

University of Pretoria Yearbook 2018

Materials science 123 (NMC 123)

Qualification	Undergraduate
Faculty	Faculty of Engineering, Built Environment and Information Technology
Module credits	16.00
Programmes	BEng Civil Engineering ENGAGE BEng Computer Engineering ENGAGE BEng Electrical Engineering ENGAGE BEng Electronic Engineering ENGAGE BEng Industrial Engineering BEng Industrial Engineering ENGAGE BEng Mechanical Engineering BEng Mechanical Engineering ENGAGE BEng Metallurgical Engineering ENGAGE BEng Mining Engineering ENGAGE
Prerequisites	No prerequisites.
Contact time	1 practical per week, 1 tutorial per week, 4 lectures per week
Language of tuition	Separate classes for Afrikaans and English
Department	Materials Science and Metallurgical Engineering
Period of presentation	Semester 2

Module content

Introduction to materials: the family of materials, atomic structure and types of bonding, crystal types and space arrangement of atoms, directions and planes in crystals, defects in crystals, diffusion in solids. Mechanical properties of materials: stress and strain, mechanical testing (strength, ductility, hardness, toughness, fatigue, creep), plastic deformation, solid-solution hardening, recrystallisation.

Polymeric materials: polymerisation and industrial methods, types of polymeric materials and their properties. Corrosion of metals: mechanisms and types of corrosion, corrosion rates, corrosion control. The heat treatment of steel: Fe-C phase diagram, equilibrium cooling, hardening and tempering of steel, stainless steel. Composite materials: Introduction, fibre reinforced polymeric composites, concrete, asphalt, wood.

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