



University of Alberta Mechanical Engineering

Computational Fluid Dynamics MECE 639

An advanced course on numerical methods that teaches **all the aspects involved in developing CFD models and programs**. In addition to specialized techniques for the solution of the Navier-Stokes equations, the course covers **advanced numerical techniques and coding for high-performance**, including parallelism, which can be applied to other fields of scientific modelling. The course is aimed at graduate students that are developing or improving numerical simulation codes, not strictly limited to CFD.

Instructor: Dr. Carlos F. Lange

Objectives:

- Learn and understand methods for modelling, discretization, and solution of fluid flows with emphasis on incompressible flows.
- Practise programming, debugging and validation of advanced numerical methods.

Topics covered:

- ➔ Review of Fluid Mechanics
- ➔ Review of Numerical Methods (Finite Diff.)
- ➔ Grid Generation
- ➔ Finite Volume Method, Boundary Conditions
- ➔ Efficient Solvers
- ➔ Parallel Computing and HPC
- ➔ Solution of the Incompressible Navier-Stokes Eqs. (SIMPLE)
- ➔ Turbulence Modelling
- ➔ Verification & Validation

Write your own CFD code for 2D flows!

