

# Course guide

## 270744 - AHCT - Assistive and Health-Care Technologies

**Last modified:** 21/07/2022

**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:** 2022    **ECTS Credits:** 4.5    **Languages:** English

### LECTURER

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**Coordinating lecturer:** JOAN CABESTANY MONCUSI

**Others:** Primer quadrimestre:  
JOAN CABESTANY MONCUSI - 10

### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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#### 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.

CEA12. Capability to understand the advanced techniques of Knowledge Engineering, Machine Learning and Decision Support Systems, 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. APPROPRIATE 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.

CT6. REASONING: Capability to evaluate and analyze on a reasoned and critical way about situations, projects, proposals, reports and scientific-technical surveys. Capability to argue the reasons that explain or justify such situations, proposals, etc..

CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

## TEACHING METHODOLOGY

Methodology will be mainly based on two different activities: theory sessions and practical sessions. Both will be developed with the active participation of the students.

The schem for the theory sessions will be:

- 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)

Practical 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.A specific objective will be the specification and analysis of a health service based on technology use (functionality, patient/user perspective, requirements...)
- 2.Acquiring correct skills on Assistive technologies

## STUDY LOAD

Type	Hours	Percentage
Hours small group	22,5	55.56
Hours large group	9,0	22.22
Guided activities	9,0	22.22

**Total learning time:** 40.5 h

## CONTENTS

### Assistive technologies. State of the Art. Challenges and perspectives.

**Description:**

Overview on the state of the art, depending on the specific condition and domain.

### Healthcare domain. Technology based services.

**Description:**

Specific healthcare domain and the possible corresponding technology based services will be discussed.

### Ambient Assisted Living approach

**Description:**

Principles of the AAL related technologies applied to the healthcare domain.



### Ethical and usability aspects. Quality of life

**Description:**

Aspects related with ethics and user-based concepts will be treated. Improvement of the quality of life of the patients is in the focus.

## ACTIVITIES

### Assistive technologies. Challenges and perspectives.

**Specific objectives:**

2

**Related competencies :**

CEA12. Capability to understand the advanced techniques of Knowledge Engineering, Machine Learning and Decision Support Systems, 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.

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CT5. APPROPRIATE 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.

**Full-or-part-time:** 22h 48m

Theory classes: 4h

Laboratory classes: 4h

Guided activities: 1h

Self study: 13h 48m

### Healthcare domain. Technology based services.

**Specific objectives:**

2

**Related competencies :**

CEA12. Capability to understand the advanced techniques of Knowledge Engineering, Machine Learning and Decision Support Systems, and to know how to design, implement and apply these techniques in the development of intelligent applications, services or systems.

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**Full-or-part-time:** 21h 48m

Theory classes: 3h

Laboratory classes: 4h

Guided activities: 1h

Self study: 13h 48m



## Ambient Assisted Living approach

### Specific objectives:

1, 2

### Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

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CEP7. Capability to respect the legal rules and deontology in professional practice.

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.

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.

CEA12. Capability to understand the advanced techniques of Knowledge Engineering, Machine Learning and Decision Support Systems, 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.

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CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

CT5. APPROPRIATE 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.

**Full-or-part-time:** 21h 48m

Theory classes: 3h

Laboratory classes: 4h

Guided activities: 1h

Self study: 13h 48m



### Ethical and usability aspects. Quality of life

#### Specific objectives:

1, 2

#### Related competencies :

CG1. Capability to plan, design and implement products, processes, services and facilities in all areas of Artificial Intelligence.

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CT7. ANALISIS Y SINTESIS: Capability to analyze and solve complex technical problems.

CT5. APPROPRIATE 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.

**Full-or-part-time:** 24h 36m

Theory classes: 3h

Laboratory classes: 6h 48m

Guided activities: 1h

Self study: 13h 48m

### Mid-term evaluation

**Full-or-part-time:** 12h

Guided activities: 2h

Self study: 10h

### Final presentation

**Full-or-part-time:** 12h

Guided activities: 2h

Self study: 10h



## GRADING SYSTEM

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Evaluation will be according the implemented methodology for the course. The student will get a FINAL MARK mainly based on a continuous 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 submit 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 subject 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

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### Basic:

- Bouchard, B. (ed.). Smart technologies in healthcare. CRC Press, Taylor & Francis Group, 2017. ISBN 9781498722018.
- Krohn, R.; Metcalf, D.; Salber, P.R. Connected health: improving care, safety, and efficiency with wearables and IoT. Boca Raton: Taylor & Francis, 2017. ISBN 9781138737662.