

## 340623 - ECUS-R2P07 - User-Centered Engineering

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering  
Teaching unit: 707 - ESAII - Department of Automatic Control  
Academic year: 2017  
Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012).  
(Teaching unit Optional)  
ECTS credits: 5 Teaching languages: Catalan

### Teaching staff

Coordinator: MARTA DÍAZ BOLADERAS - PERE PONSA ASENSIO

Others: MARTA DÍAZ BOLADERAS - PERE PONSA ASENSIO

### Opening hours

Timetable: Pere Ponsa: Monday, D-170, 15:00 to 19:00 PM

### Requirements

Previously passed  
MEDI Metodologia del disseny

And jointly with INPS we recommend  
ENUA Enginyeria de la usabilitat i l'accessibilitat  
DIDU Disseny inclusiu i disseny centrat en l'usuari

### Degree competences to which the subject contributes

Transversal:

1. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.
3. ENTREPRENEURSHIP AND INNOVATION - Level 2. Taking initiatives that give rise to opportunities and to new products and solutions, doing so with a vision of process implementation and market understanding, and involving others in projects that have to be carried out.
5. EFFICIENT ORAL AND WRITTEN COMMUNICATION - Level 2. Using strategies for preparing and giving oral presentations. Writing texts and documents whose content is coherent, well structured and free of spelling and grammatical errors.
7. SELF-DIRECTED LEARNING - Level 2: Completing set tasks based on the guidelines set by lecturers. Devoting the time needed to complete each task, including personal contributions and expanding on the recommended information sources.
4. EFFECTIVE USE OF INFORMATION RESOURCES - Level 1. Identifying information needs. Using collections, premises and services that are available for designing and executing simple searches that are suited to the topic.

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### Teaching methodology

#### Participatory lectures

In the sessions the / the teacher / a made a synthesis of the subject. This exhibition is intended as a guide for the work study students, with the function of presenting the subject, propose material for study, clarify doubts and make a synthesis.

Each theme will be provided:

- Material in Power-Point format used in the exhibition class and other supplementary material which will be available on the Digital Campus.
- Bibliography indicating specific location, preferring to material in electronic format.

It is taking care that concepts have a direct connection with work activities during the course.

#### Attended Work Activities

- Problems and Exercises for fixing the concepts introduced in the exhibition.
- Approach of situations that allow the group build a shared experience that serves to advance the understanding of the contents (for example group dynamics, effective communication experiences). They are based on experience different situations in which the experience serves as a study material.

#### Casework and articles

The work on cases or articles will be based on questions raised by the / the teacher / a. These jobs will have to deliver on agreed at the beginning of the session which will discuss in class group. The deadline to submit a case is set in the calendar. The / the teacher / a can upload the Digital Campus, additional reference and guidance, some of the more well worth every delivery jobs.

The casework seeks to promote the following capabilities:

- Understanding of the situation presented and the ability to synthesize the most important aspects
- Apply the concepts studied to practical cases.
- Capturing the complexity of real life situations, different points of view and the various dimensions of the phenomena
- Submission of written documents
- Ability to exchange views and discuss, and ability to learn the debate

#### Draft

The project will be conducted in groups.

Throughout the course three practices where problems which will need to apply the knowledge they have acquired will be raised will be made. This project will act as the backbone of learning, following the principles of project-based learning. For each practice a dossier which shall include the objectives, description, date of delivery, and evaluation criteria will be provided. Each practice will consist of a report and a presentation at pp.

#### Oral presentations of their practices by students

Each student will make an oral presentation at least one of them practices carried out. The days of exposure will be announced at the beginning of the course. The day of the exhibition / the teacher / a designate the groups that made the exhibition.

#### Individualized tutoring in small group

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The / the teacher / a will individually and in small groups student progress and monitor their practices, providing feedback on their progress, the degree of achievement of the objectives of their work and giving directions for improvement.

### Learning objectives of the subject

#### OBJECTIVES

1. Analysis requirements of users
2. Context of use
3. Application of universal design principles
4. Applicatio of usability engineering methods and tools
5. Application of interface design techniques
6. Human centric interfaces for ambient intelligence
7. Home automation systems: domotic systems

#### RESULTS

1. Multidisciplinary project development
2. Guidelines design based on the user profile
- 3 Usability rapports
- 4 Plan and development of evaluation test
- 5 Knowlegde of international standards

### Study load

Total learning time: 125h	Hours large group:	30h	24.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	12.00%
	Guided activities:	0h	0.00%
	Self study:	80h	64.00%



