Course guides
270538 - PTDMA - Programming of Cell Phones and Mobile Autonomous Devices

Unit in charge: Barcelona School of Informatics
Teaching unit: 723 - CS - Department of Computer Science.
Degree: MASTER'S DEGREE IN INFORMATICS ENGINEERING (Syllabus 2012). (Optional subject).

Academic year: 2020  ECTS Credits: 3.0  Languages: Catalan, English

LECTURER

Coordinating lecturer: PERE PAU VÁZQUEZ ALCOCER
Others: Segon quadrimestre: PERE PAU VÁZQUEZ ALCOCER - 10

PRIOR SKILLS

Students need to be able to program with object-oriented languages. The course does not aim to teach a specific programming language, but the particularities of the platform. Development will be done in Java or Kotlin or similar, so prior knowledge of at least Java is required.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
CTE11. Capability to conceptualize, design, develop and evaluate human-computer interaction of products, systems, applications and informatic services.
CTE12. Capability to create and exploit virtual environments, and to the create, manage and distribute of multimedia content.

Generical:
CG8. Capability to apply the acquired knowledge and to solve problems in new or unfamiliar environments inside broad and multidisciplinary contexts, being able to integrate this knowledge.

Transversal:
CTR3. TEAMWORK: Capacity of being able to work as a team member, either as a regular member or performing directive activities, in order to help the development of projects in a pragmatic manner and with sense of responsibility; capability to take into account the available resources.
CTR5. APPROPRIATE ATTITUDE TOWARDS WORK: Capability to be motivated by professional achievement and to face new challenges, to have a broad vision of the possibilities of a career in the field of informatics engineering. Capability to be motivated by quality and continuous improvement, and to act strictly on professional development. Capability to adapt to technological or organizational changes. Capacity for working in absence of information and/or with time and/or resources constraints.

Basic:
CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.
CB9. Possession of the learning skills that enable the students to continue studying in a way that will be mainly self-directed or autonomous.
TEACHING METHODOLOGY

The course is organized laboratory sessions. These sessions are entirely practical. The goal is to learn to program phones and other mobile devices with Android as it develops a real application. Every week of the year is dedicated to the development of a theme and the corresponding component of the application.

Each session is organized as follows: During the first 30-60 minutes of teaching, the teacher will perform a short introduction to the subject and the rest is dedicated to implement exercises. In some cases, the explanation will be a little longer. Some days will be asked presenting exercises as individuals or groups. The idea is that there is discussion and comments on these presentations.

LEARNING OBJECTIVES OF THE SUBJECT

1. Development of an App using Android

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guided activities</td>
<td>3,0</td>
<td>4.00</td>
</tr>
<tr>
<td>Self study</td>
<td>48,0</td>
<td>64.00</td>
</tr>
<tr>
<td>Laboratory classes</td>
<td>24,0</td>
<td>32.00</td>
</tr>
</tbody>
</table>

Total learning time: 75 h

CONTENTS

Introduction and environment configuration

Description:
Introduction of the course and detailed description of the application to be developed as practical weekly exercise. Configuration of the (hardware and software) working environment and programming environment. First exercises with Android and design of the initial menus and components of the application. Installation on the devices.

Content providers and storage

Description:
Introduced some different content providers (media files, calendar, etc.) and explains how to access it. Storing options and its use are introduced.

Menus and Databases

Description:
Using menus (option menus, text menus, etc.) and databases within Android applications. Introduction to SQLite.

Design and programming of a part of the practical application related with this topic.
## Threads and Intents

**Description:**
Students are introduced to the need to use threads (the smallest sequence of programmed instructions that can be managed independently by an operating system scheduler) in mobile applications and how to program them using the class Thread from Java and the handler classes from Android.

Also in this session, we introduce the Intents and learn how to apply them to handle basic phone features such as calls and SMS messages. An intent is an abstract description of an operation to be performed, that provides a facility for performing late runtime binding between the code in different applications.

Design and programming of a part of the practical application related with this topic.

## Location and mapping

**Description:**
Geographical location and mapping on Android using the mobile devices’ GPS (Global Positioning System) along with the Mapview and Google Maps tools. Simulation of geographic positioning and movement of devices using DDMS (Dalvik Debug Monitor Server).

Design and programming of a part of the practical application related with this topic.

## Introduction to 2D and 3D graphics on Android devices

**Description:**
Design methods of graphical 2D and 3D applications are introduced. This includes the definition of primitives such as animation.
ACTIVITIES

Development of an Android App

Specific objectives:

1

Related competencies:
CG8. Capability to apply the acquired knowledge and to solve problems in new or unfamiliar environments inside broad and multidisciplinary contexts, being able to integrate this knowledge.
CTE11. Capability to conceptualize, design, develop and evaluate human-computer interaction of products, systems, applications and informatic services.
CTE12. Capability to create and exploit virtual environments, and to the create, manageme and distribute of multimedia content.
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CB6. Ability to apply the acquired knowledge and capacity for solving problems in new or unknown environments within broader (or multidisciplinary) contexts related to their area of study.

Full-or-part-time: 36h 18m
Laboratory classes: 21h
Guided activities: 4h 18m
Self study: 11h

App presentation

Full-or-part-time: 11h
Guided activities: 1h
Self study: 10h

GRADING SYSTEM

We evaluate two factors:

1. Participation in class:
   - Weekly work 50%. Evaluated with the delivery of one or more small works, or partial delivery of the project, and taking into account attendance.

2. Final project that extends the contents of the weekly exercises: 50%
BIBLIOGRAPHY

Basic:

Complementary: