

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, 1 practical per week, 3 lectures 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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