

University of Pretoria Yearbook 2021

Materials science 113 (NMC 113)

Qualification Undergraduate

Faculty [Faculty of Engineering, Built Environment and Information Technology](#)

Module credits 16.00

NQF Level 05

Programmes [BEng Civil Engineering](#)

[BEng Computer Engineering](#)

[BEng Electrical Engineering](#)

[BEng Electronic Engineering](#)

[BEng Metallurgical Engineering](#)

[BEng Mining Engineering](#)

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 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.

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