



POLITÉCNICA

INTERNATIONAL  
CAMPUS OF  
EXCELLENCE

COORDINATION PROCESS OF  
LEARNING ACTIVITIES  
PR/CL/001



E.T.S. de Ingeniería y Sistemas  
de Telecomunicación

# ANX-PR/CL/001-01

## LEARNING GUIDE

### SUBJECT

593000613 - Programming Of Wireless Devices

### DEGREE PROGRAMME

59AI - Master Universitario En Comunicaciones Inalámbricas

### ACADEMIC YEAR & SEMESTER

2024/25 - Semester 2

## Index

---

### Learning guide

1. Description.....	1
2. Faculty.....	1
3. Prior knowledge recommended to take the subject.....	2
4. Skills and learning outcomes .....	2
5. Brief description of the subject and syllabus.....	3
6. Schedule.....	5
7. Activities and assessment criteria.....	7
8. Teaching resources.....	9

## 1. Description

---

### 1.1. Subject details

<b>Name of the subject</b>	593000613 - Programming Of Wireless Devices
<b>No of credits</b>	4.5 ECTS
<b>Type</b>	Optional
<b>Academic year of the programme</b>	First year
<b>Semester of tuition</b>	Semester 2
<b>Tuition period</b>	February-June
<b>Tuition languages</b>	English
<b>Degree programme</b>	59AI - Master Universitario en Comunicaciones Inalámbricas
<b>Centre</b>	59 - Escuela Tecnica Superior De Ingeniería Y Sistemas De Telecomunicación
<b>Academic year</b>	2024-25

## 2. Faculty

---

### 2.1. Faculty members with subject teaching role

<b>Name and surname</b>	<b>Office/Room</b>	<b>Email</b>	<b>Tutoring hours *</b>
Jesus Rodriguez Molina (Subject coordinator)		jesus.rodriquezm@upm.es	- -
Alberto Martin Perez		a.martinp@upm.es	Sin horario.

\* 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

---

#### 3.1. Recommended (passed) subjects

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

#### 3.2. Other recommended learning outcomes

- XML and/or JSON understanding
- Java programming skills

### 4. Skills and learning outcomes \*

---

#### 4.1. Skills to be learned

CB6 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

CB7 - 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

CB8 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios

CGI02 - Comprender el procedimiento, valor y límites del método científico, siendo capaz de identificar, localizar y obtener datos requeridos en un trabajo de investigación, de diseñar y guiar investigaciones analíticas, de modelado y experimentales, así como de evaluar datos de una manera crítica y extraer conclusiones.

CGI03 - Valorar la importancia de las fuentes documentales, manejarlas y buscar la información para el desarrollo de cualquier trabajo de investigación.

CGI04 - Leer y comprender publicaciones dentro de su ámbito de estudio/investigación, así como su catalogación y valor científico.

UPM1 - Uso de la lengua inglesa

UPM4 - Organización y planificación /

## 4.2. Learning outcomes

RA23 - Choose the programming methods and tools necessary to tackle the solution of a problem

RA25 - Interpret data derived from empirical observations and measurements in terms of their importance and relate them to the appropriate theory.

RA22 - Identify the elements of the source code of a program and modify what is necessary to achieve a specific objective

RA24 - Apply the use of user and human-machine interfaces to improve the usability of a product

RA21 - Program the behavior of the sensors of a user equipment and extract the information collected by them

\* 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

---

### 5.1. Brief description of the subject

No hay descripción de la asignatura.

## 5.2. Syllabus

1. Introduction and basic Android User Interfaces
  - 1.1. Introduction and IDE
  - 1.2. Basic UI Events
  - 1.3. Event processing, responsiveness
2. Sensor Data Access
  - 2.1. Common mobile sensors
  - 2.2. Movement sensors
  - 2.3. Location sensors
3. Advanced Android User Interfaces
  - 3.1. Intents, layouts, orientation, lists
  - 3.2. Clean Architecture Design, Adapters
  - 3.3. Map interfaces: geolocation of measurements, open map APIs
  - 3.4. Data visualization
  - 3.5. Quick Response (QR) codes in Android
  - 3.6. Other UI elements
4. Communications and data processing
  - 4.1. Network interfaces
  - 4.2. Data parsing
  - 4.3. Cloud data management
  - 4.4. Message Queue Telemetry Transport

