Course guide
270712 - HCI - Human-Computer Interaction

Last modified: 04/02/2025

Unit in charge: Barcelona School of Informatics
Teaching unit: 710 - EEL - Department of Electronic Engineering.
707 - ESAII - Department of Automatic Control.

Degree: MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE (Syllabus 2017). (Optional subject).

Academic year: 2024 **ECTS Credits:** 4.5 **Languages:** English

LECTURER

Coordinating lecturer: ANDREU CATALA MALLOFRE

Others: Segon quadrimestre:
ANDREU CATALA MALLOFRE - 10

PRIOR SKILLS

None

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CEA10. Capability to understand advanced techniques of Human-Computer Interaction, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.
CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.
CEP4. Capability to design, write and report about computer science projects in the specific area of ??Artificial Intelligence.
CEP6. Capability to assimilate and integrate the changing economic, social and technological environment to the objectives and procedures of informatic work in intelligent systems.
CEP7. Capability to respect the legal rules and deontology in professional practice.

Generical:
CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.
CG3. Capacity for modeling, calculation, simulation, development and implementation in technology and company engineering centers, particularly in research, development and innovation in all areas related to Artificial Intelligence.

Transversal:
CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

CT5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated for professional development, to meet new challenges and for continuous improvement. Capability to work in situations with lack of information.
CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

TEACHING METHODOLOGY

Methodology will be based on two kind of activities: theory and practice. Theory will be developed arround specific topics with the following scheme:

- Plenary conferences given by the teacher
- Self-study sessions done by the students on a related topic
- Students presentations about the conclusions on the topic (presentations will be part of the evaluation activities)

Practice aspect will follow a Project Based Learning approach:
1.The student should do a literature review of the field, detecting the most important research groups, patents and projects in his area of interest
2.Design of a real project based on a use case
3.Detailed analysis of the most convenient architecture and algorithmia.
4.Technologies and innovative aspects of the proposed solution
A presentation of the final project will be part of the evaluation process

LEARNING OBJECTIVES OF THE SUBJECT

1.Acquiring Human-Computer Interaction general methodology
2.Development of Ambient Inteligence related projects

STUDY LOAD

Type	Hours	Percentage
Hours large group	9,0	8.00
Guided activities	9,0	8.00
Hours small group	22,5	20.00
Self study	72,0	64.00

Total learning time: 112.5 h

CONTENTS

Introduction

Description:
Principles of human-computer interaction.
User centered design, user needs elicitation and ergonomics principles.
Contexts of use, and functional requirements.
User-system communication design.
Project management principles.

Interaction

Description:
Principles of human information processing, performance, learning and cognition.
Sensation and perception.
Cognitive basis of emotions. Cognitive engineering.
Multimodal interaction.

Pervasive Computing

Description:
Principles and technology overview.
Architectures.
Operating Systems.
Location and context awareness.
Ubiquitius interfaces.

Person centered Ambient Intelligence

Description:
Smart environments. Principles and technologies of Ambient Intelligent design.
Ambient Assisted Living (AAL): requirements and solutions.
Ethics in AAL: privacy, autonomy, integrity, reliability, e-inclusion, technology in the society, ...

ACTIVITIES

Introduction

Specific objectives:
1

Related competencies :
CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.
CEA10. Capability to understand advanced techniques of Human-Computer Interaction, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.
CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Full-or-part-time: 16h
Self study: 11h
Theory classes: 3h
Laboratory classes: 2h

Interaction

Specific objectives:
1

Related competencies :
CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.
CEA10. Capability to understand advanced techniques of Human-Computer Interaction, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.
CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Full-or-part-time: 16h
Self study: 11h
Theory classes: 3h
Laboratory classes: 2h

