

# University of Pretoria Yearbook 2021

## 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.

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