INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

3rd YEAR MIC_SEMESTER 6 INSA

Practical info

Location(s)

Toulouse

System and Network Programming

ECTS
5 crédits

Hourly volume
59h

Practical info

Location(s)

Toulouse

Object oriented Programming and Graphs

ECTS
4 crédits

Hourly volume
54h

Introducing

Objectives

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

- the principles and fundamental notions of objects oriented design and programing,
- the principles of UML class diagram and object oriented programming in Java
- the different kinds of graphs, several classical problems on graphs and solving methods, comparison between several graph representations and algorithms
- Apply the Graph theory for modelling various problems
- Conception and Implementation of efficient algorithms based on graph data structure to solve a given problem.

The student will be able to:

- design class diagrams of an application
- design and program in JAVA a simple application,
- to develop a classical graph algorithm aimed at solving a well-known problem whose specificity is to manipulate great amount of data,
- to develop and compare different implementation of a well-known algorithm with the aim to apprehend the notion of algorithm complexity,
- to propose and adapt classical algorithms aimed at solving a new problem,
- to perform relevant measurements tests aimed at evaluating performances of different algorithms.

Necessary prerequisites

Necessary knowledge:

- C Language (3e year MIC)
- Introduction to complexity (3e year MIC)
- Algorithms and Data structures (2e year MIC, 1st year)

Practical info

Location(s)

Toulouse

Signal processing and telecommunications

ECTS
5 crédits

Hourly volume
68h

Practical info

Location(s)

Toulouse

Concepts and Hardware for Data Transmission

ECTS
6 crédits

Hourly volume
81h

Introducing

Objectives

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

-The differences between ARM and x86 architectures, and how they are taken into account by the compiler (in particular for function calls, memory management and security);
-The design and optimization of an embedded operating system and its software layer;
-The computer toolchain: compiler, assembler, linker and debugger;
-The advantages and constraints of parallel architectures (Multi-core, GPU);
-The recent security threats in computer science, especially low level attacks at the interface of software and hardware.

The student will be able to:
-analyze desassembly code
-develop assembly functions and their integration to C code
-design and optimize an embedded system project
-manipulate hardware attacks simulators

Location(s)

Toulouse

Practical info

Modelling

ECTS
7 crédits

Hourly volume
64h

Introducing

Objectives

At the end of this module, the student should have understood and be able to explain the following notions for each subject :

¿ Mechanics : understanding the behaviour of a moving solid subjected to external actions.

¿ Introduction to numerical modelling : fundamentals of the finite difference method (order of a scheme, stability, discrete maximum principle, convergence); formal definition of the Brownian motion and principles of the Monte-Carlo method for parabolic PDEs; the use of PDE for modelling problems with continuous variables.

¿ Modelling project : how to model mathematically and numerically a given industrial ¿ engineering - scientific problem.

The student should have the following skills :

¿ Mechanics : to parameterize a moving solid in the space; To apply the Newton¿s laws to moving solids.

¿ Introduction to numerical modelling : to model simple problems using PDEs; to analyse stability and consistency of a finite difference scheme; to program with Python a finite difference scheme or the Monte-Carlo method for solving a linear parabolic PDE; to analyse numerical results and identify / explain numerical errors.

¿ Modelling project : to develop a solution to the initial engineering problem by employing the different mathematical and numerical tools studied in his other courses.

Necessary prerequisites

Required knowledge for each subject :

¿ Mechanics : mathematics (derivation, intégration, PDE), atomic structure , point mass mechanics.

¿ Introduction to numerical modelling : basis of probability theory, of integral and differential calculus, and of numerical analysis.

¿ Modelling project : numerical analysis, matrix computations, optimisation, ODE, PDE, geometrical modelling, probabilities, statistics, programming (Python).

Practical info

Location(s)

Toulouse

Martix computation and geometry

ECTS
4 crédits

Hourly volume
51h

Introducing

Objectives

Objectives:
At the end of this module, the student will have understood and be able to explain (main concepts):
- QR factorization: the Gram-Schmidt and Householder methods
- Singular value decomposition
- Application to the least squares problem.
- Piecewise functions, Ck continuity, natural cubic splines and their local and global representations, basis of B-Splines, B-Spline curves and their control points.
- The extension to NURBS curves and to surface modelling in CAD.

The student will be able to:
- Determine the most efficient method to solve a least squares problem by identifying the characteristics of the problem.
- Determine and compute the interpolating spline, the smoothing spline, and the least squares spline of n given points.
- Build a B-Spline curve of n given points (analytically and by a subdivision algorithm (de Casteljau, de Boor))
- Apprehend, modify a NURBS curve.

Necessary prerequisites

Necessary knowledge:

Linear algebra, resolution of linear systems, use of matlab or python.

Practical info

Location(s)

Toulouse

Statistics

ECTS
6 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Object oriented coding

ECTS
3 crédits

Hourly volume
42h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts) the concepts of the object programming. The student will be able to create simple programs in object language.

Practical info

Location(s)

Toulouse

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

ECTS
5 crédits

Hourly volume
48h

Practical info

Location(s)

Toulouse

Companies in their environments and languages

ECTS
5 crédits

Hourly volume
63h

Introducing

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)

Toulouse

Engineering and ecological issues 2nd semester

ECTS
3 crédits

Hourly volume
26h

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
1 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
2 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
4 crédits

Hourly volume

Practical info

Location(s)

Toulouse

[FRANCAIS] Challenge – Formation ECIU

ECTS
5 crédits

Hourly volume

Practical info

Location(s)

Toulouse