UNIVERSIDADE DA CORUÑA

Teaching Guide				
Identifying Data				2024/25
Subject (*)	Systems Programming		**Code**	614G01058
Study programme	Grao en Enxeñaría Informática			
Descriptors				
Cycle	**Period**	**Year**	**Type**	**Credits**
Graduate	1st four-month period	Fourth	Optional	6
Language	SpanishEnglish			
Teaching method	Hybrid			
Prerequisites				
Department	Enxeñaría de Computadores			
Coordinador	Vazquez Regueiro, Carlos		**E-mail**	carlos.vazquez.regueiro@udc.es
Lecturers	Vazquez Regueiro, Carlos		**E-mail**	carlos.vazquez.regueiro@udc.es
Web				
General description	Programming embedded systems and mobile devices			

Study programme competences / results	
Code	**Study programme competences / results**
A32	Capacidade de desenvolver procesadores específicos e sistemas embarcados, así como desenvolver e optimizar o sóftware dos ditos sistemas.
A34	Capacidade de deseñar e implementar sóftware de sistemas e de comunicacións.
B1	Capacidade de resolución de problemas
C6	Valorar criticamente o coñecemento, a tecnoloxía e a información dispoñible para resolver os problemas cos que deben enfrontarse.
C7	Asumir como profesional e cidadán a importancia da aprendizaxe ao longo da vida.
C8	Valorar a importancia que ten a investigación, a innovación e o desenvolvemento tecnolóxico no avance socioeconómico e cultural da sociedade.

Learning outcomes			
Learning outcomes	**Study programme competences / results**		
Ability to develop Android applications in mobile devices, specific processors and embedded systems	A32 A34	B1	C6 C7 C8
Ability to develop Android applications with capacity of communications and interaction	A32 A34	B1	C6 C7 C8

Contents	
Topic	**Sub-topic**
1.1. Introduction to Systems Program	Introduction to Systems Program Subject presentaction
1.2. Introduction to Android	History and evolution Architecture and characteristics Main components Manifest
1.3. Development tools	SDK and Android Studio instalation Basic application and application structure Debugging and testing Application's Resources

2.1. Activities, Fragments and Intents	Activities and Cycle of life
	Intents, explicit and implicit
	Parameters exchange
	Fragments: estatics and dynamics
	Fragments communication
2.2. User interface	Layouts and Views
	Events
	Notifications
	Menus and Dialogs
	Lists and Adapters
2.3. Working in background	Local Services
	Bound Services
	Broadcast Receivers
	Processes and Threads
	Asynchronous threads
3.1. App architecture	Types of app architectures
	Distribution of layers
	Interchanges
3.2. Data persistence	Preferences
	Files internal and external
	Data bases: SQL and ROOM
	Content Providers
3.3. Interconnection	Communications
	Network services
	Cloud services
4.1. System services and Sensors	System services
	Sensors
	Location and Maps
4.2. Distribution	Publication
	Permissions
	Monetization

Planning				
Methodologies / tests	Competencies / Results	Teaching hours (in-person & virtual)	Student?s personal work hours	Total hours
Laboratory practice	A32 A34 B1 C6 C7	14	42	56
Supervised projects	A32 A34 B1 C6 C7 C8	7	35	42
Mixed objective/subjective test	A32 A34 B1 C6	2	11	13
Guest lecture / keynote speech	A32 A34	16	20	36
Personalized attention		3	0	3

(*)The information in the planning table is for guidance only and does not take into account the heterogeneity of the students.

