Course guide
270505 - CSI - Computing and Intelligent Systems

Last modified: 12/07/2022

Unit in charge: Barcelona School of Informatics
Teaching unit: 723 - CS - Department of Computer Science.

Degree: MASTER'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2012). (Compulsory subject).

Academic year: 2022 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: FRANCISCO JAVIER LARROSA BONDIA

Others: Primer quadrimestre:
RAMON FERRER CANCHO - 10
FRANCISCO JAVIER LARROSA BONDIA - 10

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE7. Capability to understand and to apply advanced knowledge of high performance computing and numerical or computational methods to engineering problems.
CTE9. Capability to apply mathematical, statistical and artificial intelligence methods to model, design and develop applications, services, intelligent systems and knowledge-based systems.

Transversal:
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.

Basic:
CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

TEACHING METHODOLOGY

It combines lectures to introduce the fundamental concepts, the classes of problems to practice and exercise their implications with laboratory classes, where you will see a more practical all this through case study and using packages already implemented.

LEARNING OBJECTIVES OF THE SUBJECT

1.Get languages ☐☐for modeling and solving problems and reasoning saver and apply them to specific problems with certainty and uncertainty, using specialized tools, while being aware of the implications of complexity theory.

STUDY LOAD

Type	Hours	Percentage
Self study	96,0	64.00
Hours large group	13,5	9.00
Hours medium group	13,5	9.00

Type	Hours	Percentage
Hours small group	27,0	18.00

Total learning time: 150 h

CONTENTS

Knowledge representation and reasoning in the context of automatic certainty

Description:
Will be propositional logic. Its syntax and semantics, the basic inference algorithm and its expressive power.

Knowledge representation and automatic reasoning with uncertainty

Description:
Will be the Bayesian Networks, syntax, semantics, the basic inference algorithms and their expressive power.

Machine learning

Description:
Will be the most important machine learning algorithms understanding the strengths and weaknesses of each in order to know what is the most appropriate for each situation

ACTIVITIES

Development of the first theme of the course (propositional logic)

Description:
Assimilate the basics of propositional logic (syntax, semantics, inference) understand the expressive power of propositional logic and see examples of actual use.

Specific objectives:
1

Related competencies :
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE9. Capability to apply mathematical, statistical and artificial intelligence methods to model, design and develop applications, services, intelligent systems and knowledge-based systems.
CTE7. Capability to understand and to apply advanced knowledge of high performance computing and numerical or computational methods to engineering problems.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

Full-or-part-time: 47h
Theory classes: 5h
Practical classes: 5h
Laboratory classes: 10h
Guided activities: 2h
Self study: 25h

2 Development of the subject matter (Bayesian networks)

Description:
Assimilate the basics of Bayesian networks (syntax, semantics, inference) Assimilate the expressive power of Bayesian networks and examples of actual use.

Specific objectives:
1

Related competencies :
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE9. Capability to apply mathematical, statistical and artificial intelligence methods to model, design and develop applications, services, intelligent systems and knowledge-based systems.
CTE7. Capability to understand and to apply advanced knowledge of high performance computing and numerical or computational methods to engineering problems.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

Full-or-part-time: 43h
Theory classes: 4h
Practical classes: 4h
Laboratory classes: 8h
Guided activities: 2h
Self study: 25h

3 Develop the topic of the course (Machine Learning)

Specific objectives:
1

Related competencies :
CTE1. Capability to model, design, define the architecture, implement, manage, operate, administrate and maintain applications, networks, systems, services and computer contents.
CTE9. Capability to apply mathematical, statistical and artificial intelligence methods to model, design and develop applications, services, intelligent systems and knowledge-based systems.
CTE7. Capability to understand and to apply advanced knowledge of high performance computing and numerical or computational methods to engineering problems.
CTR6. REASONING: Capacity for critical, logical and mathematical reasoning. Capability to solve problems in their area of study. Capacity for abstraction: the capability to create and use models that reflect real situations. Capability to design and implement simple experiments, and analyze and interpret their results. Capacity for analysis, synthesis and evaluation.
CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

Full-or-part-time: 43h
Theory classes: 4h
Practical classes: 4h
Laboratory classes: 8h
Guided activities: 2h
Self study: 25h

GRADING SYSTEM

The course is divided into 3 parts, each one with the same weight. Each part is evaluated with an exam and a project. The weight of the exam is twice the weight of the project.

BIBLIOGRAPHY

Basic:
- Russell, S.J.; Norvig, P. Artificial intelligence: a modern approach. 4th ed., global ed. Harlow: Pearson Education Limited, 2022. ISBN 9781292401133.

Complementary:
- Farré, R.; Nieuwenhuis, R.; Nivela, P.; Oliveras, A.; Rodríguez, E.; Sierra, J. Lógica para informáticos. Marcombo, 2011. ISBN 978-84-267-1694-1.