Code	Subject Title	Cr. Hrs	Semester
MATH-415	**Fluid Mechanics-I**	**3**	**VII**
Year	Discipline		
4	**Mathematics**		

Objectives:

Conservation of Matter

- Introduction
- Fields and continuum concepts
- Lagrangian and Eulerian specifications
- Local, convective and total rates of change
- Conservation of mass
- Equation of continuity
- Boundary conditions

Nature of Forces in a Fluid Field and their Effects

- Surface and body forces
- Stress at a point
- Viscosity and Newt on's viscosity law
- Viscous and inviscid flows
- Laminar and turbulent flows
- Compressible and incompressible flows

Irrotational Fluid Motion

- Velocity potential from an irrotational velocity field
- Streamlines
- Vortex lines and vortex sheets
- Kelvin's minimum energy theorem
- Conservation of linear momentum
- Bernoulli's theorem and its applications
- Circulations, rate of change of circulation (Kelvin's theorem)
- Aaxially symmetric motion
- Stokes's stream function

Two-dimensional Motion

- Stream function
- Complex potential and complex velocity, Uniform flows
- Sources, sinks and vortex flows
- Flow in a sector
- Flow around a sharp edge, Flow due to a doublet

Recommended Books:

- H. Schlichting, K. Gersten, E. Krause and H. Oertel, Jr.: Boundary-Layer Theory, 8th edition (Springer, 2004).
- Yith Chia-Shun: Fluid Mechanics (McGraw Hill, 1974).
- I. L. Distsworth: Fluid Mechanics (McGraw Hill, 1972).
- F. M. White: Fluid Mechanics (McGraw Hill, 2003).
- I. G. Curie: Fundamentals of Mechanics of Fluids, Third edition (CRC, 2002).
- R. W. Fox, A. T. McDonald and P. J. Pritchard: Introduction to Fluid Mechanics (John Wiley and Sons, 2003).