

MECH 479: Computational Fluid Dynamics (3 credits)

Lectures: Tues, Thurs 9:30–11:00; CEME 1215

Instructor: **Prof. W. K. Bushe**
Rm. 109 Rusty Hut
Phone: 604-822-3398
e-mail: wkb@mech.ubc.ca

Grading: Quizzes: 30%
Project: 20%
Final: 50%

Course Synopsis

This course is an introduction to the computational methods used to predict temperature, pressure, velocity and fluid flow rates in an engineering context. It has been designed for advanced, mature students. The course will provide coverage of major topics such as numerical methods, gridding, stability, convergence and turbulence modelling; here the intent is to provide a background in these methods to enable students to make better use of commercial software packages through an improved understanding of the methods used in such packages. There will be a project in which students will be expected to use CFD to study a flow in a pseudo-industrial context.

First class: Thursday September 9, 2010

Course Outline by Lecture Period

Date	Topic
Sept. 9	Introduction to CFD
Sept. 14	“Review” of Differential Equations
Sept. 16	Finite Difference/Volume/Element methods
Sept. 21	Time integration/iteration
Sept. 23	Boundary and initial conditions
Sept. 28	Meshing, stability and convergence
Sept. 30	Case study: simulating a laminar flow
Oct. 5	Quiz 1
Oct. 7	“Review” of statistics
Oct. 12	Review of statistics (cont.)
Oct. 14	Turbulence
Oct. 19	Statistics for turbulent flows
Oct. 21	Direct Numerical Simulation
Oct. 26	Mean governing equations
Oct. 28	Turbulent viscosity models
Nov. 2	Reynolds stress models
Nov. 4	Large Eddy Simulation
Nov. 9	Case study: simulating a turbulent flow
Nov. 16	Case study (cont.)
Nov. 18	Quiz 2
Nov. 20 – Nov. 30	Use of Commercial CFD
Dec. 2	Review