INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES TOULOUSE

5th YEAR AE_THEME SIEC

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

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

Modeling, evaluation and optimisation of networks and protocols

ECTS
4 crédits

Hourly volume
78h

Practical info

Location(s)

Toulouse

[FRANCAIS] Commande avancée et supervision

ECTS
6 crédits

Hourly volume

Practical info

Location(s)

Toulouse

Projet physique PTP_ISS

ECTS
4 crédits

Hourly volume

Practical info

Location(s)

Toulouse

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)

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

Embedded Computer Architecture

ECTS
4 crédits

Hourly volume

Introducing

Objectives

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

- The principles and specificities of networks used in embedded systems in the automotive, avionics and connected objects,
- The specificities of operating systems and their main services (scheduling, memory, privileges,
etc.) for embedded systems
- The advantages and disadvantages of the different computer architectures used for embedded
systems
- The elements impacting the performance (computation, energy consumption, etc.) of a computer architecture and the methods to optimize them.

The student will be able to:
- Choose a network technology that meets the needs of an embedded system,
- Set up the support network of an embedded system,
- Deploy an operating system on an embedded architecture,
- Develop a driver within an operating system,
- Compare two embedded computer architectures in terms of performance,
- Choose a computer architecture adapted to the needs of an application.

Necessary prerequisites

C programming, computer organization, network, operating system

Practical info

Location(s)

Toulouse

Engineering methods

ECTS
4 crédits

Hourly volume
42h

Introducing

Objectives

Present 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 embedded systems explain different methods and chose the best adapted
to develop a specific application.

Practical info

Location(s)

Toulouse

Dependability

ECTS
5 crédits

Hourly volume
68h

Introducing

Objectives

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

The basic concepts of dependability and main methods and techniques for obtaining and validation of the safety.

The student will be able to:
- apply these general competences to computer based embedded systems
- explain different methods and chose the best adapted to develop a specific application.

Necessary prerequisites

Discrete event systems, Propositional Logic,

Practical info

Location(s)

Toulouse

Interdisciplinary Project

ECTS
5 crédits

Hourly volume

Introducing

Objectives

At the end of this module, the student will be able to:
- Implement and apply agile management according to the agile method in order to create a product,
- Select and interweave a set of interdisciplinary technical skills in order to develop a critical embedded system,
- Search autonomously and be able to critique technical solutions for which he/she does not have prior knowledge in order to meet requirements specific to critical embedded systems,
- Design and build a product deployed on a heterogeneous and communicating embedded architecture guaranteeing performance properties,
- Define needs, requirements and architecture when designing a product
- Communicate in an interdisciplinary context and to work together with actors with heterogeneous skills,
- Adapt the writing and presentation of scientific results according to the audience (client, decision maker, evaluator, general public) and through various media (presentation, website, report, synthesis, poster).

To express themselves correctly in English, using a concise and precise style respecting the conventions of genre in writing as well as orally

Practical info

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