SOFTWARE ENGINEERING

Code: 10801

Main Scientific Area: Information Systems and Artificial Intelligence

Lecturer: Margarida Isabel Pereira Portela

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 60h Total Workload: 100h

ECTS: 6,0

Objectives

This class intends to present the principles of software engineering and encourage students to use the most appropriate techniques and tools throughout the software development process.
This class has as main objective to help students to obtain skills to plan, manage and execute all activities of the development process of a software system.

Learning Outcomes

At the end of this class, students should have the ability to:

. Identify the general principles of Software Engineering (ES);

. Identify and use techniques and tools appropriate to each phase of the software development process;

. Plan, manage and execute the activities of the software development process.

Course Contents

INTRODUCTION

. Background to software engineering

. Software life cycle

. Software development process

SOFTWARE ARCHITECTURE

Principles of architecture construction

. Importance of documentation

. Patterns and styles of architecture

. Service-oriented architecture

DEVELOPMENT MODELS

. Classic development processes (e.g. waterfall)
. Agile development (e.g. eXtreme Programming, IRUP)

. SCRUM

SYSTEM SPECIFICATION

. Requirements (Requirements Engineering)

. Commonly used tools (e.g. UML)

. Documentation

DEVELOPMENT

. Construction phases
. Coding (e.g. commenting, compliance)
. Solution organization (projects, packages, modules, etc.)

. Development support tools (e.g. repositories, team communication)

SOFTWARE TESTING AND QUALITY

. Development environments types

. Testing phases

. Types of testing

. Testing tools and techniques

. Software quality

Recommended Bibliography

. Braude, E. Bernstein, M. (2010). So*ware Engineering – Modern Approaches (2nd ed.). Waveland Press, Inc.

. Glenford, J.M.; Sandler, C. Badgett, T. (2015). The Art of Software Testing (3rd ed.). Wiley.

. Leach, R. (2010). Introduc:on to Software Engineering (2nd ed.). CRC Press Publica>ons.

. Pressman, R.S. Maxim. B. (2015). Software Engineering: A Prac::oner's Approach (8th ed.). McGraw Hill.

. Schwaber, K. Sutherland, J. (2017). The Scrum Guide – The definitve guide to Scrum: The rules of the game (e-book).

. Sommerville, I. (2016). Software Engineering (10th ed.). Pearson Publishers.

. Stephens, R. (2015). Beginning Software Engineering (10th ed.). John Wiley Sons, Inc.

. Unhelkar, B. (2018). So*ware Engineering with UML. CRC Press Publications

Learning and Teaching Methods

This class aims to provide students with the tools to perform a rigorous approach to software development.

The first chapter gives an introduction to software engineering. The second presents software architecture. The third chapter presents the main models of software development process, taking into consideration the advantages and disadvantages of each one. Subsequently system specification is addressed recalling the importance of requirements engineering and visual tools (e.g. UML). Good coding practices and software construction phases are covered in chapter five. The last chapter covers software testing and quality.

In order to put the acquired knowledge into practice, students will carry out and manage the development of applications, where they can put into practice the knowledge obtained in the course.

Assessment Methods

Continuous assessment – 2 components:

Practical Component:

GW: group work (continuous assessment)

WG.IG: individual grade = WG defense (comp. theoretical work) (40%)

WG.SG: solution grade = WG grade (work practice) (20%),

in addition to:

Theoretical Component:

PP: proposed project (grade differentiated by student contribution) (30%), and

I: individual transversal assessment (individual: performance in class context) (10%).

Frequency Grade (FG: Final) = WG.IG*40% + WG.SG*20% + PP*30% + I*10%

Whereas:

- Approval, if the FG >= 10 values;

- Minimum marks for approval: WG.IG >= 10 values, and PP >= 10 values;

- The practical component (WG) can only be carried out during the academic period;

- Failure to pass the PP implies assessment during the exam period – replacing this component of the grade with assessment in the form of an exam.

Assessment during Exam Period (resource, special, others...), in this case:

IFE: individual final exam (exam period) (30%)

Exam Season Grade (ESG: Final) = WG.IG*40% + WG.SG*20% + IFE*30% + I*10%

It is considered that:

- Approval, if the ESG >= 10 values;

- Minimum marks for approval: WG.IG>= 10 values, and IFE >= 10 values

Considerations:

Group work

- Group Work (TG) is mandatory for presentation, defense and approval;

- The constitution of each group (maximum of 3 members) must be communicated by the end of the first month of classes;

- The defense is individual and mandatory (for the award of the WG.IG component).

- Failure to deliver on the date defined for the defense/oral test (WG.IG) corresponds to non-delivery, i.e., WG = zero values;

- The development is only valid during the continuous evaluation period.

Proposed project

- The Proposed Project (PP) is mandatory for presentation, defense and approval;

- The constitution of each group (maximum of 3 members) must be communicated to the teacher by the end of the first month of classes;

- Delivery must be made in the form of a presentation to the class – with the right to questions from assistants;

- The chosen topic must be communicated to the teacher within the defined deadline (see UC timetable). The development of the same theme by several groups will not be permitted. Priority in presentation depends on the order in which the groups are delivered.

- Failure to complete by the end of the semester corresponds to a classification of 0 values, that is, PP = zero values.

- The grade will be different per student, depending on their individual contribution to the (final) result.

- The grade will focus on execution (SG) and individual defense (IG) (questions about work carried out).

- Deliveries or improvements will not be accepted after the defined date (see UC calendar).

Individual Final Exam

- The Individual Final Exam (EFI) is a written test (on paper) to be taken during the exam period;

- Consult other aspects relating to the assessment method to find out the restrictions on access to this test.

- The questions will cover material taught throughout the semester.