

University of Pretoria Yearbook 2025

Electrical machines 311 (ELX 311)

Qualification Undergraduate

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

Module credits 16.00

NQF Level 07

Programmes [BEng in Electrical Engineering 4-year programme](#)

[BEng in Electrical Engineering 5-year programme](#)

Prerequisites EIR 211/221 and admission into relevant programme.

Contact time 1 tutorial per week, 9 hours practical per semester, 3 lectures per week

Language of tuition Module is presented in English

Department Electrical, Electronic and Computer Engineering

Period of presentation Semester 1

Module content

This module centres on converting a physical, electrical system into an equivalent electrical circuit model. The module starts by developing an equivalent circuit model of basic magnetic circuits through the study of flux, flux density, reluctance, hysteresis and MMF, which is later used to study and analyse electro-mechanical conversion systems. The module then moves to modelling single and three-phase transformers by introducing a fundamental electrical engineering tool, the per-unit system, as well as voltage regulation and efficiency in analysing the equivalent circuit model. Before modelling rotating machines, the fundamental principles thereof, including torque, speed, efficiency and heat loss, are introduced. Two rotating machines models are developed and studied: three-phase induction motors and DC motors. The equivalent models are used to analyse the performance of the machines.

General Academic Regulations and Student Rules

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. The G Regulations are updated annually and may be amended after the publication of this information.

Regulations, degree requirements and information

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

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 (HEQSF) 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.