



POLITÉCNICA

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



E.T.S. de Ingenieros
Informaticos

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

2023/24 - Semester 2

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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	2023-24

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 replicas experimentales

RA35 - Realizar agregaciones de experimentos en ingeniería del software

* 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	Classroom activities	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				Submission and presentation of assignment 1 Group presentation Continuous assessment Presential Duration: 15:00
8		Lecture: Chapter 5 Duration: 04:00 Laboratory assignments		
9				Submission of assignment 2 Group work Continuous assessment Not Presential Duration: 10:00

10				
11				
12				
13				
14				
15				
16				
17				<p>Re-submission and presentation of assignment 1 Group work Final examination Presential Duration: 15:00</p> <p>Re-submission of assignment 2 Group work Final examination Not Presential Duration: 10:00</p>

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. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
7	Submission and presentation of assignment 1	Group presentation	Face-to-face	15:00	50%	5 / 10	CEM1 CG4 CG7 CG8 CG9 CG12 CG13 CG14 CG17 CGI20 CGI23 CEM3
9	Submission of assignment 2	Group work	No Presential	10:00	50%	5 / 10	CEM1 CG4 CG7 CG8 CG9 CG12 CG13 CG17 CGI20 CGI23 CEM3

7.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Re-submission and presentation of assignment 1	Group work	Face-to-face	15:00	50%	5 / 10	CEM1 CG4 CG7 CG8 CG9 CG12 CG13 CG14 CG17 CGI20 CGI23 CEM3

17	Re-submission of assignment 2	Group work	No Presential	10:00	50%	5 / 10	CEM1 CG4 CG7 CG8 CG9 CG12 CG13 CG17 CGI20 CGI23 CEM3
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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	CEM1 CG4 CG7 CG8 CG9 CG12 CG13 CG14 CG17 CGI20 CGI23 CEM3

7.2. Assessment criteria

During the progressive evaluation period:

- Students will be evaluated using the assignments only. No examination will be made.
- The assessment of assignments will depend on the correctness of the results. Additionally, for assignment 1 the presentation made by the students will be taken into consideration.
- The final grade will be calculated using a weighted average (each assignment counts 50% of final score).

For the global evaluation:

- Failed assignments (and/or presentations) will have to be re-submitted.

For the extraordinary evaluation, students will have to perform an exam. After 2 submission trials (during progressive evaluation and global evaluation), if a student has not been able to pass the course, it means that the assignments mode is not suitable for him/her. Therefore, a different evaluation method should be used.

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