



Subject: Human-Computer Interaction (HCI)  
Code: 32431  
Institution: Escuela Politécnica Superior  
Degree: Master's program in Research and Innovation in Information and Communications Technologies (I<sup>2</sup>-ICT)  
Level: Master  
Type: Elective [Human-Centered Software Development]  
ECTS: 6

## COURSE GUIDE: Human-Computer Interaction (HCI)

**Academic year:** 2017-2018

**Program:** Master's program in Research and Innovation in Information and Communications Technologies (I<sup>2</sup>-ICT)

**Center:** Escuela Politécnica Superior

**University:** Universidad Autónoma de Madrid

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## 1. ASIGNATURA / COURSE (ID)

### Interacción Persona-Ordenador Human-Computer Interaction (HCI)

#### 1.1. Programa / Program

Máster Universitario en Investigación e Innovación en Tecnologías de la Información y las Comunicaciones (I<sup>2</sup>-TIC)

Master in Research and Innovation in Information and Communications Technologies (I<sup>2</sup>-ICT) [Officially certified]

#### 1.2. Course code

32431

#### 1.3. Course areas

Computer Languages and Systems / Computer Science

#### 1.4. Tipo de asignatura / Course type

Optativa [itinerario: Software Centrado en el Usuario]  
Elective [itinerary: Human-Centered Software Development]

#### 1.5. Semester

First semester

#### 1.6. Credits

6 ECTS

#### 1.7. Language of instruction

Lecture notes are in English. Lectures are mostly in Spanish. However, some of the lectures and seminars may be taught in English.



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## 1.8. Recommendations / Related subjects

Knowledge of programming and ICT at an introductory level is useful to follow the course.

Related subjects are:

- Desarrollo de Software Dirigido por Modelos [Model-Driven Software Development]
- Sistemas Adaptativos y Modelado de Usuario [Adaptive Systems and User Modelling]
- Redes Sociales, Colaboración en Red [Social Networks and Collaboration on the Internet]
- Computación Ubicua e Inteligencia Ambiental [Ubiquitous Computing and Ambient Intelligence]

## 1.9. Lecturers

Add @uam.es to all email addresses below.

**Lectures and labs:**

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## 1.10. Objetivos de la asignatura / Course objectives

El objetivo fundamental de esta asignatura es abordar los conceptos sobre Interacción Persona-Ordenador deseables para un grado de máster en investigación, lo que implica conocer las áreas y los trabajos de investigación e innovación más importantes hoy en día en el área. Para ello, se describirán aspectos avanzados relacionados con la interacción entre personas y ordenadores, así como aspectos relativos a las interfaces de usuario en el marco de relevantes líneas de trabajo e investigación en el campo de la Interacción Persona-Ordenador en la actualidad.

The main objective of this course is to address research and innovation topics desirable for a master-in-research degree, principally related to Human-Computer Interaction. To do this, relevant works and research lines related to both user interfaces and user interaction will be addressed. The aim is to bring the student closer to relevant research topics today in the field of Human-Computer Interaction.

At the end of each unit, the student should be able to:

UNIT BY UNIT SPECIFIC OBJECTIVES	
<b>UNIT 1.- Introduction to HCI</b>	
1.1.	Provide a definition of HCI and related issues.
1.2.	Know the importance of HCI.
1.3.	Characterize the concept of user interface.
1.4.	Characterize promising lines in HCI.
1.5.	Characterize actual trends and research works.
<b>UNIT 2.- End-User Development</b>	
2.1.	Know the motivation of EUD.
2.2.	Understand main objectives and definitions.
2.3.	Identify research lines and applications.
2.4.	Know specific related issues such as intelligent user interfaces and model-based user interfaces.
<b>UNIT 3.- Research and Innovation on Accessibility</b>	
3.1.	Know the importance of accessibility today.
3.2.	Know the principal guidelines, standards and regulation about accessibility.
3.3.	Examine the quality and the market viability in accessibility.
3.4.	Characterize main tools and methods concerning accessibility.
3.5.	Know the principal works and trends in accessibility research.
<b>UNIT 4.- Internationalization</b>	
4.1.	Know the importance of facing internationalization in software development.
4.2.	Characterize the advantages of internationalization.
4.3.	Determine aspects to be considered in internationalized software.
4.4.	Characterize design clues.
4.5.	Know the principal resources and research to carry through internationalization.
<b>UNIT 5.- Research on Usability and User-Centered Design</b>	
5.1.	Know the usability and its importance in software development.



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5.2.	Describe the user-centered design process.
5.3.	Understand the process models to carry out usability objectives.
5.4.	Characterize principal techniques and activities in the user-centered process.
5.5.	Characterize actual trends and research works on usability.
<b>UNIT 6.- Interaction Design</b>	
6.1.	Understand the need of interaction design.
6.2.	Know different Interaction design approaches, objectives, principles and guidelines.
6.3.	Understand both user and interaction.
6.4.	Describe and apply the interaction design process.
6.5.	Explore research trends and new dimensions in interaction design.
<b>UNIT 7.- Affective Interaction</b>	
7.1.	Understand the concept of emotional interaction and related issues.
7.2.	Understand the nature of emotions and their role in reasoning and intelligence.
7.3.	Understand the value of integrating emotions in HCI.
7.4.	Know the different research lines in affective interaction.
<b>UNIT 8.- Experimentation in HCI</b>	
8.1.	Understand the scientific method and how it is applied to HCI research.
8.2.	Understand the importance of testing and experimentation in HCI and the way they are carried out.
8.3.	Understand the basic principles of experimental design.
8.4.	Understand the basis of experimental data analysis.
<b>UNIT 9.- Advanced Topics</b>	
9.1.	Know advanced research topics in the area of HCI that will be covered by invited speakers. Possible topics are related, but not limited, to Human Factors in HCI, 3D, Haptic and Physical Interaction, among others.

