



INTERNATIONAL  
CAMPUS OF  
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COORDINATION PROCESS OF  
LEARNING ACTIVITIES  
PR/CL/001



E.T.S. de Ingenieros  
Informaticos

# ANX-PR/CL/001-01

## LEARNING GUIDE

### SUBJECT

**103000693 - Programming of user interfaces**

### DEGREE PROGRAMME

10AQ - Eit Digital Master's Programme In Human Computer Interaction And Design

### ACADEMIC YEAR & SEMESTER

2018/19 - Semester 1

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## 1. Description

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### 1.1. Subject details

<b>Name of the subject</b>	103000693 - Programming of user interfaces
<b>No of credits</b>	6 ECTS
<b>Type</b>	Compulsory
<b>Academic year of the programme</b>	First year
<b>Semester of tuition</b>	Semester 1
<b>Tuition period</b>	September-January
<b>Tuition languages</b>	English
<b>Degree programme</b>	10AQ - Eit digital master's programme in human computer interaction and design
<b>Centre</b>	10 - Escuela Tecnica Superior de Ingenieros Informaticos
<b>Academic year</b>	2018-19

## 2. Faculty

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### 2.1. Faculty members with subject teaching role

<b>Name and surname</b>	<b>Office/Room</b>	<b>Email</b>	<b>Tutoring hours *</b>
Raul Alonso Calvo	D2315/5004	raul.alonso@upm.es	M - 10:00 - 13:00 W - 10:00 - 13:00
Guillermo Roman Diez (Subject coordinator)	D2304	guillermo.roman@upm.es	M - 10:00 - 14:00 Tu - 10:00 - 12:00
Angel Lucas Gonzalez Martinez	D2310/1004B	lucas.gmartinez@upm.es	M - 16:30 - 18:00 Tu - 11:30 - 14:00 W - 11:30 - 13:30

\* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

## 3. Prior knowledge recommended to take the subject

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### 3.1. Recommended (passed) subjects

El plan de estudios Eit Digital Master's Programme In Human Computer Interaction And Design no tiene definidas asignaturas previas recomendadas para esta asignatura.

### 3.2. Other recommended learning outcomes

- Programming skills, including elementary knowledge of object-oriented programming.

## 4. Skills and learning outcomes \*

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### 4.1. Skills to be learned

CB10 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

CE01 - Capacidad para la integración de tecnologías, aplicaciones, servicios y sistemas propios de la Ingeniería Informática, con carácter generalista, y en contextos más amplios y multidisciplinares.

CE04 - Capacidad para modelar, diseñar, definir la arquitectura, implantar, gestionar, operar, administrar y mantener aplicaciones, redes, sistemas, servicios y contenidos informáticos.

CE05 - Capacidad de comprender y saber aplicar el funcionamiento y organización de Internet, las tecnologías y protocolos de redes de nueva generación, los modelos de componentes, software intermediario y servicios

CE08 - Capacidad para analizar las necesidades de información que se plantean en un entorno y llevar a cabo en todas sus etapas el proceso de construcción de un sistema de información.

CE11 - Capacidad de diseñar y desarrollar sistemas, aplicaciones y servicios informáticos en sistemas empujados y ubicuos

CG01 - Capacidad de organizar y planificar

CG03 - Especificación y realización de tareas informáticas complejas, poco definidas o no familiares

CG04 - Capacidad para la aplicación de los conocimientos adquiridos y de resolver problemas en entornos nuevos o poco conocidos dentro de contextos más amplios y multidisciplinarios, siendo capaces de integrar estos conocimientos

CG09 - Apreciación de los límites del conocimiento actual y de la aplicación práctica de la tecnología más reciente

## 4.2. Learning outcomes

RA16 - Work with other peers collaborating in the design, prototype, and implementation interactive systems

RA14 - Choose a user interface technology platform that is most suitable for a new system

RA15 - Prototype digital interactive systems using specific tools for running prototypes

RA20 - Implement basic interactive android applications

RA19 - Implement basic interactive web applications using different JavaScript frameworks

RA18 - Implement basic interactive desktop applications

RA17 - Understand techniques, technologies and processes that allow to prototype, develop and improve digital interactive systems based on various user interface technology platforms

\* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

## 5. Brief description of the subject and syllabus

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### 5.1. Brief description of the subject

This course introduces the fundamentals of programming techniques for interactive systems. Students will learn how to design and implement good user interfaces, how user interface systems work and integrate with operating systems.

