

# University of Pretoria Yearbook 2022

## Modulation systems 310 (EMS 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 (Electronic Engineering)</a> <a href="#">BEng (Electronic Engineering) ENGAGE</a>
<b>Prerequisites</b>	ELI 220 GS
<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

Introduction to communication systems. Signals and the signal space, correlation, orthogonal signals, revision of the exponential Fourier series. Analysis and transmission of signals, revision of the Fourier transform, transmission channels and channel distortion, signal power and power spectral density. Analog modulation systems: amplitude modulation (AM), single sideband (SSB), vestigial sideband (VSB), phase modulation (PM), frequency modulation (FM). The phase locked loop (PLL). Sampled Systems (sampling theorem, aliasing). Pulse coded modulation (PCM) and quantisation noise, adaptive differential PCM (AD-PCM), delta modulation, pulse width modulation (PWM). Introduction to digital modulation. Line coding, pulse shaping, Nyquist's criterion, partial response signalling, digital receivers (equalisation and synchronisation), eye diagrams, digital modulation techniques: binary and M-ary amplitude shift keying (ASK), phase shift keying (PSK), frequency shift keying (M-FSK). The focus will be on analog and digital modulation techniques as applied to radio communication systems.

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

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.