ME 282 Jan 3:0

Computational Heat Transfer and Fluid Flow

Instructor

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Department: Mechanical Engineering

Course Time:

Lecture venue:

Detailed Course Page:

Announcements

Brief description of the course

The course should be useful to students interested in the broad area of computational fluid dynamics. The course introduces fundamental discretization techniques, discusses consistency and convergence and demonstrates how this knowledge can be applied to simulate complex fluid flow problems accurately and efficiently.

Prerequisites

none

Syllabus

Mathematical description of fluid flow and heat transfer: conservation equations for mass, momentum, energy and chemical species, classification of partial differential equations, coordinate systems; discretization techniques using finite difference methods: Taylor-Series and control volume formulations; modelling of heat conduction, convection-diffusion, and flow field using finite volume method (FVM); introduction to FVM with unstructured grids; modelling of phase change problems;

introduction to turbulence modelling; application to practical problems.

Course outcomes

Through this course students learn about discretization methodologies that go into complex large scale fluid flow simulations. They also gain knowledge of important concepts such as consistency and convergence including stability of the discrete systems that are obtained from approximation of governing equations.

Grading policy

10%: Assignments, 25% Midterm, 40% Final, 25% Project

Assignments

Resources