

# University of Pretoria Yearbook 2025

## Electromagnetism 310 (EMZ 310)

<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 in Electrical Engineering 4-year programme</a> <a href="#">BEng in Electrical Engineering 5-year programme</a> <a href="#">BEng in Electronic Engineering 4-year programme</a> <a href="#">BEng in Electronic Engineering 5-year programme</a>
<b>Prerequisites</b>	WTW 238 GS, WTW 263 GS, EIR 211/221 GS and admission into relevant programme.
<b>Contact time</b>	1 tutorial per week, 9 hours practical per semester, 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 introduces transmission lines (wave propagation, lossless line input impedance, power flow), electrostatics (Maxwell's equations, charge and current distributions, Coulomb's law and Gauss's law, electric potential, electric properties of materials, electric boundary conditions, capacitance, electrostatic potential energy), magnetostatics (Biot-Savart law and Ampère's law, vector magnetic potential, magnetic properties of materials, magnetic boundary conditions, inductance, magnetic energy), time-varying fields (Faraday's law, stationary loop in varying field, moving conductor in static field, moving conductor in varying field, displacement current, electromagnetic boundary conditions, charge-current continuity, electromagnetic potentials), plane-wave propagation (time harmonic fields, wave propagation in lossless media, polarisation, wave propagation in lossy media, power density), and wave reflection and transmission (normal incidence, Snell's law, oblique incidence).

### 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.