## 1.11. Course contents

1. Introduction to HCI
  - a. Definition of HCI
  - b. Importance of HCI
  - c. The User Interface
  - d. Research on HCI
2. End-User Development
  - a. Motivation
  - b. Main Objectives and Foundations
  - c. Research and Applications
  - d. Intelligent User Interfaces
  - e. Programming by Demonstration
  - f. Model-Based User Interfaces
3. Research and Innovation on Accessibility
  - a. Introduction



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- b. Basis on Accessibility
  - c. Guidelines, Standards and Regulations
  - d. Quality and Metrics
  - e. Resources, Tools and Methods
  - f. The Market for Accessible Technology
  - g. Research Trends and Works
4. Internationalization
- a. Introduction
  - b. Objectives and Goals
  - c. Analysis and Design Aspects
  - d. Localization
  - e. Resources and Tools
  - f. Research Trends
5. Research on Usability and User-Centered Design
- a. People in the Software Development
  - b. Basis on Usability and User-Centered Design
  - c. Windl Usability Process Model
  - d. MPIU+a - Accessibility and Usability Engineering Process Model
  - e. Research Trends
  - f. Bridging the Gap between HCI and Software Engineering
  - g. Extending the Personas Technique for Adoption in Requirements Engineering: PersonaSE
  - h. Usability Techniques in the Open Source Software Development Process
  - i. Reusable Solutions for Implementing Usability Functionalities
6. Research on Interaction Design
- a. Definition of Interaction Design
  - b. Interaction Design Approaches, Goals, Principles and Guidelines
  - c. User Cognition and Real World Emulation
  - d. User Conceptual Frameworks: Mental Models, Information Processing and External Cognition
  - e. Conceptual Interaction Models, Metaphors and Paradigms
  - f. Interaction Aspects: Task, Information, Sequence and Interface
  - g. Design Process
  - h. Extending the Scope of Interaction Design
  - i. Research Trends and Works
7. Affective Interaction
- a. Introduction
  - b. Emotions, reasoning and Intelligence
  - c. Limbic roles
  - d. Emotions, Turing test and affective communication
  - e. Developing, recognizing, expressing and “having” emotions
  - f. Building Affective Interaction
  - g. Research on Affective Interaction



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8. Experimentation in HCI
  - a. Research, Scientific Method and HCI
  - b. Empirical and Experimental Research
  - c. Experiments, Participants and Variables
  - d. Hypotheses, Error and Statistical Significance
  - e. How to observe in HCI?
  - f. Designing Experiments
  - g. Data Analysis
  - h. Study Case
  
9. Other Advanced and Research Topics
  - a. Human Factors in HCI
  - b. Alternative Paradigms: 3D, Haptic and Physical Interaction
  - c. Others yet to be Determined

## 1.12. Course bibliography

[Bibliography available at the library's catalogue \(click here\)](#)

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17. Nielsen, J. *Usability Engineering*. Academic Press (1993)
18. Nielsen, J. *Usabilidad. Diseño de Sitios Web*. Prentice-Hall (2000)
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21. Picard, R.W. *Affective Computing*. MIT Press (1998)
22. Preece, J., Rogers Y. & Sharp, H. *Interaction Design: Beyond Human Computer-Interaction*. Wiley (2011)
23. Purchase, H.C. *Experimental Human-Computer Interaction*. Cambridge University Press (2012)
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25. Shneiderman, B. *Designing the User Interface: Strategies for Effective Human-Computer Interaction*. Addison-Wesley (1998)
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27. Trappl, R. Petta. P. & Payr, S. *Emotions in humans and artifacts*. MIT Press (2002)
28. Tullis, T. & Albert, W. *Measuring the User Experience*. Morgan Kaufmann (2013)

### 1.13. Coursework and evaluation

The course involves lectures, weekly assignments, practical sessions, seminars and research work presentations and evaluations. The teaching methodology will be based on the delivery of continuous-evaluation works and participatory lectures, as well as the assessment of the student's personal work. It is expected, therefore, that the students attend classes and spend an estimated time of 4 hours per week to their personal work consisting in reading research literature and accomplishing the different works proposed by the teachers of the course. Requirements for work realization will be described in detailed statements to be published conveniently.

For the ordinary exam period, the evaluation of the course will be based on classroom attendance, the regular evaluation of the works proposed and the assessment and presentation of a final research work at the end of the semester. Classroom attendance is therefore mandatory. To pass the course, the maximum number of excused absences will not exceed, in any case, 20% of the total number of hours planned.





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Students are expected to devote the right time to elaborate and research the works proposed. That time should be used to generate a quality product including the appropriate bibliography. Critical aspect and the student's original contribution are encouraged. However, copy-paste from the web, poor or non-personal contribution, as well as other non-original activities will be penalized in the work evaluation. Besides, all continuous-evaluation works must be submitted electronically using the Moodle platform. Students are expected to meet the deadline for each work. The penalty for late submissions will be of -1.5 points, up to first day of delay, and -0.5 points for each day onwards. The counting of delay days will be based on calendar days, i.e., also including holidays

- In the ordinary exam period, the evaluation will be made according to the following scheme:
  - Mandatory class attendance (at least 80%)
  - 50% Continuous-evaluation works
  - 50% Final research work

For the extraordinary exam period - i.e., failing the continuous assessment during the semester, students will be requested to carry out a final examination, including the complete subject matter.

- In the extraordinary exam period, the evaluation will be made according to the following scheme:
  - 100% Oral or written examination comprising all the complete course material. Details will be conveniently given by the teachers.

In both the ordinary and the extraordinary exam period it is necessary to have a pass grade ( $\geq 5$ ) to pass the course.