SEMESTER 4_2nd YEAR MIC

Practical info

Location(s)

Toulouse

Calculus and signal theory

ECTS
5 crédits

Hourly volume
64h

Introducing

Objectives

Objectives :

At the end of this module, the student will have understood and be able to explain (main concepts):

Analysis :
The fundamentals of differential calculus and the calculation of integrals with (multiple) parameters

Signal :
The main concepts, mathematical methods and tools used for signal processing

The student will be able to :
Analysis :
- define and calculate a differential
- define a condition of extremum
- calculate a change of variables (multiple)
- calculate an integral with parameters (multiple)

Signal :
- decompose periodic signals into Fourier series
- determine the spectrum of deterministic signals
- calculate the transfer function of a continuous, invariant linear filter and calculate the output signal of that filter for a given input

Necessary prerequisites

Necessary knowledge :
Lectures of mathematics of first year (I1ANIF11, I1ANMT11, I1ANMT21).
Lectures of mathematics of first semester (I2MIMT11)

Practical info

Location(s)

Toulouse

INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Electromagnetic waves : optics and propagation in materials

ECTS
4 crédits

Hourly volume
50h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain the concepts of temporal and spatial coherences of two light sources, the interference and diffraction phenomena, the propagation of electromagnetic waves in simple material (linear, homogeneous and isotropic, dielectric, magnetic or conductive), the reflection and the refraction at one interface, the principle of rectangular metallic wave guides and of the electromagnetic energy transport.

The student will be able to calculate the interference patterns in the case of two Young slits and of diffraction grating, and the diffraction pattern in the case of rectangular aperture. He will also be able to use the Maxwell equation to determine the nature of the electromagnetic waves in a simple system (L.H.I. material, interface between two materials, confined space between two planes of conductive material).

Necessary prerequisites

Necessary knowledge :

Electromagnetism course (static and quasi-static)
Mathematical tools: complex number, vector field, differential calculus.

Practical info

Location(s)

Toulouse

Python and Algorithm and programming II

ECTS
4 crédits

Hourly volume
54h

Introducing

Objectives

This course has a two objectives :

a/ to understand the concepts of exception, protection by encapsulation, packaging and genericity, in order to design robust and reusable programs;
b/ to know how to realize abstract data types (stacks, queues, lists, trees, heaps) with dynamic data structures (using pointers) and to design the associated algorithms (search/ insert/ delete/ update, filtering)
At the end of this course, the student should be able to design dynamic data structures and implement them through new Ada packages or by instanciation of generic packages. This course prepares students for O.O. (object-oriented) design and programming.

This course also provides an introduction to the Python language.

Necessary prerequisites

Basic level in algorithmics and imperative programming in Ada : control structures in sequential algorithms (if-then-else, loops for/while/repeat-until) top-down design, subprograms and parameter passing.

Practical info

Location(s)

Toulouse

Control systems

ECTS
3 crédits

Hourly volume
39h

Introducing

Objectives

Objectives :
At the end of this module, the student will have understood and be able to explain (main concepts):
(1) the modelling, the responses and the control of linear invariant systems;
(2) the synthesis and the analysis of sequential logic systems.

The student will be able to:
- transform a linear differential equation into a transfer function (and vice-versa),
plot the time and frequency responses of linear systems (dominant poles), recognize a first- or second-order system, determine the asymptotic stability (Routh criterion or root locus), state and use the Nyquist stability criterion, find the gain and phase margins, compute the settling time and the steady-state error, design a
PID controller (Ziegler & Nichols method), compute a P controller for a given phase margin, state the principle of phase-lead and phase-lag controllers
- Analyze and synthesize complex sequential logic systems, analyze logic sequential systems, use Petri nets for specifying parallelism, synchronization, and shared resources, analyze the Petri nets properties (reachability, liveness, boundedness) with the marking graph, analyze the Harel statechart properties.

Necessary prerequisites

Necessary knowledge:

I2MIIM11 Logic Design and Computer Organisation

Practical info

Location(s)

Toulouse

Probability and statistics

ECTS
3 crédits

Hourly volume
39h

Introducing

Objectives

Objectives:
At the end of this module, the student will have understood and be able to explain (main concepts):
- what a probability space is
- the notion of conditional probability and independence between events
- what a random variable (discrete or continuous) and its characteristics are
- how to apply limit theorems such as the Law of Large Numbers (LLN) or the Central Limit Theorem (CLT)
- the notion of statistical estimation

The student will be able to:
- to compute probabilities by Bayes formula
- to determine the law of a given random variable, to compute its expectation, variance, characteristic function, etc ¿
- to prove independence between random variables (when they are independent)
- to approximate distributions by using underlying limit theorems
- to estimate by confidence intervals some unknown parameters (expectation, variance, proportion) associated to a large population

Necessary prerequisites

Necessary knowledge:
Lectures of mathematics of first year (I1ANMAAR, I1ANMATC, I1ANMAEF).
Lectures of mathematics of second year (I2MIMT11, I2MIMT21)

Practical info

Location(s)

Toulouse

Communicating in Foreign Languages

ECTS
5 crédits

Hourly volume
57h

Introducing

Objectives

LV2 Module (Spanish/ German / Chinese / Portugese / French Sign Language):
The objectives defined with reference to the CERL for the 5 language skills are specific to the language studied and the student¿s level.

The student will be able to :
-strengthen their listening, reading and note-taking skills
-analyse and synthesise information
-organise and efficiently communicate information
-speak in front of a group
-attend or lead a job interview
-interact with another person in the foreign language

Remedial English
A module can be proposed to students in certain very specific cases, as a substitute to LV2.

Necessary prerequisites

Necessary knowledge:

First-year LV1, Expression and LV2 skills (D1ANHU01)
Second-year LV1 and Expression skills (I2CCGE31)

Practical info

Location(s)

Toulouse

INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

Improving one’s autonomy and building one’s own professional project level 2B

ECTS
6 crédits

Hourly volume
292h

Introducing

Objectives

To be able :
- deepen self-knowledge (analyze my strengths and weaknesses),
- self-assessment,
- take into account the skills (strengths and weaknesses) of its partners,
- to adjust and regulate their behavior according to others.

Necessary prerequisites

1st year learning outcomes.

Practical info

Location(s)

Toulouse