



University of Pretoria Yearbook 2020

Advanced finite element methods 781 (MEE 781)

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| 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 |
| Department | Mechanical and Aeronautical Engineering |
| 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.

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