Methodologies	
Methodologies	Description

Laboratory practice	Students will develop practices in the laboratory for learning programming mobile devices with Android. A series of practices following a script to familiarize the student with the concepts and the basic procedures of Android programming will be raised (competencies A32 and A34). It will also promote the expansion and improvement of the basic features of each proposed practice (competency C7) as well as the discussion and resolution of problems (competencies B1 and C6). The practices consist of an immediate part that is delivered at the end of the session and a deferred part that is delivered before the next session. Some practice may also consist of creating and presenting an individual work on some relevant aspect of mobile device programming. Part-time students could present all the practices of non Presential form.
Supervised projects	Works (applications) will be proposed to make students deepen in topics covered by the course (competences A32 and C34) and explore new knowledge (competencies C6 and C7). It will be valued especially that the application is functional and robust (competency B1) and is valuable for society (competency C8). Each work will be developed by a small number of students (typically between 2 and 4), so that group coordination and working methodology is very important. A small report of follow-up in the most important phases of development will also be required. Ideas and problems will be discussed primarily during the hours tutoring in small groups.
Mixed objective/subjective test	Exam and different mixed tests on the contents of the subject that will combine theory questions, practical questions, problem solving and individual work. In this type of tests, the acquisition of skills A32 and A34 is checked.
Guest lecture / keynote speech	Didactic exhibition of the theoretical content of the subject using slides and other ICT resources. Also, certain basic application will be explain in detail so that students can implement them and tested during laboratory practices. The lectures are oriented both to adquire the necesssary knowledges (A32 and A34) as to guide the students to autonomously search and adquire new knowledge (competency C7). Moreover, the lectures are used to encourage the discussion and criticism of different options and alternatives in the problem resolution (competences B1 and C6). Some of the sessions may be guided by the students themselves.

Personalized attention	
Methodologies	**Description**
Supervised projects Laboratory practice Guest lecture / keynote speech	Keynote session: attend and answer questions from students in relation to the theoretical material exposed in the lectures. Laboratory practice: attend and answer questions from students in relation to proposed or carried out in the laboratory practices. Supervised projects: attend and answer questions from students in relation to the proposed projects. The personalized attention will be carried out preferably by telematic means.

Assessment

Methodologies	Competencies / Results	Description	Qualification
Supervised projects	A32 A34 B1 C6 C7 C8	Evaluation of the work done by the student in the supervised projects by means of mixed tests. It includes various monitoring reports, the repository and the source code of the application, the application file and the exhibition of the final work through a video created by the participants.	30
Laboratory practice	A32 A34 B1 C6 C7	Evaluation of the work done by the student in the laboratory practice. Of this note, 5/6 will be the laboratory practices themselves, while 1/6 (10% final grade) will be for continuous monitoring.	40
Mixed objective/subjective test	A32 A34 B1 C6	Theoretical and practical knowledge of the subject will be assessed through different mixed tests, problem solving and/or individual work.	30

Assessment comments
The subject is approved by obtaining at least 50% of the rating. Part-time students could present all the practices of non Presential form. But the defense of supervised projects will be mandatory, face-to-face or virtual through ICT resources. In the July evaluation, the supervised project and the practices can be improved or presented. All aspects related to "academic exemption", "dedication to study", "permanence" and "academic fraud" will be governed in accordance with the current academic regulations of the UDC.

Sources of information	
Basic	- Jesús Tomás Gironés (2022). El gran libro de Android. Marcombo - Reto Meier e Ian Lake (2018). Professional Android. WRox - Joan Ribas Lequerica (2018). Manual imprescindible de desarrollo de aplicaciones para Android. Anaya Multimedia - Erik Hellman (2013). Android Programming: Pushing the Limits. Wiley - Joseph Annuzzi, Lauren Darcey y Shane Conder (2015). Introduction to Android Application Development. Android Essentials. Addison-Wesley - Jesús Tomás Gironés y Jaime Lloret Mauri (2022). El gran libro de Android . Marcombo - Eran Boudjnah (2022). Clean Architecture for Android. BPB Publications - Petros Efthymiou (2022). Clean Mobile Architecture: Become an Android, iOS, Flutter Architect.
Complementary	- Carmen Delessio, Lauren Darcey y Shane Conder (2015). Android Application development in 24 hours. SAMS - Joshua J. Drake , Zach Lanier , Collin Mulliner , Pau Oliva Fora, Stephen A. Ridley , Georg Wichersk (2014). Android Hacker's Handbook. Wiley - Joan Ribas Lequerica (2017). Desarrollo de aplicaciones para Android. Anaya - José Enrique Amaro Soriano (2019). Android. Programación de dispositivos móviles a través de ejemplos. Marcombo - Anders Goransson (2014). Efficient Android Threading: Asynchronous Processing Techniques for Android Applications. O'Reilly Media

Recommendations
Subjects that it is recommended to have taken before
Operating Systems/614G01016
Concurrency and Parallelism/614G01018
Subjects that are recommended to be taken simultaneously
Embedded Systems/614G01060
Subjects that continue the syllabus
Other comments