

# University of Pretoria Yearbook 2022

## Electrical machines 311 (ELX 311)

<b>Qualification</b>	Undergraduate
<b>Faculty</b>	<a href="#">Faculty of Engineering, Built Environment and Information Technology</a>
<b>Module credits</b>	16.00
<b>NQF Level</b>	07
<b>Programmes</b>	<a href="#">BEng (Electrical Engineering)</a> <a href="#">BEng (Electrical Engineering) ENGAGE</a>
<b>Prerequisites</b>	EIR 211/221
<b>Contact time</b>	1 practical per week, 1 tutorial per week, 3 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Electrical, Electronic and Computer Engineering
<b>Period of presentation</b>	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.

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