Linear systems 220 (ELI 220)

Qualification	Undergraduate
Faculty	Faculty of Engineering, Built Environment and Information Technology
Module credits	16.00
NQF Level	06
Programmes	BEng (Computer Engineering) *4-year programme*
	BEng (Computer Engineering) *5-year programme*
	BEng (Electrical Engineering) *4-year programme*
	BEng (Electrical Engineering) *5-year programme*
	BEng (Electronic Engineering) *4-year programme*
	BEng (Electronic Engineering) *5-year programme*
Prerequisites	EIR 211/221 GS and admission into relevant programme.
Contact time	1 tutorial per week, 3 lectures per week, 9 hours practical per semester
Language of tuition	Module is presented in English
Department	Electrical, Electronic and Computer Engineering
Period of presentation	Semester 2

Module content

This module presents an introduction to linear systems (classification of signals, elementary signal properties, signal operations and system equations), time-domain models of linear systems (impulse response, LTI responses, convolution of continuous-time signals and related properties), Fourier series (exponential and trigonometric Fourier series, Euler, amplitude and phase spectra, bandwidth, Gibbs phenomenon, Parseval's theorem and Dirichlet condition), the Fourier transform (Fourier transform and its inverse, properties, introduction to modulation systems (amplitude modulation), energy and power spectral density of continuous-time signals), the Laplace transform (relationship with Fourier, properties, transform pairs, integro-differential equations of RC, RL and RLC circuits, block diagrams, poles and zeros, Bode plots, second-order system properties, stability, final and initial value theorems, natural frequency, natural and forced response, step response and sinusional input analysis), filter design (ideal filters and practical filter design (lowpass, highpass, bandpass and bandstop) and Butterworth and other filter designs), and sampling and quantisation (sampling theorem and Nyquist criteria, aliasing, introduction to anti-aliasing filters and digital systems).

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.