop mathematical representation (models of physical phenomena and apply these models to solve engineering problems in fluid mechanics.
3. Make the students aware the importance of energy conservation in designing flow systems

Topic covered:

1. Introduction and Review of Basic Principles (Fluid Statics, Pressure, Manometry, Head, etc.) (0.5 week)
2. Molecular Transport, Viscosity, Shear, Gradients, non-Newtonian Behavior (1 week)
3. Concepts of Laminar and Turbulent Flow (1 week)
4. Shell Balances, Hagen-Poiseuille Equation (1 week)
5. Design Equations for Laminar and Turbulent Flow in Pipes (2 weeks)
6. Friction Factor, Loss in Pipes, Fittings, etc. (2 weeks)
7. Conservation of Mass / Continuity Equation (1 week)
8. Energy and Mechanical Engineering Balance / Navier - Stokes Equation (2 weeks)
9. Friction Losses in Mechanical Engineering Balances (1 week)
10. Measurement of Flow of Fluids and Pumps
11. Flow Pass Immersed Objects, Flow in Packed Beds, Description of Filtration and Fluidization (1 week)
12. 3 exams (1½ weeks)

Grading:

The final course grade a student earns is the average of the 3 major exams on the material covered in the lectures

Points (100 pt basis)

Exams (3) total/300

$90 > A \leq 100$

$85 \leq B+ < 90$

$80 \leq B < 85$

$75 \leq C+ < 80$

$70 \leq C < 75$

$60 \leq D < 70$

$0 \leq F < 60$

In rare cases a student may receive the grade of I and it must be removed as stated by school policy