

Faculty of Applied Sciences



ELEC2360 Telecommunications 1 : Channels and signals

[30h+30h exercises] 5 credits

This course is taught in the 2nd semester

Teacher(s): Danielle Janvier, Luc Vandendorpe
Language: French
Level: Second cycle

Aims

At the end of this lecture, the students will be able to :

- provide the main characteristics (time, frequency, sensitivity) of signals likely to be transmitted over a communication system;
- describe the origin and the parameters of noise sources;
- compute the main parameters of transmission lines (lossy or lossless);
- define and use the concepts of reflection coefficient and standing wave ratio (VSWR) as well as the Smith chart;
- make use of bandpass signals; deterministic or random, with the help of their baseband representation;
- explain and describe with equations the different types of amplitude modulation, the associated demodulation operations and the effect on the spectra;
- explain and show by means of equations the effect of noise on amplitude;
- use mixing with a sinusoidal carrier to move spectra;
- explain and show by means of equations the effect of noise on frequency modulation;
- understand the superheterodyne receiver

Main themes

Identical to the contents of the course

Content and teaching methods

- Signals : speech, audio, image, video, data
- Analysis of the electromagnetic fields in transmission lines, fundamental parameters of lossless and lossy transmission lines
- Fundamental equations of transmission lines in harmonic regime : voltage, current, line impedance, reflection coefficient and voltage standing wave ratio
- Construction and use of the Smith Chart, matching methods
- Line matching and conjugate matching, power transfer
- Calculation of transients on transmission lines
- Noises : thermal noise, impulse noise
- Signals and systems : analytic signal, complex envelope, random signals
- Decibels
- Analog modulations : DSB (SC), SSB, VSB, demodulation, noise effect, frequency change
- Angle modulations : FM (narrow and wide band), demodulation, noise effect, capture, threshold effect
- Superheterodyne receiver

Other information (prerequisite, evaluation (assessment methods), course materials recommended readings, ...)

There will be lectures interleaved with practical training (in teaching room or computation center with MATLAB and Mefisto 2D)

Prerequisites :

INMA2731

Assessment :

Written examination about exercices, with notes

Other credits in programs

ELEC21	Première année du programme conduisant au grade d'ingénieur (5 credits) civil électricien	Mandatory
ELEC22	Deuxième année du programme conduisant au grade (5 credits) d'ingénieur civil électricien	
FSA3DS/TL	Diplôme d'études spécialisées en sciences appliquées (5 credits) (télécommunications)	
MAP21	Première année du programme conduisant au grade d'ingénieur (5 credits) civil en mathématiques appliquées	