

G63.2770 , 2780 Fluid Dynamics I,II

First Term:

Eulerian and Lagrangian description of fluids. Conservation of mass, momentum, and mechanical energy. Basic theory of inviscid incompressible and barotropic fluids. Kinematics and dynamics of vorticity. Potential flow, circulation and lift, airfoil theory. Gravity waves. Rotational flows. The Navier Stokes equations and some examples of viscous incompressible flow. Stokes flow. Boundary Layer theory.

Second Term:

Thermodynamics of gases and the energy equation. One dimensional homentropic flow. Shock waves, weak and strong. Characteristic methods. Linearized supersonic flow. If time allows, a special topic in fluid dynamics will be included.

Texts: Primary for both terms: Fluid Mechanics by Landau and Lifshitz. Secondary texts: First Term: An Introduction to Fluid Dynamics by Batchelor, and Theoretical Hydrodynamics by Milne-Thomson. Second term: Supersonic Flow and Shock Waves by Courant and Friedrichs.