



University of Pretoria Yearbook 2016

Numerical thermoflow 781 (MSM 781)

Qualification Postgraduate

Faculty [Faculty of Engineering, Built Environment and Information Technology](#)

Module content The Efficient Solvers: Background, multigrid theory and detailed description of the algorithm. Finite Volume method: Understand the governing equations, general form of the transport equations, Gauss's theorem and the finite volume discretisation. Iterative solution algorithm: Pressure-velocity coupling, types of grids, unsteady flows, multiple phases. Finite Volume Discretisation: Diffusion term, convection term and source term for steady flows. Convection-diffusion problems: Boundary conditions, higher order discretisation, accuracy / stability. Solution Algorithm for Pressure-Velocity coupling: SIMPLE, SIMPLER, SIMPLEC and PISO. Laminar, transitional and turbulent flow: Background and theory. Turbulence modelling and examples: Definition of turbulence, turbulence modelling approaches, turbulence models (zero-equation models, one equation, two equation, Reynolds Stress Model (RSM), Large Eddy Simulation, wall function approach), turbulence modelling guidelines. Recent CS developments: Current state of the art in turbulence modelling etc. Viscous boundary meshes: Background and objectives, internal and external flow, turbulence modelling considerations.

Module credits 16.00

Programmes [BEngHons Mechanical Engineering](#)

[BScHons Applied Science Applied Science: Mechanics](#)

Prerequisites MSM 780 Numerical thermoflow 780

Contact time 21 contact hours per semester

Language of tuition English

Academic organisation Mechanical and Aeronautical En

Period of presentation Semester 2

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