The course will focus on prototyping and development of simple graphical user interfaces (GUI) using rapid development tools such as graphical user interface layout editors combined with simple code to create functioning interfaces.

The course also focuses on practice in the skills needed for development of user interfaces to be deployed on desktop, on the World Wide Web, and on mobile platforms.

Concretely, students will learn to use technologies that are used for desktop, web and mobile applications:

- Basics on GUI, such as event-driven programming, or design patterns, like Model-View-Controller (MVC).
- Java Swing and JavaFX and their UI components, including aspects like drag-and-drop, data transfer, etc.
- Web programming, learning basics of HTML, CSS, DOM, JavaScript client-side Frameworks, server-side languages, and, client-server communications .
- Android framework and development, including system interaction, application states, layout generation, basic UI components.

## 5.2. Syllabus

### 1. Introduction

- 1.1. Introduction to principles in software design and development processes
- 1.2. Principles of object oriented programming and design techniques for GUI
- 1.3. Interaction programming and event driven programming

### 2. Programming Web Applications

- 2.1. Introduction to Web applications development
- 2.2. Web UI client-side components
- 2.3. Developing UI using Javascript Frameworks

### 3. Programming Desktop Applications

- 3.1. Desktop application interfaces
- 3.2. UI desktop common components
- 3.3. Developing UI using Java Swing and JavaFX

### 4. Programming Mobile Applications

- 4.1. Introduction to Android architecture
- 4.2. Android UI layouts and components
- 4.3. Developing UI in Android

## 6. Schedule

### 6.1. Subject schedule\*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Other face-to-face activities	Assessment activities
1	<p><b>1.1 Introduction to principles in software design and development processes</b> Duration: 01:00 Lecture</p> <p><b>1.2 Principles of object oriented programming and design techniques for GUI</b> Duration: 01:00 Lecture</p> <p><b>1.3 Interaction programming and event driven programming</b> Duration: 01:00 Lecture</p>			
2	<p><b>3.1 Introduction to Web applications development</b> Duration: 03:00 Lecture</p>			
3	<p><b>3.2 Web UI client-side components</b> Duration: 02:00 Lecture</p>	<p><b>3.2 Web UI client-side components</b> Duration: 01:00 Laboratory assignments</p>		
4	<p><b>3.3 Developing UI using Javascript Frameworks</b> Duration: 02:00 Lecture</p>	<p><b>3.3 Developing UI using Javascript Frameworks</b> Duration: 01:00 Laboratory assignments</p>		
5	<p><b>2.1 Desktop application interfaces</b> Duration: 03:00 Lecture</p>			
6	<p><b>2.2 UI desktop common components</b> Duration: 02:00 Lecture</p>	<p><b>2.2 UI desktop common components</b> Duration: 01:00 Laboratory assignments</p>		<p><b>Group assignment (GA1): Implementation of a web application UI prototype</b> Group work Continuous assessment Duration: 16:00</p>
7	<p><b>2.3 Developing UI using Java Swing and JavaFX</b> Duration: 02:00 Lecture</p>	<p><b>2.3 Developing UI using Java Swing and JavaFX</b> Duration: 01:00 Laboratory assignments</p>		
8	<p><b>2.3 Developing UI using Java Swing and JavaFX</b> Duration: 02:00 Lecture</p>	<p><b>2.3 Developing UI using Java Swing and JavaFX</b> Duration: 01:00 Laboratory assignments</p>		



9	<b>2.3 Developing UI using Java Swing and JavaFX</b> Duration: 02:00 Lecture	<b>2.3 Developing UI using Java Swing and JavaFX</b> Duration: 01:00 Laboratory assignments		
10	<b>2.3 Developing UI using Java Swing and JavaFX</b> Duration: 02:00 Lecture	<b>2.3 Developing UI using Java Swing and JavaFX</b> Duration: 01:00 Laboratory assignments		
11	<b>4.1 Introduction to Android architecture</b> Duration: 03:00 Lecture			
12	<b>4.2 Android UI layouts and components</b> Duration: 02:00 Lecture	<b>4.2 Android UI layouts and components</b> Duration: 01:00 Laboratory assignments		<b>Group assignment 2 (GA2): Implementation of a desktop application UI prototype</b> Group work Continuous assessment Duration: 16:00
13	<b>4.2 Android UI layouts and components</b> Duration: 02:00 Lecture	<b>4.2 Android UI layouts and components</b> Duration: 01:00 Laboratory assignments		
14	<b>4.3 Developing UI in Android</b> Duration: 02:00 Lecture	<b>4.3 Developing UI in Android</b> Duration: 01:00 Laboratory assignments		
15	<b>4.3 Developing UI in Android</b> Duration: 02:00 Lecture	<b>4.3 Developing UI in Android</b> Duration: 01:00 Laboratory assignments		
16	<b>4.3 Developing UI in Android</b> Duration: 02:00 Lecture	<b>4.3 Developing UI in Android</b> Duration: 01:00 Laboratory assignments		<b>Group assignment 3 (GA3): Implementation of an Android application UI prototype</b> Group work Continuous assessment Duration: 16:00
17				<b>Pupil portfolio presentation</b> Individual presentation Continuous assessment Duration: 03:00  <b>Assignment 1 (FA1): Implementation of a desktop application UI prototype</b> Individual work Final examination Duration: 08:00  <b>Assignment 2 (FA2): Implementation of a web application UI prototype</b> Individual work Final examination Duration: 08:00  <b>Assignment 3 (FA3): Implementation of an Android application UI prototype</b> Individual work Final examination Duration: 08:00  <b>Pupil portfolio presentation</b> Individual presentation Final examination Duration: 03:00

