Summary
This course is on the foundations of digital communication. The focus is on the transmission problem (rather than being on source coding).

Content
Optimal receiver for vector channels
Optimal receiver for waveform (AWGN) channels
Various signaling schemes and their performance
Efficient signaling via finite-state machines
Efficient decoding via Viterbi algorithm
Communicating over bandlimited AWGN channels
Nyquist Criterion
Communicating over passband AWGN channels

Keywords
Detection, estimation, hypothesis testing, Nyquist, bandwidth, error probability, coding, decoding, baseband, passband, AM, QAM, PSK.

Learning Prerequisites

Required courses
Signal processing for communications and modèles stochastiques pour les communications

Important concepts to start the course
Linear algebra, probability.

Learning Outcomes
By the end of the course, the student must be able to:
• Estimate the error probability of a communication link
• Design a "physical layer" communication link
• Implement a prototype of a "physical layer" transmitter/receiver via Matlab

Teaching methods
Ex cathedra + exercises + project. Lots of reading at home and exercises in class.

Assessment methods
With continuous control

**Prerequisite for**
Advanced Digital Communications
Software-Defined Radio: A Hands-On Course