Course Code : **ME 761**

Course Title : **Advanced Fluid Mechanics**

Credit Hours : **3**

Course Description

General equations of motion of viscous fluid, Exact solutions of the Navier Stokes equations, Exact solutions of the Navier Stokes equations, Flow at small Reynolds number, The laminar boundary layer theory, Exact solutions of the boundary layer equations, Exact solutions of the boundary layer equations, Exact solutions of the boundary layer equations, Non-steady boundary layers, Boundary layer control , Transition and turbulent boundary layers, Case studies and design problems encountered on\\in various fluid flows and related fields.

Course Objectives

Acquire good understanding and deep insight into the different types of fluid flows.
Design, analyze and solve any problem in the field of fluid flows and related topics.

Course Topics

Week no. 1: Introduction.

Week no. 2: General equations of motion of viscous fluid

Week no. 3: Exact solutions of the Navier Stokes equations

Week no. 4: Exact solutions of the Navier Stokes equations (Cont.)
Week no. 5: Flow at small Reynolds number

Week no. 6: The laminar boundary layer theory

Week no. 7: The laminar boundary layer theory (Cont.) / 7^{th} week evaluation.

Week no. 8: Exact solutions of the boundary layer equations.

Week no. 9: Exact solutions of the boundary layer equations (Cont.).

Week no. 10: Non-steady boundary layers

Week no. 11: Boundary layer control

Week no. 12: Transition and turbulent boundary layers / 12^{th} week evaluation

Week no. 13: Turbulent boundary layer.

Week no. 14: Turbulent boundary layer (Cont.).

Week no. 15: Case studies and design problems encountered on\\in various fluid flows and related fields

Week no. 16: Final Examination

References

H. Shlichting. Boundary Layer Theory. McGraw Hill

L. Rosenhead. Laminar Boundary Layers. Oxford at Clarendon Press.

H. Versteeg and W. Malalasekera. An Introduction to Computational Fluid Dynamics.

- The Finite Volume Method. Longman Scientific and Technical.