

SHAKE THE FUTURE.



ENGINEERING PROGRAMME

SPECIALISATION

COMPUTER SCIENCE
SPRING SEMESTER

KNOWLEDGE ANALYSIS AND REPRESENTATION

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION

SPRING SEMESTER

Professor: Vincent TOURRE

Objectives

This course aims at going beyond the computer-science classical concept of data. It will introduce the notion of knowledge based on both data analysis and will provide an overview of data representation, including computer graphics. Current business applications of these techniques will also be presented.

Course contents

- Graphic communication (history, needs, interactive computer graphics)
- Graphic interfaces (general concepts, basic hardware and software, architecture models, development tools)
- Dialogue design (techniques, methods and styles of interaction, design methodology, specification levels)
- Graphic presentation of data (visualization techniques, presentation rules)

Course material

Keywords

man-machine interfaces, graphic interfaces

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	20 hrs	10 hrs	0 hrs	0 hrs

WEB PROGRAMMING

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Jean-Marie NORMAND

Objectives

The objective of this course is to provide students with the fundamentals of web programming. It starts with HTML-CSS and Javascript and concludes with J2EE and Spring.

Course contents

This course includes lectures and lab work.

Lectures:

- Introducing HTML, CSS and Javascript
- PHP
- J2EE
- Notions of Frameworks

Lab work:

- HTML & Javascript
- PHP
- J2EE
- Framework Play
- SPRING

Course material

Keywords

HTML, Javascript, PHP, J2EE, Play, Spring, Synfony

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	6 hrs	0 hrs	26 hrs	0 hrs

SYSTEMS AND DATA SECURITY

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Jean-Yves MARTIN

Objectives

The aim of this course is to highlight the main elements in terms of security. That means security for the Informations Systems, and for their data. Managing security includes administrative aspects, technical aspects and auditing aspects.

Course contents

- Security from an administrative perspective. Security planning, RSSI, Using security audit.
- Security from a company audit perspective.
- Security from a technical point of view. Main attacks: how we can protect computers and software.
- Security from a legal point of view. CNIL, software licenses.
- Personal data protection.

Course material

Keywords

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	28 hrs	2 hrs	0 hrs	0 hrs

INFORMATION SYSTEMS

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Jean-Yves MARTIN

Objectives

The aim of this course is to understand information systems, how they are built, how they can be analyzed.

Course contents

This course is delivered in two parts.

Part 1

- Information System management
- Cartography
- Urbanization
- ITIL

Part 2 Tools

- LDAP
- Notions of Cloud

Course material

Keywords

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	22 hrs	0 hrs	8 hrs	0 hrs

STEP-BY-STEP REAL TIME KERNEL BUILDING

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION

SPRING SEMESTER

Professor: Pierre MOLINARO

Objectives

Presentation of parallelism principles and how real-time systems work. The students will study synchronization and communication mechanisms. The goal is to help them understand the design process of operational architectures for real-time embedded applications.

Course contents

- Introduction to the objectives of parallelism, dedicated to real-time applications
- Communication and synchronization through shared variables.
- Modelling and verification principles for parallel programs.
- Industrial hardware architecture for implementing real-time applications. Application fault tolerance and operational dependability.
- Construction of a real-time operating system kernel: how to dispatch and organize it. Task, event and time management primitives.

Course material

Keywords

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	20 hrs	10 hrs	0 hrs	0 hrs

LOGIC PROGRAMMING

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Carito GUZIOLOWSKI

Objectives

This course is an overview of the logic programming paradigm, which is a declarative paradigm of programming. We will use Answer Set Programming (ASP) as a modeling language and framework. The aim of ASP is to propose a solution to a problem (notably a combinatorial search problem) by modelling this problem instead of coding its solution. Modelling is performed in the form of logical rules (first order predicates) that have a defined syntax and semantics. The resolution of ASP logic programmes is carried out with very powerful solvers. In this course we will use gringo and clasp.

Course contents

The course presents an overview of the following aspects:

- Declarative programming
- ASP Syntax
- ASP Semantics
- Modelling of a problem

This course will be strongly articulated around practical tutorial and lab sessions. The main idea of these sessions will be to propose logic programmes to solve classical combinatorial search problems.

Course material

Knowledge representation, Reasoning, and Declarative Problem Solving. Chitta Baral. Cambridge University Press New York, NY, USA, 2003.

Keywords

logic programming, knowledge representation

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	20 hrs	10 hrs	0 hrs	0 hrs

ARTIFICIAL INTELLIGENCE

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Didier LIME

Objectives

Artificial intelligence is an important and old domain of computer science. It addresses many very different problems. Here we focus only on a subset of those problems.

The main objectives are:

- acquire a global view of the field, including its current challenges and limits
- understand and know how to implement the main algorithms related to strategic reasoning (based in particular on game tree searches)
- understand and know how to implement some approaches to statistical machine learning, in particular artificial neural networks

Course contents

We address the broad topic of artificial intelligence. Among the many concepts fitting in this quite generic expression, we study in some detail:

1) Strategic reasoning, based on game theory

- Markov decision processes
- game tree search: minimax, negamax, alphabeta
- game tree search: Monte Carlo Tree Search

2) Two approaches of statistical machine learning

- Markov chains
- Artificial neural networks

These concepts will be developed and implemented in the framework of the programming of a simple two player game artificial intelligence (Othello)

Course material

Keywords

Game theory, tree search, machine learning, markov process

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	20 hrs	10 hrs	0 hrs	0 hrs

PARALLELISM AND MODEL CHECKING

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Olivier ROUX

Objectives

Presentation of parallelism principles and how distributed systems and real-time systems work. The students will study synchronization and communication mechanisms in both parallel and distributed systems. Finally, the course discusses the modeling and verification issues of parallel applications.

Course contents

- Introduction to the objectives of parallelism, architectures and the competition.
- Communication and synchronization through shared variables.
- Communication and synchronization in distributed systems,
- Modelling and verification principles for parallel programs .
- Industrial hardware architecture for implementing real-time applications. Applications fault tolerance and operational reliability.
- Construction of a real-time operating system kernel: how to dispatch and organize it. Task, event and time management primitives.
- Field network architecture and operation principles. Protocols and services.

Course material

Keywords

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	3	20 hrs	10 hrs	0 hrs	0 hrs

GROUP PROJECT

COMPUTER SCIENCE, ENGINEERING PROGRAMME SPECIALISATION
SPRING SEMESTER

Professor: Jean-Yves MARTIN

Objectives

The aim of this project is to have students work in groups in order to address design issues, code sharing, project planning, development.

Course contents

This course is a project undertaken in groups of 5 to 7 students.

Emphasis is placed on project reporting, project management, code sharing, the quality of the deliverable, documentation of the source code and the results.

Projects change every year. They can include web development, specific software development, etc.

Course material

Keywords

Links with other programmes

LANGUAGE	ECTS CREDITS	LECTURES	TUTORIALS	LABO	PROJECT
French	2	0 hrs	0 hrs	0 hrs	48 hrs