



POLITÉCNICA

INTERNATIONAL  
CAMPUS OF  
EXCELLENCE

COORDINATION PROCESS OF  
LEARNING ACTIVITIES  
PR/CL/001



E.T.S. de Ingenieros  
Informáticos

# ANX-PR/CL/001-01

## LEARNING GUIDE

### SUBJECT

**103000871 - Programming Of User Interfaces**

### DEGREE PROGRAMME

10AZ - Master Universitario En Innovación Digital

### ACADEMIC YEAR & SEMESTER

2021/22 - Semester 1

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## 1. Description

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### 1.1. Subject details

<b>Name of the subject</b>	103000871 - Programming Of User Interfaces
<b>No of credits</b>	6 ECTS
<b>Type</b>	Optional
<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>	10AZ - Master Universitario en Innovación Digital
<b>Centre</b>	10 - Escuela Tecnica Superior De Ingenieros Informaticos
<b>Academic year</b>	2021-22

## 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>
Angel Lucas Gonzalez Martinez	D2310/1004B	lucas.gmartinez@upm.es	M - 09:30 - 11:00 M - 16:30 - 17:30 Tu - 09:30 - 10:30 W - 10:00 - 12:30 Please, set up an appointment by email

Raul Alonso Calvo	D2315/5004	raul.alonso@upm.es	M - 10:00 - 13:00 W - 10:00 - 13:00 Please, set up an appointment by email
Guillermo Roman Diez (Subject coordinator)	D2304	guillermo.roman@upm.es	M - 12:00 - 15:00 W - 12:00 - 15:00 Please, set up an appointment by email

\* 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

The subject - recommended (passed), are not defined.

#### 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

CB07 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio

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.

CE-DIPO01 - Capacidad para conceptualizar, diseñar y desarrollar la interacción persona-ordenador de productos y servicios innovadores

CG02 - Que los estudiantes desarrollen la autonomía suficiente para participar en proyectos de investigación y colaboraciones científicas o tecnológicas dentro su ámbito temático explorando y generando nuevas ideas sistemáticamente, en contextos interdisciplinarios y, en su caso, con una alta componente de transferencia del conocimiento.

CG03 - La capacidad de usar la lengua inglesa de manera competente, es decir, con capacitación para tareas complejas de trabajo y estudio.

CG05 - Comprensión de los principios de la gestión de proyectos, riesgo y cambio, así como poseer la capacidad de aplicar metodologías y procesos para gestionar proyectos y mitigar los riesgos.

## 4.2. Learning outcomes

RA24 - Implement basic interactive desktop applications

RA23 - Implement basic interactive web applications using different JavaScript frameworks

RA21 - Implement basic interactive android applications

RA19 - Apply techniques for designing and implementing prototypes of different fidelity levels

\* 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).
- Android framework and development, including system interaction, application states, layout generation, basic UI components.
- Web programming, learning basics of HTML, CSS, DOM, JavaScript client-side Frameworks, server-side languages, and, client-server communications .
- Java Swing and JavaFX and their UI components, including aspects like drag-and-drop, data transfer, etc.

## 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

### 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 Mobile Applications

- 3.1. Introduction to Android architecture
- 3.2. Android UI layouts and components
- 3.3. Developing UI in Android

### 4. Programming Desktop Applications

- 4.1. Desktop application interfaces
- 4.2. UI desktop common components
- 4.3. Developing UI using Java Swing and JavaFX

## 6. Schedule

### 6.1. Subject schedule\*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	<b>1.1 Introduction to principles in software design and development processes</b> Duration: 01:00  <b>1.2 Principles of object oriented programming and design techniques for GUI</b> Duration: 01:00  <b>2.1 Introduction to Web applications development</b> Duration: 02:00		<b>1.1 Introduction to principles in software design and development processes</b> Duration: 01:00  <b>1.2 Principles of object oriented programming and design techniques for GUI</b> Duration: 01:00  <b>2.1 Introduction to Web applications development</b> Duration: 02:00	
2	<b>2.2 Web UI client-side components</b> Duration: 02:00	<b>4.2 Web UI client-side components</b> Duration: 02:00	<b>2.2 Web UI client-side components</b> Duration: 02:00  <b>4.2 Web UI client-side components</b> Duration: 02:00	
3	<b>2.3 Developing UI using Javascript Frameworks</b> Duration: 02:00	<b>2.3 Developing UI using Javascript Frameworks</b> Duration: 02:00	<b>2.3 Developing UI using Javascript Frameworks</b> Duration: 02:00  <b>2.3 Developing UI using Javascript Frameworks</b> Duration: 02:00	
4				<b>Group assignment 3 (GA3): Implementation of a web application UI prototype</b>  Continuous assessment Not Presential Duration: 08:00
5	<b>4.1 Desktop application interfaces</b> Duration: 02:00  <b>4.2 UI desktop common components</b> Duration: 01:00	<b>4.2 UI desktop common components</b> Duration: 01:00	<b>4.1 Desktop application interfaces</b> Duration: 02:00  <b>4.2 UI desktop common components</b> Duration: 01:00  <b>4.2 UI desktop common components</b> Duration: 01:00	