Pervasive Computing

Full-or-part-time: 16h
Self study: 11h
Theory classes: 3h
Laboratory classes: 2h

Person centered Ambient Intelligence

Full-or-part-time: 16h
Self study: 11h
Theory classes: 3h
Laboratory classes: 2h

Ambient Intelligence Project

Specific objectives:
2

Related competencies :
CEP6. Capability to assimilate and integrate the changing economic, social and technological environment to the objectives and procedures of informatic work in intelligent systems.
CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.
CEP4. Capability to design, write and report about computer science projects in the specific area of ??Artificial Intelligence.
CEP7. Capability to respect the legal rules and deontology in professional practice.
CEA10. Capability to understand advanced techniques of Human-Computer Interaction, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.
CG3. Capacity for modeling, calculation, simulation, development and implementation in technology and company engineering centers, particularly in research, development and innovation in all areas related to Artificial Intelligence.
CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.
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CT5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated for professional development, to meet new challenges and for continuous improvement. Capability to work in situations with lack of information.
CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

Full-or-part-time: 28h 48m
Self study: 11h
Guided activities: 5h
Theory classes: 2h
Laboratory classes: 10h 48m

Test

Specific objectives:
1

Related competencies :
CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.
CEA10. Capability to understand advanced techniques of Human-Computer Interaction, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.
CT3. TEAMWORK: Being able to work in an interdisciplinary team, whether as a member or as a leader, with the aim of contributing to projects pragmatically and responsibly and making commitments in view of the resources that are available.

Full-or-part-time: 11h
Self study: 10h
Guided activities: 1h

Project Assesment

Specific objectives:
2

Related competencies :
CEP6. Capability to assimilate and integrate the changing economic, social and technological environment to the objectives and procedures of informatic work in intelligent systems.
CEP3. Capacity for applying Artificial Intelligence techniques in technological and industrial environments to improve quality and productivity.
CEP4. Capability to design, write and report about computer science projects in the specific area of ??Artificial Intelligence.
CEP7. Capability to respect the legal rules and deontology in professional practice.
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CT5. APPROPIATE ATTITUDE TOWARDS WORK: Capability to be motivated for professional development, to meet new challenges and for continuous improvement. Capability to work in situations with lack of information.
CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

Full-or-part-time: 11h
Self study: 10h
Guided activities: 1h

GRADING SYSTEM

Evaluation will be according the implemented methodology for the course. The student will get a FINAL MARK mainly based on a continous evaluation scheme. A personal Final Exam based on theory aspects will be done, with a specific weight in the Final Mark.

Final Mark = 0,4 PROJECT evolution mark + 0,3 PROJECT final assessment + 0,15 Presentation and reporting of theory sessions + 0,15 Final Exam mark.

- The evolution of the project will be based on a number of scheduled sessions that will be evaluated by the professors and the students (some of them)

- The final assessment of the Project will be done in a public presentation session at the end of the semester. This session will be evaluated by the professors and the students. Students will be asked to submitt a complete report of the Project that will be evaluated by the professors, but will be available to all the students for their information.

- After some specific theory sessions, the students will be asked to prepare a related subjet that they will present to the audience. The professors and the students will evaluate this session (with different weights in the marks) and a report will be submitted after this presentation. Professors will consider these reports in the professors' evaluation.

- In the final exam, the student will be asked to answer some specific questions related to the theory aspects developed along the course.

BIBLIOGRAPHY

Basic:
- Scott MacKenzie, I. Human-Computer interaction: an empirical research perspective. Amsterdam ; Boston: Morgan Kaufmann, 2013. ISBN 9780124058651.
- Righi, C.; James, J. User-centered design stories: real-world UCD case files. San Francisco, Calif. ; Oxford: Morgan Kaufmann : Elsevier Science, 2007. ISBN 9780123706089.
- Weber, W.; Rabaey, J.M.; Aarts, E. (eds.). Ambient intelligence. Berlin: Springer, 2005. ISBN 3540238670.
- Boy, G.A. Human-systems integration: from virtual to tangible. Boca Raton: CRC Press, 2020. ISBN 9780367357733.