

University of Pretoria Yearbook 2021

Materials science 123 (NMC 123)

Qualification Undergraduate

Faculty Faculty of Engineering, Built Environment and Information Technology

Module credits 16.00

NQF Level 07

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 Admission to relevant programme.

Contact time 1 practical per week, 1 tutorial per week, 4 lectures per week

Language of tuition Module is presented in 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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