University of Pretoria Yearbook 2017

Materials science 113 (NMC 113)

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

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.