Relevant Course: Fluid Mechanics

Relevant Department: Mechanical Engineering, Civil Engineering, Aerospace Engineering, Automobile Engineering, Chemical Engineering, Metallurgy and Materials Engineering, Biotechnology,Power Engineering, Energy Engineering, Physics, Applied Mathematics

Relevant Semester: 3rd

Pre- requisite : Engineering Mathematics with integral calculus, differential calculus and vector calculus

Course Description and Outline:

Fluid Kinematics: Eulerian and Lagrangian approach, concept of streamline, streakline, pathline, deformation and rotation, vorticity and angular velocity, constraint of incompressibility and continuity equation, stream function and velocity potential

Dynamics of inviscid flows: Euler and Bernoullis equation and their applications

Reynolds Transport Theorem (RTT): Derivation of Reynolds Transport Theorem, Application of RTT to Conservation of Mass and Momentum

Differential form of Conservation Equations: Continuity and Navier-Stokes equations and their derivation

Some exact solutions of Navier-Stokes equation for steady incompressible flows:Fully developed low between two infinite parallel plates (plane Poiseuille flow), Shear driven flow between two parallel plates, Thin film flow along an inclined wall, Flow through circular tube / pipe (Hagen Poiseuilleflow), concept of friction factor and application to pipe flow design