



POLITÉCNICA

INTERNATIONAL
CAMPUS OF
EXCELLENCE

COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingenieros
Informaticos

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000542 - Experimental Software Engineering

DEGREE PROGRAMME

10AM - Master Universitario En Ingenieria Del Software

ACADEMIC YEAR & SEMESTER

2021/22 - Semester 2

Index

Learning guide

1. Description.....	1
2. Faculty.....	1
3. Prior knowledge recommended to take the subject.....	2
4. Skills and learning outcomes	2
5. Brief description of the subject and syllabus.....	3
6. Schedule.....	6
7. Activities and assessment criteria.....	8
8. Teaching resources.....	10

1. Description

1.1. Subject details

Name of the subject	103000542 - Experimental Software Engineering
No of credits	6 ECTS
Type	Optional
Academic year of the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	10AM - Master Universitario en Ingenieria del Software
Centre	10 - Escuela Tecnica Superior De Ingenieros Informaticos
Academic year	2021-22

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Natalia Juristo Juzgado	D-5104	natalia.juristo@upm.es	Sin horario.
Sira Vegas Hernandez (Subject coordinator)	D-5105	sira.vegas@upm.es	Tu - 14:00 - 17:00 Th - 12:00 - 15:00

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Prior knowledge recommended to take the subject

3.1. Recommended (passed) subjects

The subject - recommended (passed), are not defined.

3.2. Other recommended learning outcomes

- Basic knowledge of statistics.

4. Skills and learning outcomes *

4.1. Skills to be learned

CE13 - Tener una visión de los distintos aspectos específicos y emergentes de la ingeniería del software, y profundizar en algunos de ellos

CE14 - Comprender lo que pueden y no pueden conseguir las prácticas actuales de ingeniería del software, y sus limitaciones y su posible futura evolución.

CG1 - Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución de problemas en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio (RD)

CG13 - Apreciación de los límites del conocimiento actual y de la aplicación práctica de la tecnología más reciente

CG14 - Conocimiento y comprensión de la informática necesaria para la creación de modelos de información, y de los sistemas y procesos complejos

CG18 - Capacidad de trabajar y comunicarse también en contextos internacionales

CG3 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades (RD)

CG6 - Gestión de la información

CG7 E - Especificación y realización de tareas informáticas complejas, poco definidas o no familiares

CG8 - Planteamiento y resolución de problemas también en áreas nuevas y emergentes de su disciplina

CG9 - Aplicación de los métodos de resolución de problemas más recientes o innovadores y que puedan implicar el uso de otras disciplinas

4.2. Learning outcomes

RA13 - Given a particular software engineering field, the student will be able to design and evaluate the most adequate approach to solve some of the related problems, highlighting the technical difficulties and limits of application.

* The Learning Guides should reflect the Skills and Learning Outcomes in the same way as indicated in the Degree Verification Memory. For this reason, they have not been translated into English and appear in Spanish.

5. Brief description of the subject and syllabus

5.1. Brief description of the subject

Software engineering technologies are not being adequately evaluated. That is, professionals do not know for sure whether a technology is effective or not and, if so, cannot be sure how effective and applicable it is. This lack of proper evaluation undermines the ability of the industry to produce competitive quality software.

Experimental Software Engineering (ESE) is a discipline of Software Engineering that aims to produce reliable information for professionals about what technologies should be used in software development projects. ESE uses empirical studies (experiments, quasi-experiments, case studies, etc.) to evaluate the effectiveness of technologies for software development.

This course aims to train students in the basic skills necessary to apply the empirical methods. It focuses on the experiments, since they constitute the most mature and best understood type of empirical study in the field of SE. Students will learn how to perform, analyze, aggregate and replicate experiments (in industry and in academic settings).

