INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

5th YEAR IR_ORIENTATION SDBD

Practical info

Location(s)

Toulouse

Prescriptive Analytics

ECTS
4 crédits

Hourly volume

Introducing

Objectives

This course addresses several efficient models for processing data encountered in industrial combinatorial problems. These models are based on logical inference and mathematical optimisation techniques : constraint satisfaction problems (CSPs), boolean satisfiability (SAT)
and integer linear programming (ILP).
In the first part (CSPs), students are expected to understand and to be able to apply the main constraint propagation techniques and solving strategies, by hand, but are also initiated to programming tools that integrate general solvers (ex : CPLEX) during practical works.
In the SAT modeling part of this course, students are initiated to some propagation and heuristic solving techniques used in SAT solvers (DPPLL, Implication Graphs, Conflict Analysis, Two-watched litterals algorithm). Various applications problems such as allocation, graph colouring, scheduling serve as training examples for SAT encoding.
In the last part (MILPs), students will have to translate industrial problems into mixed-integer linear programs, then to solve them efficiently using branching algorithms or decomposition methods, embedded in existing tools such as CPLEX.

Necessary prerequisites

Algorithmics & programming (I2MIIF11, I2MIIF21). Fundamentals in Computer Science (I4IRIF11), Intelligent Systems (I4IRSD11)

Practical info

Location(s)

Toulouse

Software Defined Communication Infrastructure

ECTS
4 crédits

Hourly volume

Introducing

Objectives

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

- the concepts related to the virtualization of network functions (in the NFV sense)
- the concepts related to network programming (in the SDN sense)
- the model of autonomic computing defined (among others) by IBM
- the views of real-world actors involved in a-large-scale project (application developer,-middleware operator, network operator)

The student will be able to:
- use an SDN network emulator (ContainterNET)
- use an SDN (Ryu) controller
- use a standardized MANO NFV (SON-EMU)
- develop a standardized VNF
- architect and implement solutions that take advantage of the concepts of virtualization of network functions and programmable networks, in the context of the realization of an SDCI
- apply and implement the model of autonomic computing to a problem of management of QoS in an SDCI

Necessary prerequisites

Networks Interconnexion - TCP/IP

Object oriented design UML (2. 0)

Object Oriented Programming - Java

Service-Oriented Architectures

Network Programming - TCP/IP

Practical info

Location(s)

Toulouse

Non-contractual information

Cloud Computing

ECTS
6 crédits

Hourly volume
69h

Practical info

Location(s)

Toulouse

Model driven engineering

ECTS
6 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Non-contractual information

Modeling, evaluation and optimisation of networks and protocols

ECTS
4 crédits

Hourly volume
78h

Practical info

Location(s)

Toulouse

Non-contractual information

[FRANCAIS] Commande avancée et supervision

ECTS
6 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Non-contractual information

Projet physique PTP_ISS

ECTS
4 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Non-contractual information

Service Robotics

ECTS
6 crédits

Hourly volume
50h

Toulouse

Introducing

Objectives

At the end of this module, the student would be able to explain the main components of a robot service and to say in which way it differs from industrial robotics; he/she will know the main concepts in humanoid robotics and why it is difficult to control a walking robot. His/her knowledge will
include the main notions in jointed robotics: direct and inverse kinematic models, dynamic model of the robot, trajectory generation and stability of a bipedal robot.

The student is supposed to be able to model a jointed robot, to understand its technical components and to analyse the functioning of a service robot in its domestic or professional environment.

Necessary prerequisites

Matrix theory, Linear control

Practical info

Location(s)

Software engineering and service oriented architectures

ECTS
4 crédits

Hourly volume
41h

Introducing

Objectives

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

- Software project lifecycle
- The challenges of software development
- Project management methods, particularly the agile method
- Service oriented architecture
- Resource oriented architecture (RESTful)
- Microservice architecture

The student will be able to:
- Control the conduct of a software development project with a team by following the scrum agile method
- Perform requirement analysis: expression, analysis and transformation into technical requirements
- Design and develop a service oriented architecture
- Implement Web services SOAP and Rest
- Develop a service composition (orchestration) via BPEL
- Develop microservices
- Understand and implement a RESTfull API

Necessary prerequisites

Algorithmic, Object oriented programming (Java), Object oriented design (UML), XML, and XML schema

Practical info

Location(s)

Toulouse

Non-contractual information

Reliability and model-checking

ECTS
4 crédits

Hourly volume
42h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain the main principles of systems engineering and software engineering: concepts, methods and tools, to define and control the process development of a critical embedded system.

