
Academic Year: (2019 / 2020)**Review date: 25-04-2019**

Department assigned to the subject: Department of Telematic Engineering**Coordinating teacher: IBAÑEZ ESPIGA, MARIA BLANCA****Type: Compulsory ECTS Credits : 6.0****Year : 2 Semester : 1**

STUDENTS ARE EXPECTED TO HAVE COMPLETED

Programming and Systems Programming

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

1. The student must be able to design a software system using the C Programming Language containing non-trivial data structures, dynamic memory management, and using engineering techniques to translate a set of given high level constraints, derived from a hypothetical industrial setting, into a robust application.
2. The student must be able to use proficiently the following industry-category tools: a compiler with different options to generate debugging information and to analyze the diagnostics produced while developing the application, an Integrated Development Environment (IDE) to implement a software system, a version controlled system to handle regular development flows, a cross compiler to create multidevice versions of an application and conduct experiments to verify device compatibility, and profiling tools to analyze memory behavior in a software application.
3. The student must be able to: work effectively in a team to execute a project entailing the design of a software application on a mobile device, generate ideas collaboratively in a team to promote the exchange of information, organize the work in a team to optimize its performance and comply with the project requirements, and divide tasks effectively among the team members.
4. The student must be able to: learn autonomously, manage different information sources, generate and value concise information about the tasks accomplished, manage the time of personal work, and present effectively the results derived from the process.
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DESCRIPTION OF CONTENTS: PROGRAMME

The programme is divided into the following blocks:

1. The C programming language
 - 1.1. Basic data types and flow constructions
 - 1.2. Structure of a C application. The pre-processor, division in files and creating an executable.
 - 1.3. Pointer manipulation.
2. Dynamic memory management in C
 - 2.1. Dynamic data structures
 - 2.2. Memory leaks
 - 2.3. Concurrent tools
 - 2.4. Tools for detecting memory leaks
3. Architecture of the Linux
 - 3.1. Kernel, processes, and filesystem
 - 3.2. Main libraries
 - 3.3. Concurrency
4. Team project design
 - 4.1. Conflicts and their resolution
 - 4.2. Project development

LEARNING ACTIVITIES AND METHODOLOGY

The activities used to underpin the competences and the skills in the course are (preceded by the reference to the program objectives):

- Exercises covering the following topics: design the most appropriate data structure for a functionality in a mobile application, write code fragments to manipulate data structures, read/write fields, process data, etc, calculate the amount of memory occupied by different data structures (PO: a).
- During the lab sessions code fragments are written, compiled, linked and executed using different compiler options and detect, analyze and correct these programs using the debugger (PO: b).
- During the lab sessions code fragments are written to create, destroy and manipulate data structures using dynamic memory. Students are also requested to divide a given functionality into functions and write their code (PO: c).
- During an eight-week period students are divided into teams of four or five members and they must execute a project entailing the design of a software application containing multiple milestones, deliverables and objectives(PO: d).
- Write detailed meeting minutes with the action items and final conclusions, exchange information between teammates using chats, forums, email, explain the requirements derived from the specification of a work module, and the solution decided by the team (PO: g).
- Students are requested in several activities throughout the course to search for auxiliary documents to support the information studied in a topic. In their final report, they must acknowledge the information sources they used (PO: i).
- Use of the following tools: Virtual machines, compiler, IDE, version control and emulator in multiple laboratory sessions (PO: k).

During these activities the teaching staff reviews the student work in the class, supervises the lab sessions, answers questions in course forum, maintains at least one hour a week of office hours and calls for plenary office hours upon demand.

ASSESSMENT SYSTEM

Continuous evaluation (EC) for the course (60%):

- Individual lab (10%)
- Partial exam (10 %)
- Team project development (30%)
- Project test (10%)

Final Exam (EF)(40%)

- There is a minimum of 40% for this test

There are 10% of additional points for unscheduled activities. These points will be directly added on EC.

% end-of-term-examination:	40
% of continuous assessment (assignments, laboratory, practicals...):	60

BASIC BIBLIOGRAPHY

- Steve Oualline: Practical C Programming, Proquest, 1991