

# University of Pretoria Yearbook 2019

## Electrical engineering 221 (EIR 221)

**Qualification** Undergraduate

**Faculty** Faculty of Engineering, Built Environment and Information Technology

**Module credits** 16.00

**Programmes** BEng Chemical Engineering

BEng Chemical Engineering Engage

BEng Mechanical Engineering

BEng Mechanical Engineering Engage

BEng Metallurgical Engineering

BEng Metallurgical Engineering Engage

**Prerequisites** EBN 111 or EBN 122 and WTW 161/164

**Contact time** 1 tutorial per week, 1 practical per week, 3 lectures per week

**Language of tuition** Separate classes for Afrikaans and English

**Department** Electrical, Electronic and Computer Engineering

**Period of presentation** Semester 2

### Module content

Transient response phenomena in RC, RL and RLC circuits: Natural response and step response. Alternating current (AC) circuits: Phasors, impedances, and power in AC circuits. The application of Ohm's law, Kirchoff's circuit theorems, matrix methods, and Thevenin and Norton equivalents to sinusoidal steady-state analysis. Three-phase circuits: Balanced three-phase circuits, star/delta configurations, and three-phase power transfer calculations. Magnetically coupled circuits: Mutual inductance, coupling factor, transformers, ideal transformers and autotransformers. Application of circuit theory to induction motors: basic principles of induction motors, equivalent circuit and analysis thereof, calculation of power and torque through application of Thevenin's theorem. Synoptic introduction to other types of motors.

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