UNIVERSIDADE DA CORUÑA

| Teaching Guide | | | | |
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| Identifying Data | | | | 2020/21 |
| 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 | | | |
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| Lecturers | Porta Trinidad, Juan<br>Vazquez Regueiro, Carlos | E-mail | juan.porta@udc.es<br>carlos.vazquez.regueiro@udc.es | |
| Web | | | | |
| General description | Programming embedded systems and mobile devices | | | |

**Contingency plan**

1. Modifications to the contents

There are no plans to modify the contents

2. Methodologies

* Teaching methodologies that are maintained

All the proposed teaching methodologies can be adapted to a virtual classroom situation through telematic means.
All the information will be available to and accessible through the Moodle platform.

*Teaching methodologies that are modified

Depending on the situation, the final test could be replaced by an individual work in the form of an expository presentation.
Depending on the workload of the students, the deferred part of some of the laboratory practices can be reduced.

3. Mechanisms for personalized attention to students

Personalized attention will be carried out preferably by telematic means.
The Microsoft's tools (Teams, Stream, etc.) can be employed into the different methodologies: lectures, laboratory practices and supervised work.
The same scheme as in the face-to-face case will be maintained, to facilitate coordination with other subjects.

4. Modifications in the evaluation

*Evaluation observations:

No major changes are expected, except for possible substitution of the final test for the presentation of an individual job.

5. Modifications to the bibliography or webgraphy

No bibliographic changes expected

| 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<br>A34 | B1 | C6<br>C7<br>C8 |
| Ability to develop Android applications with capacity of communications and interaction | A32<br>A34 | B1 | C6<br>C7<br>C8 |

| Contents | |
|---|---|
| Topic | Sub-topic |
| 1.1. Introduction to Systems Program | Introduction to Systems Program<br>Subject presentaction |
| 1.2. Introduction to Android | History and evolution<br>Architecture and characteristics<br>Main components<br>Manifest |
| 1.3. Development tools | SDK and Android Studio instalation<br>Basic application and application structure<br>Debugging and testing<br>Application's Resources |
| 2.1. Activities, Fragments and Intents | Activities and Cycle of life<br>Intents, explicit and implicit<br>Parameters exchange<br>Fragments: estatics and dynamics<br>Fragments communication |
| 2.2. User interface | Layouts and Views<br>Events<br>Notifications<br>Menus and ToolBar<br>Dialogs<br>Lists and Adapters |
| 2.3. Working in background | Local Services<br>Bound Services<br>Broadcast Receivers<br>Processes and Threads<br>Asynchronous threads |

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| 3.1. App architecture | Types of app architectures<br>Distribution of layers<br>Interchanges |
| 3.2. Data persistence | Preferences<br>Files internal and external<br>Data bases: SQL and ROOM<br>Content Providers |
| 3.3. Interconnection | Communications<br>Connection by Post<br>Protocols: XML and JSON<br>Advanced network services |
| 4.1. System services and Sensors | System services<br>Connectivity<br>Wifi and Phone Services<br>Sensors |
| 4.2. Localization and Maps | Localization<br>Maps (Google Maps library)<br>Localization Services |
| 4.3. Distribution | Publication<br>Permissions<br>Monetization and Publicity<br>Optimization |

| 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 | 3 | 0 | 3 |
| Guest lecture / keynote speech | A32 A34 | 20 | 25 | 45 |
| Personalized attention | | 4 | 0 | 4 |
| (*)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).<br><br>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).<br><br>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.<br><br>Part-time students could present all the practices of non Presential form. |

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| 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).<br><br>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.<br><br>Ideas and problems will be discussed primarily during the hours tutoring in small groups. |
| Mixed objective/subjective test | Examination of the contents of the subject that will combine questions about theory and problem solving or an individual work about aspects not treated on the course.<br><br>This type of tests will be used to check competencies A32 and A34. |
| Guest lecture / keynote speech | Didactic exhibition of the theoretical content of the subject using slides and other ICT resources.<br>Also, certain basic application will be explain in detail so that students can implement them and tested during laboratory practices.<br><br>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).<br>Some of the sessions may be guided by the students themselves. |

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

| Assessment | | | |
|---|---|---|---|
| **Methodologies** | **Competencies / Results** | **Description** | **Qualification** |
| Mixed objective/subjective test | A32 A34 B1 C6 | The knowledge of the subject will be valued (including the problem solving) by means of mixed tests or an individual work on aspects not covered in the course. | 15 |
| 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.<br>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. | 40 |
| Laboratory practice | A32 A34 B1 C6 C7 | Evaluation of the work done by the student in the laboratory practice by means of mixed tests. | 45 |

| Assessment comments |
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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 mixed objetive/subjective test and defense of supervised projects will be mandatory, face-to-face or virtual through ICT resources. In the July evaluation, a mixed objetive/subjective test and defense of supervised project will be valued.

| Sources of information | |
|---|---|
| Basic | - Wie Meng Lee (2012). Android 4 Desarrollo de aplicaciones. Wrox (Anaya Multimedia)<br>- Jesús Tomás Gironés (2012). El gran libro de Android. Marcombo<br>- Reto Meier (2016). Professional Android. WRox<br>- Joan Ribas Lequerica (2014). Manual imprescindible de desarrollo de aplicaciones para Android. Anaya Multimedia<br>- Erik Hellman (2013). Android Programming: Pushing the Limits. Wiley<br>- Scott McCracken (2012). Android. Curso de desarrollo de aplicaciones. Inforbook<br>- Joseph Annuzzi, Lauren Darcey y Shane Conder (2015). Introduction to Android Application Development. Android Essentials. Addison-Wesley |
| Complementary | - Lauren Darcey y Shane Conder (2012). Android Application development in 24 hours. SAMS<br>- Joshua J. Drake , Zach Lanier , Collin Mulliner , Pau Oliva Fora, Stephen A. Ridley , Georg Wichersk (2014). Android Hacker's Handbook. Wiley<br>- Joan Ribas Lequerica (2012). Desarrollo de aplicaciones para Android. Anaya<br>- José Enrique Amaro Soriano (2012). Android. Programación de dispositivos móviles a través de ejemplos. Marcombo<br>- Anders Goransson (2014). Efficient Android Threading: Asynchronous Processing Techniques for Android Applications. O'Reilly Media |

| Recommendations |
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| Subjects that it is recommended to have taken before |
| Operating Systems/614G01016<br>Concurrency and Parallelism/614G01018 |
| Subjects that are recommended to be taken simultaneously |
| Embedded Systems/614G01060 |
| Subjects that continue the syllabus |
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| Other comments |
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**(*)The teaching guide is the document in which the URV publishes the information about all its courses. It is a public document and cannot be modified. Only in exceptional cases can it be revised by the competent agent or duly revised so that it is in line with current legislation.**