The independent study hours are training activities during which students should spend time on individual study or

individual assignments.

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

\* The subject schedule is based on a previous theoretical planning of the subject plan and might go through experience some unexpected changes along throughout the academic year.

## 7. Activities and assessment criteria

### 7.1. Assessment activities

#### 7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
6	Group assignment (GA1): Implementation of a web application UI prototype	Group work	No Presential	16:00	30%	3 / 10	CB10 CE08 CG03 CE01 CE04 CG01 CG04 CG09 CE05
12	Group assignment 2 (GA2): Implementation of a desktop application UI prototype	Group work	No Presential	16:00	30%	3 / 10	CE01 CE04 CB10 CE08 CG01 CG04 CG09
16	Group assignment 3 (GA3): Implementation of an Android application UI prototype	Group work	No Presential	16:00	30%	3 / 10	CE11 CE01 CE04 CB10 CE08 CG03 CG01 CG04 CG09 CE05
17	Pupil portfolio presentation	Individual presentation	Face-to-face	03:00	10%	5 / 10	CG01

#### 7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Assignment 1 (FA1): Implementation of a desktop application UI prototype	Individual work	No Presential	08:00	30%	3 / 10	CE01 CE04 CB10 CE08 CG01 CG04 CG09

17	Assignment 2 (FA2): Implementation of a web application UI prototype	Individual work	No Presential	08:00	30%	3 / 10	CE01 CE04 CB10 CE08 CG03 CG01 CG04 CG09 CE05
17	Assignment 3 (FA3): Implementation of an Android application UI prototype	Individual work	No Presential	08:00	30%	3 / 10	CE11 CE01 CE04 CB10 CE08 CG03 CG01 CG04 CG09 CE05
17	Pupil portfolio presentation	Individual presentation	Face-to-face	03:00	10%	5 / 10	

### 7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Group assignment 1 (GA1): Implementation of a desktop application UI prototype	Group work	Face-to-face	08:00	30%	3 / 10	CE01 CE04 CB10 CE08 CG01 CG04 CG09
Group assignment 2 (GA2): Implementation of a web application UI prototype	Group work	Face-to-face	08:00	30%	3 / 10	CE01 CE04 CB10 CE08 CG03 CG01 CG04 CG09 CE05
Group assignment 3 (GA3): Implementation of an Android application UI prototype	Group work	Face-to-face	08:00	30%	3 / 10	CE11 CE01 CE04 CB10 CE08 CG03 CG01 CG04 CG09

						CE05
Pupil portfolio presentation	Individual presentation	Face-to-face	00:30	10%	5 / 10	CG01

## 7.2. Assessment criteria

Grade Criteria based on:

- Students proactive participation in class
- Quality of pupil assignment
- Ability to understand concepts
- Capacity of presenting their work

NOTE: The groups of 3 people created to develop GA1, GA2 and GA3 cannot change along the course.

## 8. Teaching resources

### 8.1. Teaching resources for the subject

Name	Type	Notes
Moodle	Web resource	<a href="https://moodle.upm.es/titulaciones/oficiales">https://moodle.upm.es/titulaciones/oficiales</a>
Java Foundations: Introduction to Program Design and Data Structures	Bibliography	Lewis J., DePasquale P., Chase J., 2/E, Pearson, 2010
Java SDK	Others	
Eclipse EE	Others	
Android SDK	Others	
Android Studio	Others	