



# Systemes Électroniques Embarqués

## Semester 6 -

MODULE	UV	TITLE	PARTICIPANTS	ECTS	
	<b>SEE6-D</b>	<b>Mathematical tools</b>	Y. BERTHOUMIEU (resp)	<b>6.00</b>	
MA106		Mathematics for engineers	P. TESSON (resp)	2.00	page 0
TS110		Signal processing	Y. BERTHOUMIEU (resp) A. SCHUTZ I. TURCU	2.00	page 0
TS111		Digital communications	G. FERRE (resp)	2.00	page 0

# MA106 : Mathematics for engineers

## Shared by UV(s) :

SEE6-D Mathematical tools

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## ECTS credits :

2.00

## Evaluation :

S1: CC x1

## Number of hours :

Combined lecture and tutorial classes : 20.00

## Teacher(s) :

TESSON Patrice

## Title :

Mathematics for engineers

## Abstract :

Mathématiques de l'ingénieur pour la filière SEE. Il s'agit d'introduire des concepts nouveaux et en complément des connaissances introduites dans l'UV SEE5-A de mise à niveau.

## Plan :

1. Introduction à la théorie des distributions.
2. Modélisation des signaux impulsionnels. Dirac. Peigne de Dirac.
3. Transformation de Fourier et de Laplace des distributions.
4. Signaux à temps discret.
5. Notions sur les fonctions complexes de la variable complexe. Analyticité. Série de Laurent. Transformation en  $Z$ .

## Prerequisite :

UV SEE5-A de mise à niveau

# TS110 : Signal processing

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**ECTS credits :**

2.00

**Evaluation :**

S1: ET(1h,E,sd,ca) x0.5 + Proj x0.5; S2: ET(1h,E,sd,ca) x0.5

**Number of hours :**

Combined lecture and tutorial classes : 36.00

**Teacher(s) :**

BERTHOUMIEU Yannick  
SCHUTZ Aurelien  
TURCU Iona

**Title :**

Signal processing

**Abstract :**

In this module, after recalling the foundations of the theory of the continuous signal, the main treatments applied to digital discrete-time signals are presented.

In particular, we discuss about the Fourier transform, sampling theorem, Z transform and linear filtering.

**Plan :**

Course Content:

1 - Introduction

2 - Discrete signals (sampling, Shannon sampling theorem, aliasing effect, etc.).

3 - Discrete-time systems (impulse response, stability, etc.).

4 - Concept of filtering (z-transform , difference equation, frequency diagram of amplitude and phase, etc.)

5 - Discrete Fourier transform signals.

"Project":

a project in Matlab (different every year) Detection of code carrier signal, enhancement of speech etc..

**Document(s) :**

Documents distribués en cours

**Keyword(s) :**

Shannon's sampling theory, linear filtering, Impulsional function, TFD, Fast TF, windowing

**Online course :**

N/A

# TS111 : Digital communications

## Shared by UV(s) :

SEE6-D Mathematical tools

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## ECTS credits :

2.00

## Evaluation :

S1: ET(1h30,E,sd,ca) x0.7 + Proj(Rap) x0.3; S2: ET(30m,O,sd,sc) x1

## Number of hours :

Combined lecture and tutorial classes : 32.00

## Teacher(s) :

FERRE Guillaume

## Title :

Digital communications

## Abstract :

Ce cours permet d'introduire les communications numériques, au travers de cours, d'applications pratiques et d'un projet.

## Plan :

1. Introduction
2. Introduction to random signals
3. Principle of a base band digital communications
4. Power spectral density of a digital communications signal
5. Optimal receiver, theoretical performance on AWGN channel
6. Digital modulators/demodulators

## Prerequisite :

Signal processing and probability

## Document(s) :

Polycopié de cours, de TD et de TP

## Keyword(s) :

Modulations, AWGN Channels, Band Limited Channels, Matched Filter, Nyquist Criterion, power spectral density