Course Name:

Hydrodynamics

Course Number: 20-626	**Credit:** 3
Program: Graduate	**Course Type:** General Selective
Prerequisite: -	**Corequisite:** -

Course Description (Objectives):

The goal of this course is to introduce the fundamental concepts of hydrodynamics, including the analysis of flow field kinematics, principles of mass and momentum conservation, and modeling various flows such as ideal, viscous, and turbulent. It also covers analytical methods like velocity potential and flow equations.

Course Content (outline):

- Chapter 1: Vectors algebra
- Chapter 2: Kinematics of flow field
- Chapter 3: Eularian and Lagrangian approaches
- Chapter 4: Integral form of equations
- Chapter 5: Rotation and strain
- Chapter 6: Conservation of mass equation
- Chapter 7: Velocity potential, Potential flow
- Chapter 8: Conservation of momentum equation (Navier-Stokes' Equation)
- Chapter 9: Incompressible and inviscid flow (ideal flow) Equation, Stream function
- Chapter 10: Two-dimensional motion
- Chapter 11: Viscous fluid motion
- Chapter 12: Water wave mechanics
- Chapter 13: Turbulent flow

References:

- "Principals of ideal-fluid aerodynamics", K. Karamcheti, 1966.
- "Introduction of fluid mechanics", R.W. Fox & A.T. McDonald, 1985.
- "Water wave mechanics for engineers and scientists", R.G. Dean & R.A. Dalrymple, 1984.
- "Hydrodynamics", H. Lamb, 1945.
- "An Introduction to fluid dynamics", G.K. Batchelor, 1967.