6	4.3 Developing UI using Java Swing and JavaFX Duration: 02:00	4.3 Developing UI using Java Swing and JavaFX Duration: 02:00	4.3 Developing UI using Java Swing and JavaFX Duration: 02:00  4.3 Developing UI using Java Swing and JavaFX Duration: 02:00	
7	4.3 Developing UI using Java Swing and JavaFX Duration: 02:00	4.3 Developing UI using Java Swing and JavaFX Duration: 02:00	4.3 Developing UI using Java Swing and JavaFX Duration: 02:00  4.3 Developing UI using Java Swing and JavaFX Duration: 02:00	
8				<b>Group assignment 2 (GA2): Implementation of a desktop application UI prototype</b>  Continuous assessment Not Presential Duration: 08:00
9	3.1 Introduction to Android architecture Duration: 02:00  3.2 Android UI layouts and components Duration: 01:00	3.2 Android UI layouts and components Duration: 01:00	3.1 Introduction to Android architecture Duration: 02:00  3.2 Android UI layouts and components Duration: 01:00  3.2 Android UI layouts and components Duration: 01:00	
10	3.2 Android UI layouts and components Duration: 02:00	3.2 Android UI layouts and components Duration: 02:00	3.2 Android UI layouts and components Duration: 02:00  3.2 Android UI layouts and components Duration: 02:00	
11	3.3 Developing UI in Android Duration: 02:00	3.3 Developing UI in Android Duration: 02:00	3.3 Developing UI in Android Duration: 02:00  3.3 Developing UI in Android Duration: 02:00	
12				<b>Group assignment 1 (GA1): Implementation of an Android application UI prototype</b>  Continuous assessment Not Presential Duration: 08:00



13				
14				<p><b>Pupil portfolio presentation</b></p> <p>Continuous assessment Presential Duration: 03:00</p>
15				
16				<p><b>Assignment 1 (FA1): Implementation of an Android application UI prototype</b></p> <p>Final examination Not Presential Duration: 08:00</p> <p><b>Assignment 3 (FA3): Implementation of a web application UI prototype</b></p> <p>Final examination Not Presential Duration: 08:00</p> <p><b>Pupil portfolio presentation</b></p> <p>Final examination Presential Duration: 03:00</p> <p><b>Assignment 2 (FA2): Implementation of a desktop application UI prototype</b></p> <p>Final examination Not Presential Duration: 08:00</p>
17				

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 schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

## 7. Activities and assessment criteria

### 7.1. Assessment activities

#### 7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
4	Group assignment 3 (GA3): Implementation of a web application UI prototype		No Presential	08:00	30%	3 / 10	CB10 CG02 CB07 CE-DIPO01 CG05
8	Group assignment 2 (GA2): Implementation of a desktop application UI prototype		No Presential	08:00	30%	3 / 10	CB10 CG02 CB07 CE-DIPO01 CG05
12	Group assignment 1 (GA1): Implementation of an Android application UI prototype		No Presential	08:00	30%	3 / 10	CB10 CG02 CG03 CB07 CE-DIPO01 CG05
14	Pupil portfolio presentation		Face-to-face	03:00	10%	5 / 10	CG03

#### 7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
16	Assignment 1 (FA1): Implementation of an Android application UI prototype		No Presential	08:00	30%	3 / 10	CB10 CG02 CB07 CE-DIPO01 CG05
16	Assignment 3 (FA3): Implementation of a web application UI prototype		No Presential	08:00	30%	3 / 10	CB10 CG02 CB07 CE-DIPO01 CG05
16	Pupil portfolio presentation		Face-to-face	03:00	10%	5 / 10	CG03

16	Assignment 2 (FA2): Implementation of a desktop application UI prototype		No Presential	08:00	30%	3 / 10	CB10 CG02 CB07 CE-DIPO01 CG05
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### 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		Face-to-face	08:00	30%	3 / 10	CB10 CG02 CB07 CE-DIPO01 CG05
Group assignment 2 (GA2): Implementation of a web application UI prototype		Face-to-face	08:00	30%	3 / 10	CB10 CG02 CB07 CE-DIPO01 CG05
Group assignment 3 (GA3): Implementation of an Android application UI prototype		Face-to-face	08:00	30%	3 / 10	CB10 CG02 CB07 CE-DIPO01 CG05
Pupil portfolio presentation		Face-to-face	00:30	10%	5 / 10	CG03

## 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

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### 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	

## 9. Other information

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### 9.1. Other information about the subject

NOTE: This course has 4 hours per week, thus, the course has a duration of 12 weeks instead of 15 weeks.