

3rd YEAR MATERIALS DEVICES AND SYSTEMS ENGINEERING

Practical info

Location(s)





C language, Numerical analysis and Computer networks





Hourly volume 71h

Practical info

Location(s)





Experimental physics and stochastic modelling

Introducing

ECTS

5 crédits

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Objectives

At the end of this module, the student will have understood and be able to explain (main concepts): - Operation of the different sensors used during the lab sessions. They will know how to use them in order to solve a problem and view the results critically. - Stochastic modelling of measurements, confidence intervals, statistical hypothesis tests, linear models.

The student will be able to build a data acquisition system starting from different sensors, to analyse the result and quantify the various components in measurement errors, to build a statistical model from observations in order to confirm or invalidate hypotheses concerning the problem at hand, and to plan experiments in simple cases.

Necessary prerequisites

I2AIMT21 Probability in IMACS

Practical info

Location(s)





Electronic and Control





Practical info

Location(s)





Electromagnetism in materials, wave guides – Classical mechanics





Introducing

Q Toulouse

Objectives

Electromagnetisms in matter : use Maxwell's equations 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). They will be able to determine the conditions and the characteristics of electromagnetic wave propagation in metallic and optical-fibre waveguides

Mechanics : solve a problem of planar mechanics. -The student should be able to handle the notions of force, power and energy.

Necessary prerequisites

Electromagnetism (I2MAPH21)

Practical info

Location(s)





Engineering and ecological issues





Practical info

Location(s)





Improving one's autonomy and building one's own professional project – level 3





Practical info

Location(s)





Job search and language

Introducing

ECTS 5 crédits

Objectives

Job search modules in French and in English

By the end of these modules, the student is expected to understand how to successfully obtain an internship or job and will grasp the differences in the job-search process between France and English-speaking countries.

The student will be able to:

 $\dot{\boldsymbol{\varepsilon}}$ make a personal statement, and start developing a career plan

i use current research tools (web, online networks, company websites) to conduct a documentary survey on recruitment

¿ seek work placements matching his/her objectives and profile

¿ find and analyze an English advert in his/her future field

¿ adapt his/her CV and cover letter to a specific job application

¿ write a CV in English following various countryrelevant templates

 $\dot{\boldsymbol{\epsilon}}$ ensure his/her job application meets the company's requirements

¿ prepare for an interview (self-knowledge, company awareness, preparation of adequate questions)

¿ show adequate degree of proficiency in job search related technical English to be able to take a professional job interview

Second language course (optional ¿ commitment for

years 3 and 4)

Hourly volume

37h

The objectives are defined according to European specifications for the five language skills and specific to the various languages proposed - German, Spanish, and Chinese i and to students' levels.

Whenever his/her level is sufficient, the student will be able to:

¿ Synthesize and present professional documents

¿ give an oral presentation in front of a group

¿ take into account the various dimensions of interculturality

- ¿ Analyze a job ad
- ¿ simulate a job interview

¿ write a CV and a cover letter in the studies language

Remedial English (upon teachers¿ decision)

In some specific cases, a remedial English course is offered in replacement of the second language course with the objective of reinforcing the language skills useful for the TOEIC, i.e. reading and listening, grammar and vocabulary.

Necessary prerequisites

 $\grave{}$ TRE (in French): min. C1 level in French $\grave{}$ Course not open to exchange students

¿ Job Search (in English): min. B1 level in English ¿ Course open to exchange students

¿ LV2: min. A2 in the language studied ¿ Course not open to exchange students





Practical info

Location(s)

• Toulouse





[FRANCAIS] Remise à niveau 3A IMACS





Practical info

Location(s)





Political sciences semester 1





Hourly volume

Practical info

Location(s)





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Hourly volume

Practical info

Location(s)





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Hourly volume

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Hourly volume

Practical info

Location(s)





Computer Hardware





Practical info

Location(s)





Databases, C and Network programming

Hourly volume

58h

Introducing

ECTS 4 crédits

Program a simple distributed internet application using the socket interface (TCP/UDP socket API),
Be familiar with the major internet applications (http, ftp, smtp, etc.).

Objectives

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

Database:

- The different data models, their advantages and limits

- What is DBMS (Database management system)
- UML based data model
- The different concepts of the relational model
- The normalization and its importance
- Data integrity constraints
- Relational algebra and SQL languages

The student will be able to :

- Design an UML based database model

- Derive the relational model from UML model and vice versa
- Normalize and validate a relational model
- Implement the designed database while ensuring integrity constraints

- Write requests based on relational algebra and implement them in SQL for database interrogation and manipulation

C and network programming

- Manipulate the following notions using the C language: pointers, strings and parameter passing,

Necessary prerequisites

C and network programming : First and second year courses on Algorithms and Programming (I1ANIF12, I1ANIF20, I2AIIF20). Third year course on C language. Third year course on computer networks.

Practical info

Location(s)





Modelisation and automatic control

Introducing

ECTS

5 crédits

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71h

Hourly volume

Practical info

Objectives

At the end of this module, the student should have understood and be able to explain (main concepts): -The basic principles of discrete event system modeling tools (Finite State Machines, Statecharts, Petri nets), -Different techniques for controlling a discrete event system (FPGA, PLC, real-time target).

