



POLITÉCNICA

INTERNATIONAL
CAMPUS OF
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COORDINATION PROCESS OF
LEARNING ACTIVITIES
PR/CL/001



E.T.S. de Ingenieros
Informáticos

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000379 - Experimentation In Software Engineering

DEGREE PROGRAMME

10AK - Master Universitario En Software Y Sistemas

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.....	4
6. Schedule.....	6
7. Activities and assessment criteria.....	8
8. Teaching resources.....	10

1. Description

1.1. Subject details

Name of the subject	103000379 - Experimentation In Software Engineering
No of credits	4 ECTS
Type	Optional
Academic year of the programme	First year
Semester of tuition	Semester 2
Tuition period	February-June
Tuition languages	English
Degree programme	10AK - Master Universitario en Software y Sistemas
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 *
Sira Vegas Hernandez (Subject coordinator)	D-5105	sira.vegas@upm.es	Tu - 14:00 - 17:00 Th - 12:00 - 15:00
Natalia Juristo Juzgado	D-5104	natalia.juristo@upm.es	Sin horario.

* 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

CEM1 - Identificar, a partir del estado de la cuestión, la presencia de problemas de investigación relacionados con la concepción, la construcción, el uso y la evaluación de sistemas sociotécnicos complejos que hagan un uso intensivo de software

CEM3 - Aplicar métodos de investigación relevantes a problemas abiertos en el área de la Ingeniería del Software, relacionados tanto con las características peculiares del producto software como con la gestión del desarrollo del mismo

CG12 - Comprensión amplia de las técnicas y métodos aplicables en una especialización concreta, así como de sus límites

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

CG17 - Habilidades de gestión y capacidad de liderar un equipo que puede estar integrado por disciplinas y niveles distintos.

CG4 - Que los estudiantes posean las habilidades de aprendizaje que les permitan continuar estudiando de un modo que habrá de ser en gran medida autodirigido o autónomo.

CG7 - 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

CG120 - Adquirir conocimientos científicos avanzados del campo de la informática que le permitan generar nuevas ideas dentro de una línea de investigación.

CG123 - Capacidad de leer y comprender publicaciones dentro de su ámbito de estudio/investigación, así como su catalogación y valor científico

4.2. Learning outcomes

RA23 - Comprender la aplicación del paradigma experimental en ingeniería del software

RA24 - Diseñar experimentos en ingeniería del software, incluyendo replicaciones experimentales

* 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.

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 Final exam Written test Final examination Presential Duration: 04:00

10				
11				
12				
13				
14				
15				
16				
17				

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	100%	5 / 10	CG17 CGI20 CGI23 CG8 CG9 CG12 CG13 CEM3 CEM1 CG4 CG7

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
9	Final exam	Written test	Face-to-face	04:00	100%	5 / 10	CG17 CGI20 CGI23 CG8 CG9 CG12 CG13 CEM3 CEM1 CG4 CG7

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Extraordinary exam	Written test	Face-to-face	02:00	100%	5 / 10	CG14 CG17 CG120 CG123 CG8 CG9 CG12 CG13 CEM3 CEM1 CG4 CG7

7.2. Assessment criteria

- Students 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 before.

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