The student will be able to:

- apply these general competences to computer based systems
.explain different methods and chose the best adapted to develop a specific application.

Necessary prerequisites

Petri Nets, Communicating Automata, formal Logic, Graph theory

Practical info

Location(s)

Toulouse

[FRANCAIS] Analyse descriptive et prédictive

ECTS
4 crédits

Hourly volume
56h

Introducing

Objectives

At the end of this module, the student will have understood and be able to explain (main concepts):
- the different problems associated with data study (in exploratory data analysis and in machine learning)
- the main concepts and algorithms allowing to solve those problems
- the main existing libraries

The student will be able to:
- analyze the requirements of the data processing
- set up the most efficient algorithms
- use the algorithms that are implemented in the main existing libraries
- adapt and develop his/her own algorithms
- analyze and explain the results of those algorithms
- program in Python and R languages

Necessary prerequisites

Algorithms, data structures, computational complexity, programming, optimization, supervised machine learning (basic knowledge), statistics and probability (basic knowledge), programming

Practical info

Location(s)

Toulouse

Non-contractual information

Infrastructure for massive data processing

ECTS
4 crédits

Hourly volume
61h

Introducing

Objectives

At the end of this module, the student will understand and be able to explain the concepts and techniques related to the main pillars that have to be managed by an IT service provider, in terms of:

- physical infrastructure (network, storage , computing) ;
- organizational and data management (allocation of storage , ...);
- computation services of such data (based on calculation models like map reduce, etc.).

The student will be able to:

1) With regard to physical infrastructures
- design and deploy a network architecture adapted to a big data oriented service, using advanced network technology (network virtualization, optimization protocols, etc.);
- dimension and deploy a physical storage infrastructure aimed at receiving massive amounts of data;
- assess and deploy the computing power required to process massive data, based on the latest technologies for processors, such as virtualization.

2) With regard to the organization and data management
- design and implement tools to organize data within the physical infrastructure;
- provide appropriate interfaces for access to such data;
- choose a data organization adapted to the constraints of treatment (offline versus real-time processing);

3) With regard to the data processing services
- provide facilities for analyzing data and extract value added information (e.g., learning, trends).

Necessary prerequisites

Networks
Operating systems
Databases
Algorithmic and programing

Practical info

Location(s)

Toulouse

[FRANCAIS] Projet SDBD

ECTS
4 crédits

Hourly volume
52h

Toulouse

Introducing

Objectives

At the end of this module, the student should have understood and will be able to explain:

- The objectives of an Artificial Intelligence and Big Data project
- The methodological and technological choices retained and developed to respond to a specific project

The student should be able:
- To create a software chain for the collection, storage and processing of massive data,
- to argue about the choices made,
- to evaluate the proposed solution.

Necessary prerequisites

Descriptive and Predictive Analysis, Big Data Infrastructures

Practical info

Location(s)

Human relations

ECTS
6 crédits

Hourly volume
78h

Introducing

Location(s)

Toulouse

Objectives

L'étudiant devra être capable de :
-Analyser des situations de groupe avec des concepts issus de la psychologie sociale
-Identifier les dimensions éthiques de ces situations et prendre position
-Repérer et comprendre des informations liées aux RH
-Analyser une situation de management d¿équipe en référence à un cadre théorique
-Formuler et argumenter des solutions managériales
-Agir dans un milieu naturel : analyser, décider, agir ; mettre en œuvre la sécurité, utiliser du matériel spécifique. découvrir un site.
-Respecter et s'intégrer dans un environnement différent de ses habitudes
-S'engager avec cohérence dans le projet d'activités
-Prendre part activement au collectif
-Valider son projet professionnel et construire une stratégie pour trouver un emploi

Necessary prerequisites

None

Practical info

Module élève ingénieur (UE PETAR dispensée UPS)

ECTS
4 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Non-contractual information