INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

SEMESTER 8_4th YEAR IR

Practical info

Location(s)

Toulouse

Logic and problem solving artificial intelligence

ECTS
4 crédits

Hourly volume

Introducing

Objectives

This course is heterogeneous ; it is composed of 3 parts :
- Artificial Intelligence search algorithms for Problem Solving (AI-PS)
- Semantic Web (SW)
- Meta-heuristics (MH)

At the end of this module, students are expected to

[AI-PS]
Develop programs that implement
- A* algorithm for searching the best action plan in a problem-state space
- AO* Algorithm for searching the best problem decomposition graph
- Algorithms for 2-players games : minmax, negamax, alphabeta

[SW part]
Explain the major issues of the semantic web.
Implement the RDF graph model and its use for describing web resources and their metadata.
Design ontologies for knowledge representation, with the OWL language.
Develop an application that access to some ontologies and infers new knowledge through a reasoning.

[MH Part]
Be familiar with he main classes of discrete decision problems and optimization problems.
Implement three main classes of metaheuristics :
- Local search methods
- Evolutionary methods
- Hybrid methods

Necessary prerequisites

Algorithmics and programming
Logic for knowledge representation (1st order predicate calculus)

Tree search algorithms
Exact and approached methods (heuristics) for combinatorial optimization

Practical info

Location(s)

Toulouse

Software and hardware architecture for computer systems

ECTS
6 crédits

Hourly volume
65h

Introducing

Objectives

At the end of this module, the student will have understood
and be able to explain (main concepts):
- Manipulation of with various type automata, language
theory, parsers, compilers;
- Development of a compiler, management and allocation
of a program memory;
- Introduction to quantic computing
- Specification of hardware components and architectures
in a high-level language;
- Taking Into account the specific material constraints for
embedded systems with limited resources.
-architectures and technologies for green computing, green software for sustainable development
The student will be able to:
- Create parsers and compilers while considering constraints from the environment (embedded or not).
- Understand and design processor architectures
- Select a processor architecture adapted to the software
application and the environment.
- Specify a hardware system in a concurrent language used widely in industry, VHDL and implement this system
on an FPGA.

Necessary prerequisites

C programming, computer architecture

Practical info

Location(s)

Toulouse

Concurrent and real time system

ECTS
4 crédits

Hourly volume
53h

Introducing

Objectives

This module deals with specification, modelling and realisation of parallel, communicating and synchronised systems under time constraints

Necessary prerequisites

MSC: graph theory, Propositional calculus
PTR: language C

Practical info

Location(s)

Toulouse

Research Initiating Project

ECTS
4 crédits

Hourly volume
37h

Introducing

Objectives

The module aims at motivating students with research activities through a selection of tutored projects. Each project involve a team off 6 students tutored by a researcher or an industrial partner. Those projects also benefit from a preliminary training on documentary research techniques to facilit the writing of a state-of-theart review of the domain. A course to project management techniques is also provided to guide students during the realisation phase of the project.

At the end of this module, the student wil have a practical experience of the following activities :
- identify a bibliography on a given topic, and present it through a standard formulation (IEEE form).
- write a state-of-the-art synthesis.
- precise the perimeter of the realization phase.
- apply project management and collaborative work techniques.
- write a project report and prepare a presentation in english for its project defense.

Practical info

Location(s)

Toulouse

[FRANCAIS] Machine Learning

ECTS
2 crédits

Hourly volume

Introducing

Objectives

The objection of this course is to introduce the basic notions of machine learning and in particular the case of supervised learning.

Necessary prerequisites

Linear Algebra, Algorithms and complexity

Practical info

Location(s)

Toulouse

QSE , APS 2

ECTS
4 crédits

Hourly volume
38h

Practical info

Location(s)

Toulouse

Communication in organisations with LV2

ECTS
6 crédits

Hourly volume

Introducing

Objectives

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

-How to answer the demand of the civil society for technical and scientific information
-How to carry out critical analysis in order to give appropriate answers when questioned about such issues
-How to consider the circulation and content of information within the organizations in which they will be hired

The classes given in English will focus on the specific linguistic characteristics of the English used in scientific contexts in order for the students to understand and master them.
The students will also be made aware of the specificities of scientific English as relates to publications in his specific field of research.

Module L 2
The objectives, defined in reference to the CEFRL for the 5 language activities, are specific for the language studied ¿ Chinese, German, Spanish ¿ and the level of the student.
They can be consulted on :
https://moodle.insa-toulouse.fr/course/view.php?id=44

In certain cases, students may be authorised to follow an English module instead of another language

Necessary prerequisites

Necessary knowledge:
For classes in English : understanding of scientific English

Practical info

Location(s)

Toulouse

French II

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Political sciences semestre 2

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Advanced interconnection and long distance networks

ECTS
7 crédits

Hourly volume
103h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain the:
- network architectures and protocols used in operator networks. More precisely, those related to Quality of Service, IPv6, SNMP, inter-domain & intra-domain routing, MPLS and traffic engineering
- wide area data network services that are in use in business, namely VPN (Virtual Private Network) services (Layer 2 and IP) and Carrier Ethernet services
- basics of network optimization, network planning and traffic engineering as well as the accompanying models and algorithms
- main concepts and formalisms used for the description and verification of communication protocols.

The student will be able to:
- Apprehend and master the functioning of Internet core networks (that may conform to the DiffServ framework, with IPv6 and/or MPLS enabled portions, etc.) and manage them
- Design and deploy VPN services for business
- Manage network devices via SNMP
- Apply the appropriate algorithms to network planning and network optimization problems
- Apply formal modelling and verification techniques to communication protocols

Practical info

Location(s)

Toulouse

Architecture of telecommunication systems

ECTS
3 crédits

Hourly volume
41h

Toulouse

Introducing

Objectives

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

- the particularities of different types of networks (optical,
wireless, spatial networks) and their transmission channel.

- The specification, dimensioning, implementing and/or deployment process of equipments of telecommunication systems in order to optimize parameters such as quality of
service, throughput, coverage¿

Necessary prerequisites

I3MITC21 - Signals and telecommunications
I4RTC11 - Transmission Systems and Techniques

Practical info

Location(s)

Concurrent and real time system

ECTS
4 crédits

Hourly volume
53h

Introducing

Objectives

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Necessary prerequisites

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PTR: language C

Practical info

Location(s)

Toulouse

Research Initiating Project

ECTS
4 crédits

Hourly volume
37h

Introducing

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ECTS
2 crédits

Hourly volume

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Practical info

Location(s)

Toulouse

French II

ECTS
3 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Communication in organisations with LV2

ECTS
6 crédits

Hourly volume

Introducing

Objectives

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Necessary prerequisites

Necessary knowledge:
For classes in English : understanding of scientific English

Practical info

Location(s)

Toulouse

Communication in organisations

ECTS
6 crédits

Hourly volume
42h

Practical info

Location(s)

Toulouse

QSE , APS 2

ECTS
4 crédits

Hourly volume
38h

Practical info

Location(s)

Toulouse

Political sciences semestre 2

ECTS
3 crédits

Hourly volume

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