



Course Name:

Environmental Hydrodynamics

Course Number: 20-702	Credit: 3
Program: Graduate	Course Type: Technical Selective
Prerequisite: -	Corequisite: -

Course Description (Objectives):

This course aims to familiarize graduate students with the principles of stratified flow motion in lakes, reservoirs and estuaries.

Course Content (outline):

- Chapter 1: Introduction to hydrodynamics of stratified flows, applications in estuaries, oceans, lakes, and reservoir
- Chapter 2: Equations of motion for incompressible fluids: Euler equations, conservation of mass and energy, Coriolis force
- Chapter 3: Reynolds-averaged equations of motion, turbulence modeling
- Chapter 4: Approximation of governing equations for special cases: Perturbation method in engineering analysis
- Chapter 5: Internal waves in bounded and unbounded stratified fluids
- Chapter 6: Internal and surface dynamics of lakes
- Chapter 7: Selective withdrawal in reservoirs
- Chapter 8: Instability in two-layer fluid
- Chapter 9: Elective subjects: Interaction of flow and vegetation; Hydrodynamic modeling of reservoirs and lakes, Gravity currents

References:

- Turner, J. S. (1973), Buoyancy Effects in Fluids, Cambridge University Press.
- Marshall, J. S. (2001), Inviscid Incompressible Flow, John Wiley.
- Karamcheti, K. (1966), Principles of Ideal-fluid Aerodynamics, John Wiley.
- White, F. (2005) Viscous Fluid Flow, 3rd edition, McGraw-Hill.