



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

2018/19 - Semester 2

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## 1. Description

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### 1.1. Subject details

<b>Name of the subject</b>	103000542 - Experimental software engineering
<b>No of credits</b>	6 ECTS
<b>Type</b>	Optional
<b>Academic year of the programme</b>	First year
<b>Semester of tuition</b>	Semester 2
<b>Tuition period</b>	February-June
<b>Tuition languages</b>	English
<b>Degree programme</b>	10AM - Master universitario en ingenieria del software
<b>Centre</b>	10 - Escuela Tecnica Superior de Ingenieros Informaticos
<b>Academic year</b>	2018-19

## 2. Faculty

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### 2.1. Faculty members with subject teaching role

<b>Name and surname</b>	<b>Office/Room</b>	<b>Email</b>	<b>Tutoring hours *</b>
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

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### 3.1. Recommended (passed) subjects

El plan de estudios Master Universitario en Ingeniería del Software no tiene definidas asignaturas previas recomendadas para esta asignatura.

### 3.2. Other recommended learning outcomes

- Basic knowledge of statistics.

## 4. Skills and learning outcomes \*

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### 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.

### 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

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### 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	Other face-to-face activities	Assessment activities
1	<b>Lecture: Chapter 1</b> Duration: 04:00 Lecture			
2	<b>Lecture: Chapter 2</b> Duration: 02:00 Lecture  <b>Problem-solving activity: Chapter 3</b> Duration: 02:00 Problem-solving class			
3	<b>Lecture: Chapter 3</b> Duration: 01:00 Lecture  <b>Problem-solving activity: Chapter 3</b> Duration: 01:00 Problem-solving class	<b>Lecture: Chapter 5</b> Duration: 02:00 Laboratory assignments		
4	<b>Lecture: Chapter 4</b> Duration: 02:00 Lecture  <b>Problem-solving activity: Chapter 4</b> Duration: 02:00 Problem-solving class			
5	<b>Brainstorming and group discussion of assignment 1</b> Duration: 02:00 Problem-solving class	<b>Lecture: Chapter 5</b> Duration: 02:00 Laboratory assignments		
6	<b>Brainstorming and group discussion of assignment 1</b> Duration: 02:00 Problem-solving class	<b>Lecture: Chapter 5</b> Duration: 02:00 Laboratory assignments		
7				
8		<b>Lecture: Chapter 5</b> Duration: 04:00 Laboratory assignments		
9				<b>Presentation of assignments 1-3</b> Group presentation Continuous assessment Duration: 04:00
10		<b>Brainstorming and group discussion of assignment 4</b> Duration: 04:00 Laboratory assignments		

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

The independent study hours are training activities during which students should spend time on individual study or individual assignments.

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 subject schedule is based on a previous theoretical planning of the subject plan and might go through experience some unexpected changes along throughout the academic year.



## 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	CE14 CE13
12	Presentation of assignment 4	Group presentation	Face-to-face	04:00	50%	5 / 10	CE14 CE13

#### 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	CE14 CE13

#### 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	CE14 CE13

## 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

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### 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	<a href="http://www.moodle.upm.es">www.moodle.upm.es</a>
Laboratory	Equipment	TBD
Room	Equipment	MUIS room