

COMPUTER SCIENCE FIELD_9 ECTS

Introducing

Description

Évaluation

L'évaluation des acquis d'apprentissage est réalisée en continu tout le long du semestre. En fonction des enseignements, elle peut prendre différentes formes : examen écrit, oral, compte-rendu, rapport écrit, évaluation par les pairs...

Practical info

Location(s)

 Toulouse

Databases 1 and Web Programming

Introducing

Description

Database 1:

The aim is to introduce the basic concepts of designing relational databases in UML. From the conceptual model designed using UML, the process of derivation and validation of the relational model is studied. The normalization process is investigated.

Web programming

The languages HTML5, CSS, and JavaScript are studied.

Organisation:

Database 1:

10h of courses, followed by 10h of directed labs.

Web programming:

5h of courses, followed by 7,5h of directed labs, followed by 8,25h of practical labs

Students attend lectures accompanied by course materials. The lectures are followed by directed labs, during which students practice the various concepts they have learned in class. The final practical tutorial sessions are devoted to the introduction and study of a project. During practical work, students carry out their project. At the end of the practical work, students will present their project and provide a project report and source codes.

Objectives

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

Database 1:

- The different data models, their advantages and limits
- What is a DBMS (Database management system)
- UML-based data model
- The different concepts of the relational model
- The normalization and its importance
- Data integrity constraints

Web programming

- Understand the concepts and technologies of the Web
- HTML5 language
- CSS language
- JavaScript language

The student should be able to:

Database 1:

- Design a relational database based on UML
- Derive the relational model from UML model and vice versa
- Normalize and validate a relational model

Web programming

- Design a static Web site with HTML5
 - Define a CSS file
 - Write scripts with JavaScript
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Necessary prerequisites

Algorithmic for Web programming

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Practical info

Location(s)

 Toulouse

Networks

Introducing

Description

The first part of the course introduces the characteristics of the main network applications. The second part details the fundamental concepts associated with network design: connectivity, resource sharing, switching, quality of service, and architecture. The third part describes the architecture of local area networks, using case studies, and Ethernet networks. Illustrations of these concepts are explored in tutorials and labs.

Objectives

At the end of this module:

The student will understand and be able to explain the main concepts associated with computer networks (personal, local, and wide-area networks) and their interconnection within the Internet (TCP/IP).

They will thus be able to identify: the characteristics of the main distributed applications in networks, the different types of connectivity and addressing schemes within networks, resource sharing solutions and their impact on transfer quality (loss, de-sequencing, delay, throughput), and finally, the concepts of service, protocol, architecture, and quality of service.

More specifically, the services, functionalities, and main mechanisms of the protocols involved in the architecture of Ethernet local area networks and the TCP/IP Internet will be mastered theoretically by the end of the course.

Necessary prerequisites

Notions on operating systems and C programming.

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Practical info

Location(s)

 Toulouse

Theory of information and coding

Introducing

Description

- Shannon paradigm, quantity of information, entropy
- Data compression with and without loss of information
- Linear error-correcting codes
- Classical, contemporary and post-quantum cryptography

Objectives

The aim of the course is to introduce the founding principles of information theory with its applications in data compression, corrective codes and cryptography.

At the end of the course, students will be able to:

- apply the principles of information theory to evaluate, quantify and size algorithms for data compression and error detection and correction.
- apply standard cryptographic encryption algorithms for confidential information transfer.

Necessary prerequisites

Basic mathematics in algorithms, information representation, linear algebra, probability and modular arithmetic.

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Practical info

Location(s)

 Toulouse

Ecological Transition, GHG Reduction, Responsibility and Environment (EARTH)

Introducing

- ✂ Be able to understand and analyse figures/data
- ✂ Draw political conclusions from scientific facts and one's own values
- ✂ Debate, discuss and confront points of view.

Description

The teaching includes a "2 tonnes" workshop, which provides a fun way of understanding the orders of magnitude linked to the objectives of carbon neutrality in 2050. It also includes assignments on the following topics: housing; electricity production; inequalities and responsibilities; mobility; the climate inaction debate; agriculture and food; and aeronautics. Students also work on a complex problem linked to ecological issues, starting their reflections from an everyday object or service.

Objectives

At the end of this module, the student will be able to:

- ✂ Be comfortable with the fundamental concepts related to greenhouse gas emissions, and be able to make simple calculations on this subject.
- ✂ Know the order of magnitude of important quantities.
- ✂ Be able to fetch emission values from the ADEME database and use them appropriately.
- ✂ Think about ecological issues in all their complexity and study a specific problem
- ✂ Have an understanding of life cycle analysis and how to apply it
- ✂ Be able to research scientific literature

Necessary prerequisites

Basic knowledge on energy.

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Practical info

Location(s)

 Toulouse