

## NUMERICAL TRANSMISSION SYSTEMS

ECTS credits : 5

Period : year 2, semester 1

### Objectives:

The first part is an introduction to , transmission of information in a digital communication system It presents the digital modulation techniques. The second part presents advanced topics in signal processing for baseband digital communication. Introduction to recent advances in modulation and coding.

### Contents:

First part :

1. Introduction to digital transmissions
2. Digital modulations on carrier frequency (representation of bandpass signals, spectral power density, Quadrature Amplitude Modulation, Phase Modulation, performance with ideal channel, ...)

Second part :

1. Overview of the physical layer.
2. Channel modelling (additive white Gaussian noise, intersymbol interference, flat fading channels, multipath channels)
3. Synchronization techniques for non selective channel (carrier and timing)
4. Single carrier transmission (optimum receiver structure, equalization)
5. Advanced modulation schemes (OFDM, CDMA) and related receivers.
6. Trends: array processing (beamforming, MIMO, space-time coding), turbo receivers.

### Prerequisites:

Probability and statistics, error-correcting codes, random and deterministic signal processing, transmission systems.