Course Description: Introduction to differential and integral formulation of mass, momentum, and energy transport in fluids and solids. Topics include viscosity, laminar flow, boundary layer flow, turbulent flow, friction factor, conduction, convection, heat transfer coefficients, radiation, diffusion, and applications to energy technology.

Fall, 3 credits, ABCF grading


Course Topics:

1. Introduction: the commonalities among heat transfer, mass transfer, and fluid mechanics
2. Shell Momentum Balances and Velocity Distributions in Laminar Flow / Equations of Change for Isothermal Flow Systems [Chapters 2 and 3 are treated together]
3. Velocity Distributions with More than One Independent Variable and Boundary Layer Theory [Chapter 4]
4. Velocity Distributions in Turbulent Flow [Chapter 5]
5. Inter-phase Transport in Isothermal Flow Systems and Boundary Layer Flow with Separation [Chapter 6]
6. Temperature distribution in solids and in laminar flow / Equations of Change for Non-isothermal Systems [Chapters 10 and 11 are treated together]
7. Temperature Distributions with More than One Independent Variable [Chapter 12]
8. Temperature distributions in turbulent flow [Chapter 13]
9. Energy transport by radiation [Chapter 16]

First midterm (Sept. 30) [materials from #2 to #3, closed book]

Second midterm (Nov. 11) [materials from #4 to #6, closed book]

Final Examination (Dec. 2, class time [last class]) [comprehensive, open book]

Grades:

Two section tests 30 points each
Final Exam 35 points
Home work* 5 points

Note that materials of the two midterms (section tests) are based on the TP Solution Manuel and the tests are closed book. The final examination is open book.

* I will collect the homework but will not return them back to students (keep a copy for yourself). The solutions from TP Solution Manuel will be made available in due time; the submitted homework will be graded but, again, not returned.