University of Pretoria Yearbook 2019

Solid mechanics 321 (MKM 321)

Qualification	Undergraduate
Faculty	Faculty of Engineering, Built Environment and Information Technology
Module credits	16.00
Programmes	BEng Mechanical Engineering
	BEng Mechanical Engineering Engage
Prerequisites	MOW 227
Contact time	3 lectures per week, 1 practical per week
Language of tuition	Module is presented in English
Department	Mechanical and Aeronautical Engineering
Period of presentation	Semester 2

Module content

Solid mechanics, kinematics of deformation, strain tensor, traction vector, stress tensor and stress resultants. Macroscopic and infinitesimal equilibrium equations. Hooke’s law for isotropic media. Strong form of Boundary Value Problem (BVP) of solid mechanics. Weak form of BVP of solid mechanics. Derivation of finite element equations using weighted residuals. Detail development of 1D elements with concepts extended to 2D and 3D. Manipulation of continuum and discrete equations using a high level programming language. Finite element modelling concepts that include Saint Venant’s principle, linear superposition, symmetry, anti-symmetry, verification and validation.