- The main methods for synthesizing state-space control laws for time-invariant linear systems

- The basic principles of observer synthesis for timeinvariant linear systems

The student should be able to:

Model and implement the control of a discrete event system,

Define the major characteristics of the control law from the specifications,

Design the control law in the state space (pole placement).

Necessary prerequisites

- Lectures "Informatique matérielle" (I2MAIF11)
- Automatic control: frequential approaches
- State space representation

Location(s)





Electronics and Signal





Introducing



Objectives

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

* This course is devoted to analog electronic design and implementation from the basic transistor to operational amplifier

Signal Processing section:

* For a good understanding of signals and systems, principles of signal theory and methods of signal processing, with emphasize on spectral analysis and digital filter design.

The student will be able to:

Electronics section:

* design an electronic circuit, given the design specification

* perform simulations of analog circuits

- * choose appropriate components
- * build and test a prototype with a bread-board
- * do the layout and assemble a printed circuit board

Practical info

Location(s)





Thermodynamics and Diffusion

Introducing

ECTS

5 crédits

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Objectives

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

- The laws of thermodynamics, the notions of work, heat, energy associated with a transformation,

- The application to thermal machines, thermodynamic cycles, and the calculation of efficiency.

- This course is intended to provide students with an understanding of the laws of thermodynamics and the concepts of work, heat and energy associated with a transformation,

- simple phase diagrams and binary materials.

- This course is intended to provide students with the opportunity to learn more about the following topics: - The concepts of diffusion and heat/matter transport.

The student will have to integrate notions, contextualise them and then be able to decontextualise them to be able to project them into an adidactic situation.

Necessary prerequisites

Basics of mathematical analysis: functions of several variables, derivatives, integrations, differential equations.

General notions of thermodynamics of physicalchemical systems

Practical info

Location(s)

Q Toulouse

Hourly volume

54h





Material Physics





Introducing

Objectives

At the end of this module the student should be able to: - structurally characterize and orient a crystal: employ of basic X-ray and electron diffraction techniques, then analysis of the results.

- describe dislocations and their interactions from a geometric and energetic point of view, and relate them to the mechanical properties of the crystalline material: fragility and ductility

- calculate and predict electrical, thermal and mechanical effects resulting from electrical, thermal and mechanical solicitations applied to the crystal in particular directions.

- master the piezoelectric effect for applications of sensors and micro-actuators, and acousto-optical and electro-optical effects for applications of filtering, modulation or optical addressing and optoelectronic components.

Practical info

Location(s)

Toulouse





Applied material physics



Hourly volume 64h

Introducing



Toulouse

Objectives

This UF constitutes an experimental approach to the physics of materials. The educational objectives are: - acquire scientific knowledge relating to the techniques used in material science

- acquire practical skills on these techniques,

- acquire an experimental work method in physics (how to choose the experimental parameters, carry out the experiment, analyze the results)

The student should be able to:

- reproduce and apply techniques for the development and characterization of materials among the techniques mentioned in the program.

Necessary prerequisites

- UF Physics of materials must be completed before the practicals.

- Thermodynamic prerequisite : The following notions must be seen before the practicals: enthalpy, heat capacity and phase diagram.

Practical info





Quantum and statistical physics





Practical info

Location(s)





Improving one's autonomy and building one's own professional project





Practical info

Location(s)





Companies in their environments and languages

63h

Hourly volume

Introducing

ECTS 5 crédits

Objectives

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

- An overall view of financial documents used by the company. Introduction to the calculation of costs in the industrial firm

- the interdependence of the functions of the company through decision making and results analysis

- Students will also be prepared for their careers by reviewing

and further developing both oral and written transversal communication skills.

The student will be able to:

- understand companies, their structure and their environment

- use newly-acquired Business English vocabulary

- develop financial statements used and calculate business costs for a company

- organise a group project : create their own company, hold meetings?

- give an oral presentation of a documentary synthesis and a business report (in English), using presentation skills

- create basic management tools

- optimise resources to make the company profitable

- take ethical concerns into account
- take into account cultural differences in business

- appreciate the impact of the major parameters of the socio-economic and financial environment on a

company

- write professional letters and emails

Second language course (optional ¿ commitment for years 3 and 4)

The objectives are defined according to European specifications for the five language skills and specific to the various languages proposed - German, Spanish, and Chinese, Italian or Sign language ¿ and to students' levels.

Whenever his/her level is sufficient, the student will be able to:

¿ synthesise and present professional documents

¿ give an oral presentation in front of a group

¿ take into account the various dimensions of interculturality

- ¿ analyse a job ad
- ¿ simulate a job interview
- ¿ write a CV and a cover letter

Remedial English (upon teachers¿ decision)

In some specific cases, a remedial English course is offered in replacement of the second language course with the objective of reinforcing the language skills useful for the TOEIC, i.e reading, listening, grammar and vocabulary

Necessary prerequisites

Management notions : non Level : B2 in English (intermediate)

LV2 : A2 min. in the studied language German,





Spanish, Italian. A1 in Chinese ans Sign language ¿ Course not open to exchange students

Practical info

Location(s)





Engineering and ecological issues 2nd semester





Practical info

Location(s)





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Hourly volume

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