



University of Pretoria Yearbook 2019

Stochastic communications systems 320 (ESC 320)

Qualification Undergraduate

Faculty [Faculty of Engineering, Built Environment and Information Technology](#)

Module credits 16.00

Programmes [BEng Electronic Engineering](#)
[BEng Electronic Engineering Engage](#)

Prerequisites WTW 258, WTW 256, WTW 238 and EMS 310 GS

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

Language of tuition Module is presented in English

Department Electrical, Electronic and Computer Engineering

Period of presentation Semester 2

Module content

Review of signal theory. Introduction to stochastic processes: stationarity and ergodicity. Noise models. Channel models and transmission effects. Comparison of analogue and digital modulation systems in noise. Signal space concepts and geometric representation of signals. Statistical communication theory: channel capacity theorem. Design and realisation of binary and multi-level digital modulation systems. Spectral efficiency. Optimal receiver design: matched filter (MF) and correlation-type receiver structures. Nyquist and partial-response (PR) systems. Digital transmission through bandlimited AWGN channels: inter-symbol-interference (ISI). Introduction to linear estimation: equaliser algorithms and design. Introduction to channel (error correction) coding: Symbol-by-symbol versus maximum likelihood sequence estimation (MLSE) techniques. Block and convolutional codes. The focus will be on applications in the cellular and mobile communication fields where stochastic processes such as noise and channel effects are of prime importance.

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