5.2. Syllabus

1. Introduction to Experimental Software Engineering
 - 1.1. Basics of experimentalism
 - 1.2. The scientific method
 - 1.3. Scientific rules: cause-effect relationships
 - 1.4. Scientific immaturity of software engineering
2. Laboratory and Experiment
 - 2.1. The concept of laboratory
 - 2.2. The concept of experiment
 - 2.3. A lab for software engineering
 - 2.4. An experiment for software engineering
3. Elements of an Experiment
 - 3.1. Response variables
 - 3.2. Factors and levels
 - 3.3. Types of empirical studies
4. Designing Experiments
 - 4.1. Types of variables
 - 4.2. Types of control
 - 4.3. Validity
5. Data Analysis
 - 5.1. Basics of inferential statistics
 - 5.2. Parametric tests for independent samples

5.3. Parametric tests for related samples

5.4. Non parametric tests

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	Lecture: Chapter 1 Duration: 04:00 Lecture			
2	Lecture: Chapter 2 Duration: 02:00 Lecture Problem-solving activity: Chapter 3 Duration: 02:00 Problem-solving class			
3	Lecture: Chapter 3 Duration: 01:00 Lecture Problem-solving activity: Chapter 3 Duration: 01:00 Problem-solving class	Lecture: Chapter 5 Duration: 02:00 Laboratory assignments		
4	Lecture: Chapter 4 Duration: 02:00 Lecture Problem-solving activity: Chapter 4 Duration: 02:00 Problem-solving class			
5	Brainstorming and group discussion of assignment 1 Duration: 02:00 Problem-solving class	Lecture: Chapter 5 Duration: 02:00 Laboratory assignments		
6	Brainstorming and group discussion of assignment 1 Duration: 02:00 Problem-solving class	Lecture: Chapter 5 Duration: 02:00 Laboratory assignments		
7				
8		Lecture: Chapter 5 Duration: 04:00 Laboratory assignments		
9				Presentation of assignments 1-3 Group presentation Continuous assessment Presential Duration: 04:00

10		Brainstorming and group discussion of assignment 4 Duration: 04:00 Laboratory assignments		
11		Brainstorming and group discussion of assignment 4 Duration: 04:00 Laboratory assignments		
12				Presentation of assignment 4 Group presentation Continuous assessment Presential Duration: 04:00
13				
14				
15				
16				
17				Final exam Written test Final examination Presential Duration: 04:00

Depending on the programme study plan, total values will be calculated according to the ECTS credit unit as 26/27 hours of student face-to-face contact and independent study time.

* The schedule is based on an a priori planning of the subject; it might be modified during the academic year, especially considering the COVID19 evolution.

7. Activities and assessment criteria

7.1. Assessment activities

7.1.1. Continuous assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
9	Presentation of assignments 1-3	Group presentation	Face-to-face	04:00	50%	5 / 10	CG14 CG18 CE13 CE14 CG1 CG7 E CG13 CG6 CG8 CG9 CG3
12	Presentation of assignment 4	Group presentation	Face-to-face	04:00	50%	5 / 10	CG14 CG18 CE13 CG13 CE14 CG1 CG7 E CG6 CG8 CG9 CG3

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Final exam	Written test	Face-to-face	04:00	100%	5 / 10	CG13 CG14 CG18 CE13 CE14 CG1 CG7 E CG6 CG8 CG9 CG3

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Extraordinary exam	Written test	Face-to-face	04:00	100%	5 / 10	CG14 CG18 CE13 CG13 CE14 CG3 CG1 CG7 E CG6 CG8 CG9

7.2. Assessment criteria

- Students following continuous evaluation will be evaluated using the assignments only. No examination will be made. The assessment of assignments will depend on (1) presentation made by the students and (2) the correctness of the results. The final grade will be calculated using a weighted average as described above.
- Students following final test evaluation will be evaluated by means of an exam.

8. Teaching resources

8.1. Teaching resources for the subject

Name	Type	Notes
Natalia Juristo, Ana Moreno. Basics of software engineering experimentation. Kluwer 2001	Bibliography	
Claes Wohlin et al. Experimentation in software engineering: an introduction. Kluwer 2000.	Bibliography	
Course Moodle site	Web resource	www.moodle.upm.es
Laboratory	Equipment	TBD
Room	Equipment	MUIS room