

MASTÈRE SATELLITE COMMUNICATION SYSTEMS

IN BRIEF

Type of diploma : Mastère spécialisé

Ministry field : Sciences, Ingénierie et Technologies

MORE INFO

Level : BAC +6

Type of education

* Formation initiale

Kind of education : Diplôme

Organization

Mastère SATCom Systems

Organizational unit

École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications

Mastère SATCom Systems

MORE INFO

Organization

- Semestre 10 - Mastère Satellite Communication Systems

- Teaching Unit Master Thesis

Person(s) in charge
BOUCHERET MARIE LAURE

- Semestre 9 - Mastère Satellite Communication Systems

- Teaching Unit BASIC TECHNIQUES 1

Person(s) in charge
THOMAS NATHALIE

- Subject Signal Processing for communications

Pre-requisites

Bases on deterministic signals (energy, power, periodicity)

Random variables and vectors

Objectives

Two parts in this course: 1) Introduce theoretical tools for signal processing, 2) Digital signal processing (implementation).

Objectives for the first part (theoretical tools) :

- Understand the different classes of deterministic and random signals with the definitions of the autocorrelation function and the power spectrum density
- Understand the concept of linear filtering and the Wiener Lee relationships
- Understand the principles of sampling and the Shannon theorem
- Understand the interest of non-linear transformations applied to deterministic and random signals and how to apply Price's theorem

Objectives for the second part (digital signal processing) :

- To be able to correctly sample a signal and to generate simple digital signals.
- To be able to estimate digitally the autocorrelation function and to perform a frequency representation (Fourier transform, Power Spectral Density) of a signal.

- To be able to determine impulse responses for simple filters (Finite Impulse Response, or FIR, filters) and to synthesize them, meaning to choose their parameters to meet some requirements.

- To be able to filter a signal and to analyze the obtained result.

Description

For the first part (theoretical tools) :

- Autocorrelation and power spectral density
- Sampling
- Linear Filtering
- Non-linear transformations and Price's theorem

For the second part (digital signal processing) :

- Sampling and quantization.
- From theoretical to digital tools for the autocorrelation function and the Fourier transform : what are the approximations to be done ? what are their consequences ?

- Digital filters (FIR and IIR) and FIR synthesis.

Number of hours

4 lectures, 4 sessions of practical work

Person(s) in charge

THOMAS Nathalie
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Phone 2236

THOMAS NATHALIE

Teaching method

En présence

Teaching language

English

Bibliography

- Athanasios Papoulis and S. Unnikrishna Pillai, Probability, Random Variable and Stochastic Processes, McGraw Hill Higher Education, 4th edition, 2002.

- Simon Haykin and Barry Van Veen, Signal and Systems, Wiley Alan V. Oppenheim and Ronald W. Schafer, Digital Signal Processing, Prentice-Hall.

- Subject Digital Communications

Objectives

- To be able to explain the role of the different elements in a communication channel allowing to transmit a digital information.
- To be able to analyze a basic digital transmission channel (modulation/demodulation on a Additive white Gaussian noise channel) in terms of spectral and power efficiencies.
- To be able to implement basic digital transmission channels, to compare and optimize them in terms of spectral and power efficiencies.

Description

The following issues shall be addressed by this teaching unit:

- 1- Role of the different elements in a communication channel allowing to transmit a digital information.
- 2- Generation of a signal allowing to transmit a binary information (digital modulation) :
 - for a baseband transmission,
 - for a transmission on a carrier frequency (ASK, PSK, QAM modulations),
 - notion of spectral efficiency.
- 3- Basic modulation for the transmission channel.
- 4- Definition of an optimized digital demodulator :
 - power efficiency,
 - interference between symbols and Nyquist criterion,
 - matched filtering.
- 5- Bit error rate computation.
- 6- Notion of complex envelope and equivalent lowpass channel for transmissions on carrier frequencies.
- 7- Example of a basic digital transmission channel : DVB-S physical layer.

Number of hours

9 lectures, 6 project sessions

Person(s) in charge

THOMAS Nathalie
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Phone 2236

THOMAS NATHALIE

Teaching method

En présence

Teaching language

English

Bibliography

J. G. Proakis, Digital Communications, Mc Graw Hill Book Cie

- Subject Networks and Telecommunication protocols

Person(s) in charge

FASSON JULIEN

- Subject RF links

Person(s) in charge

PRIGENT GAETAN

- Teaching Unit BASIC TECHNIQUES 2

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Coding applied to satellite chantel

Person(s) in charge
POULLIAT CHARLY

- Subject Spread spectrum techniques

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Digital filter banks

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Digital Communication receivers and SDR technology

Person(s) in charge
BOUCHERET MARIE LAURE

- Teaching Unit Space Techniques et applications 1

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Introduction to satellite communication market and systems

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Communication Satellites

Person(s) in charge
BOUSQUET MICHEL

- Subject Satellite Payloads, earth stations and terminals

Person(s) in charge
PRIGENT GAETAN

- Subject Satellite system design project

Person(s) in charge

BOUSQUET MICHEL

- Teaching Unit Space technique & applications 2

- Subject Optical Satellite communications

Person(s) in charge
POULLIAT CHARLY

- Subject Satellite based computer networks

Person(s) in charge
FASSON JULIEN

- Subject Mobile et Multimedia satellite communications

- Subject Applications of Satcom

Person(s) in charge
BOUSQUET MICHEL

- Subject Projet Management

Person(s) in charge
BOUCHERET MARIE LAURE

- Teaching Unit Tutored project

Person(s) in charge
BOUCHERET MARIE LAURE

- Subject Tutored project

Person(s) in charge
BOUCHERET MARIE LAURE

Organizational unit

École Nationale Supérieure d'Électrotechnique d'Électronique d'Informatique d'Hydraulique et des Télécommunications