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### Content

#### Module 1 Human Automation Systems

Learning time: 32h

Theory classes: 8h  
Practical classes: 0h  
Laboratory classes: 6h  
Guided activities: 0h  
Self study : 18h

#### Description:

Pere Ponsa

- 1.1 Human Machine interaction
- 1.2 Robot work cell layout
- 1.3 Robot control
- 1.4 Automaiton project phases
- 1.5 Safety
- 1.6 Examples: human robot interaction

#### Related activities:

Examples and study cases where is established a relationship between interaction, technology and workplace design

#### Specific objectives:

Understand basic principles of interaction between humans, objects and complex systems. From human cells to robot work cells,

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<p>Module 2 Human factors for engineers</p>	<p>Learning time: 39h Theory classes: 10h Practical classes: 0h Laboratory classes: 8h Guided activities: 0h Self study : 21h</p>
<p>Description: Pere Ponsa</p> <ul style="list-style-type: none"><li>3.1 Sensation</li><li>3.2 Perception</li><li>3.3 Cognition and memory</li><li>3.4 Gestalt Principles and application to interface design</li><li>3.5 GEDIS guideline. Industrial automation interface design.</li><li>3.6 Examples</li><li>3.5 Joint cognitive system</li><li>3.6 Human error classification and design implications</li><li>3.7 Examples</li></ul> <p>Related activities: Study cases: automation systems</p> <p>Specific objectives: Know how the basic aspects of cognitive psychology can be useful in the interface design and the control of complex systems</p>	

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<p>Module 3 Usability engineering</p>	<p>Learning time: 39h            Theory classes: 10h            Practical classes: 0h            Laboratory classes: 8h            Guided activities: 0h            Self study : 21h</p>
<p>Description: Marta Díaz</p> <p>2.1 The process of quality assurance            2.2 InvestigationTechniques            2.3 Inspection Techniques            2.4 Test Techniques</p> <p>Related activities: Related to Module 5 project</p> <p>Specific objectives: Follow the user centred design and show how apply the usability engineering. How measure task effectiveness, efficiency and user satisfaction in the use of objects, systems and technology</p>	
<p>Module 4 User Experience</p>	<p>Learning time: 79h 45m            Theory classes: 41h 15m            Practical classes: 0h            Laboratory classes: 22h 30m            Guided activities: 0h            Self study : 16h</p>
<p>Description: Marta Díaz</p> <p>4.1 Beyond usability            4.2 Emotional Design            4.3 Interaction with technologies personified            4.4 A special case: the social relationship with robots</p> <p>Related activities: Study cases: Kismet, robot AIBO, robot Pleo, avatar</p> <p>Specific objectives: Learn how improve the relationship between the product design, the user experience and the emotional design</p>	

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<p>Module 5 Project</p>	<p>Learning time: 25h Theory classes: 20h Self study : 5h</p>
<p>Description: AL-116 Interactive Systems Design Laboratory</p> <p>Pere Ponsa Marta Díaz</p> <p>Related activities: Rapport Development of a CD multimedia Oral presentation</p> <p>Evaluation: work in class: (20%) Oral presentation (20) final rapport (60%)</p> <p>Specific objectives: - Performance - Human centred design - Ergonomics, usability and context of use</p> <p>Regarding with smart systems: Model process engineering of usability and accessibility applied to the use of a telerobot Pleo. Interface design in a supermarket machine. Interface design for automation systems</p>	

### Qualification system

The evaluation of the student will consider both the work group as the acquisition of content evaluated with one or more exams. These exams may have a short question or multiple choice test, and another open questions or development. Students will also have a score obtained from the oral presentation of the project, and according to his attendance and contributions in theoretical and practical classes.

Mark = Written exam \* 0.3 + Project \* 0.6 + Participation \* 0,1

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### Bibliography

#### Basic:

Van Gorp, Trevor; Adams, Edie. Design for emotion. Waltham, MA: Morgan Kaufmann, 2012. ISBN 9780123865311.

#### Complementary:

Norman, Donald A. El Diseño emocional : por qué nos gustan (o no) los objetos cotidianos. Barcelona: Paidós, 2005. ISBN 8449317290.

Human factors for engineers. London: The Institution of Electrical Engineers, 2004. ISBN 0863413293.

Norman, Donald A. La Psicología de los objetos cotidianos. 3a ed. San Sebastián: Nerea, 2011. ISBN 9788415042013.

#### Others resources:

##### Audiovisual material

Libro-e AIPO

<http://www.aipo.es/libro/libroe.php>

DSI

<http://www.epsevg.upc.edu/hcd/>

In-Tech llibres <http://www.intechopen.com/subjects/industrial-robotic-programming>  
Resource