## 6. Schedule

### 6.1. Subject schedule\*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	<b>Introduction. Android IDE. Basic Android UI. Android sensor framework.</b> Duration: 02:00 Lecture	<b>Android Framework, Basic APPs, Sensor framework: practice</b> Duration: 02:00 Problem-solving class		
2	<b>Advanced Android UI: intents, layouts, orientation, lists and adapters</b> Duration: 02:00 Lecture	<b>Advanced UI guided practices</b> Duration: 02:00 Problem-solving class		
3	<b>Background threads. Network connection. Data parsing.</b> Duration: 02:00 Lecture	<b>Background threads, network connection and data parsing guided practices.</b> Duration: 02:00 Problem-solving class		
4	<b>Cloud data interfaces. Maps.</b> Duration: 02:00 Lecture	<b>Cloud data interfaces and Maps guided practices</b> Duration: 02:00 Problem-solving class		
5	<b>QR codes</b> Duration: 02:00 Lecture	<b>Exercises about reading and writing information from/to QR codes</b> Duration: 02:00 Problem-solving class		
6		<b>Practical works to exercise the latest learnt contents</b> Duration: 04:00 Problem-solving class		
7	<b>Data visualization. MQTT protocol</b> Duration: 02:00 Lecture	<b>Data visualization and MQTT guided exercises.</b> Duration: 02:00 Problem-solving class		
8				<b>First theoretical exam</b> Written test Progressive assessment and Global Examination Presential Duration: 02:00
9		<b>Project work in groups</b> Duration: 02:00 Cooperative activities		
10		<b>Project work in groups</b> Duration: 02:00 Cooperative activities		
11		<b>Project work in groups</b> Duration: 02:00 Cooperative activities		

12		<b>Project work in groups</b> Duration: 02:00 Cooperative activities		
13		<b>Project works in groups</b> Duration: 02:00 Cooperative activities		
14		<b>Project works in groups</b> Duration: 02:00 Cooperative activities		
15				<b>Project defense</b> Group presentation Progressive assessment and Global Examination Presential Duration: 02:00
16				
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.



## 7. Activities and assessment criteria

### 7.1. Assessment activities

#### 7.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
8	First theoretical exam	Written test	Face-to-face	02:00	30%	5 / 10	CB7 UPM1 UPM4 UPM5 CGI02
15	Project defense	Group presentation	Face-to-face	02:00	70%	5 / 10	CGI04 CB7 UPM1 UPM4 UPM5 CGI02 CGI03 CB6 CB8

#### 7.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
8	First theoretical exam	Written test	Face-to-face	02:00	30%	5 / 10	CB7 UPM1 UPM4 UPM5 CGI02
15	Project defense	Group presentation	Face-to-face	02:00	70%	5 / 10	CGI04 CB7 UPM1 UPM4 UPM5 CGI02 CGI03 CB6 CB8

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

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Extraordinary exam	Problem-solving test	Face-to-face	04:00	100%	5 / 10	CGI04 CB7 UPM1 UPM4 UPM5 CGI02 CGI03 CB6 CB8

### 7.2. Assessment criteria

The lectures given by the teachers will provide students with the basic knowledge on the design and implementation of mobile apps for IoT environments. Taking this knowledge as a starting point, students have to do both guided exercises and more self-guided elaborated projects individually and in groups. To perform these projects, students will receive assistance from the teachers, in class and in supervision sessions. The evaluation of this work will be done by assessing the code produced, a written report and an oral presentation done in front of the class, as well as an intermediate individual assessment.

At the beginning of the teaching period, each student can choose between two evaluation itineraries: Continuous evaluation itinerary: this is the option by default. In this itinerary, attendance to class is compulsory and the students will receive guidance during the development of their projects. To choose the option of the just final exam itinerary, it is necessary that the student requests it in written form, no later than one month after the beginning of the classes, and registers this application to the subject coordinator. In this case, it is understood that the student waives the right to receive guidance in class for their project, and attendance to class is not compulsory.

Regardless of the chosen itinerary, all students will have to do the practical work proposed by the teachers

throughout the class period, produce the written report and participate in the oral presentation of their project. Besides, attendance to the oral presentations of the rest of the groups is compulsory for both itineraries.

The final grade for the course will be provided by the teachers. It will be obtained taking into account a) the exams done individually by the students, b) the project to be carried out in groups, including its code and the generated documentation and c) the oral presentation of the project. The weights of these items are specified in the tables above. If a student does not pass the subject in the ordinary period, they will have the opportunity of going through an additional evaluation process during the extraordinary period.

## 8. Teaching resources

### 8.1. Teaching resources for the subject

Name	Type	Notes
Android developers website	Web resource	<a href="https://developer.android.com/">https://developer.android.com/</a>
Android Studio: download and user guide	Web resource	<a href="https://developer.android.com/studio">https://developer.android.com/studio</a>
Android Programming for Beginners	Bibliography	HORTON, J., 2021. Android Programming for Beginners - Third edition. Packt Publishing. Free online access for UPM students and staff.
Android Sensor Programming By Example	Bibliography	NAGPAL, V., 2016. Android sensor programming by example: take your Android applications to the next level of interactivity by exploring the wide variety of Android sensors. Packt Publishing. (Free online access for UPM students and staff)