University of Pretoria Yearbook 2017

Advanced finite element methods 781 (MEE 781)

Qualification	Postgraduate
Faculty	Faculty of Engineering, Built Environment and Information Technology
Module credits	16.00
Programmes	BEngHons Mechanical Engineering
	BScHons Applied Science Mechanics
Prerequisites	No prerequisites.
Contact time	21 contact hours per semester
Language of tuition	Module is presented in English
Academic organisation	Mechanical and Aeronautical En
Period of presentation	Semester 1 or Semester 2

Module content

Non-linear statics: Overview of non-linear effects: geometric, material and boundary conditions. Continuum mechanics: tensors, indicial notation, deformation gradients, stress and strain measures, transformations and rotations, stress-strain relationships, constitutive models. Principles of virtual work. Solution methods: direct iteration, Newton methods, incremental/iterative procedures. Lagrange engineering strains. Large displacement finite element analysis of continua: total Lagrangian formulation. Small strain plasticity: Additive decomposition, flow rule, hardening laws, continuum and consistent tangents.