

# University of Pretoria Yearbook 2023

## 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.

### Regulations and rules

The regulations and rules for the degrees published here are subject to change and may be amended after the publication of this information.

The [General Academic Regulations \(G Regulations\)](#) and [General Student Rules](#) apply to all faculties and registered students of the University, as well as all prospective students who have accepted an offer of a place at the University of Pretoria. On registering for a programme, the student bears the responsibility of ensuring that they familiarise themselves with the General Academic Regulations applicable to their registration, as well as the relevant faculty-specific and programme-specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression, or basis for an exception to any of the aforementioned regulations.

### University of Pretoria Programme Qualification Mix (PQM) verification project

The higher education sector has undergone an extensive alignment to the Higher Education Qualification Sub-Framework (HEQF) across all institutions in South Africa. In order to comply with the HEQSF, all institutions are legally required to participate in a national initiative led by regulatory bodies such as the Department of Higher Education and Training (DHET), the Council on Higher Education (CHE), and the South African Qualifications Authority (SAQA). The University of Pretoria is presently engaged in an ongoing effort to align its qualifications and programmes with the HEQSF criteria. Current and prospective students should take note that changes to UP qualification and programme names, may occur as a result of the HEQSF initiative. Students are advised to contact their faculties if they have any questions.