Course Brief and Outline

ELEN 3024 - Communication Fundamentals

School of Electrical and Information Engineering, University of the Witwatersrand

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1.Course Coordinator

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Prescribed Text

- John G. Proakis and Masoud Salehi, *Communication Systems Engineering*, 2nd Edition, Prentice Hall, 2002. ISBN: 0-13-061793-8

Data Communications II - Overview

- Communication modes: simplex, half-duplex, full-duplex;
- The A/D and D/A process: PCM, Nyquist criteria, quantization noise;
- Impacts of noise on the communication channel: Shannon-Hartley theorem, types of noise, crosstalk;
- Analog modulation: AM and Angle modulation (FM and PM), modulation and demodulation, bandwidth, noise performance;
- Digital modulation: PSK, QPSK, M-FSK, M-QAM, OFDM, modulation and demodulation, bandwidth, noise performance (BER, SNR), information rate (bits/symbol), constellations, eye patterns;
- Multi-user techniques: TDM, FDM, Frequency hopping, CDMA;
- Basic antenna theory: point source, different antennas, link budget;
- Propagation;
- Equalization.

Assesment

Laboratories: 20%

Test: 20%

Exam: 60%

Arrangements

Lectures Lectures will take place in lecture periods 1 and 2 every Tuesday and period 3 every Wednesday.

Tutorials There is one 1-hour tutorial per week, in the fourth lecture period every Wednesday. More information on tutorial sessions will be provided in class.

Project The School's policy on timely submission of projects and assignments will be enforced and must be read by the student.

Laboratories Laboratory sessions will take place on Monday and Tuesday afternoons. More information on laboratory activities will be provided in class.

Consultation A modified open door policy will be followed, eg. you should bring with a written paper with your attempt of the problem which is to be consulted on.

Labs

Groups of three

Most of the labs will be based on SDRs

Students need to become familiar with Linux (Ubuntu) and gnuradio companion (Python and C++ ??)

Further detail to be provided

Course Home Page

All students are expected to consult the course home page at regular intervals

Reference material

- S Haykin, *Communication Systems*, 5th Edition, Wiley, 2009. ISBN: 0471697907
- B. P. Lathi, *Modern Digital and Analog Communication Systems*, 3rd Edition, Oxford University Press, 1998. ISBN: 0-19-511009-9
- John G. Proakis and Masoud Salehi, *Contemporary Communication Systems using MATLAB*, Brooks / Cole Thomson Learning, 2000. ISBN: 0-534-37173-6
- Ferrel G. Stremler, *Introduction to Communication Systems*, Addison-Wesley, ISBN: 0-201-07259-9
- Gordon E. Carlson, *Signal and Linear System Analyses*, 2nd Edition, John Wiley & Sons, 1998, ISBN 0-471-12465-6.