



POLITÉCNICA

INTERNATIONAL  
CAMPUS OF  
EXCELLENCE

COORDINATION PROCESS OF  
LEARNING ACTIVITIES  
PR/CL/001



E.T.S. de Ingenieros  
Informáticos

# ANX-PR/CL/001-01

## LEARNING GUIDE

### SUBJECT

**103000385 - Software Verification And Validation**

### DEGREE PROGRAMME

10AK - Master Universitario En Software Y Sistemas

### ACADEMIC YEAR & SEMESTER

2024/25 - Semester 1

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## 1. Description

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### 1.1. Subject details

<b>Name of the subject</b>	103000385 - Software Verification And Validation
<b>No of credits</b>	4 ECTS
<b>Type</b>	Optional
<b>Academic year of the programme</b>	First year
<b>Semester of tuition</b>	Semester 1
<b>Tuition period</b>	September-January
<b>Tuition languages</b>	English
<b>Degree programme</b>	10AK - Master Universitario en Software y Sistemas
<b>Centre</b>	10 - Escuela Tecnica Superior De Ingenieros Informaticos
<b>Academic year</b>	2024-25

## 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>
Sira Vegas Hernandez (Subject coordinator)	5105	sira.vegas@upm.es	M - 13:00 - 16:00 Th - 14:00 - 17:00
Natalia Juristo Juzgado	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

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### 3.1. Recommended (passed) subjects

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

### 3.2. Other recommended learning outcomes

- Programación
- Lenguajes de programación C y JAVA

## 4. Skills and learning outcomes \*

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### 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

CEM4 - Analizar y evaluar los diferentes paradigmas y enfoques de ingeniería de construcción y gestión de sistemas basados en software.

CEM5 - Aportar soluciones a aquellos problemas abiertos relacionados con el ámbito de aplicación y los métodos, técnicas y herramientas de Verificación y Validación de Software

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

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

RA42 - Seleccionar la técnica de verificación/validación de software más adecuada para un proyecto determinado

RA41 - Aplicar efectivamente las técnicas de verificación y validación de 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

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### 5.1. Brief description of the subject

No hay descripción de la asignatura.

### 5.2. Syllabus

1. Introduction
  - 1.1. Introduction to V&V
  - 1.2. V&V and the software development process
  - 1.3. V&V and the software development products
2. Dynamic evaluation: Software testing
  - 2.1. Introduction to software testing
  - 2.2. Testing levels
  - 2.3. The testing process
  - 2.4. Software verification and validation plan
  - 2.5. Testing tools

## 6. Schedule

### 6.1. Subject schedule\*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	<b>Course introduction</b> Duration: 01:00 Lecture  <b>Introduction to software testing</b> Duration: 01:00 Lecture			
2	<b>Introduction</b> Duration: 02:00 Lecture			
3	<b>White box testing</b> Duration: 02:00 Lecture			
4	<b>White box testing</b> Duration: 02:00 Problem-solving class			
5	<b>White box testing</b> Duration: 01:00 Lecture  <b>White box quiz</b> Duration: 01:00 Additional activities			<b>White box quiz</b> Written test Progressive assessment Presential Duration: 01:00
6	<b>Black box testing</b> Duration: 02:00 Lecture			
7	<b>Black box testing</b> Duration: 02:00 Problem-solving class			
8	<b>Black box testing</b> Duration: 01:00 Lecture  <b>Black box quiz</b> Duration: 01:00 Additional activities			<b>Black box quiz</b> Written test Progressive assessment Presential Duration: 01:00
9	<b>Follow-up of assignment</b> Duration: 02:00 Cooperative activities			
10	<b>Advanced testing techniques</b> Duration: 02:00 Lecture			

11	<p><b>Follow-up of assignment</b> Duration: 02:00 Cooperative activities</p>			<p><b>Assignment: testing a software system (part 1)</b> Group work Progressive assessment Not Presential Duration: 00:00</p>
12	<p><b>Testing and the software lifecycle</b> Duration: 02:00 Lecture</p>			
13	<p><b>Follow-up of assignment</b> Duration: 02:00 Cooperative activities</p>			
14	<p><b>Follow-up of assignment</b> Duration: 02:00 Cooperative activities</p>			<p><b>Assignment: testing a software system (part 2)</b> Group work Progressive assessment Not Presential Duration: 00:00</p>
15	<p><b>Sw verification and validation plan</b> Duration: 02:00 Lecture</p>			
16				<p><b>White box quiz (second trial)</b> Written test Global examination Presential Duration: 01:00</p> <p><b>Attendance</b> Other assessment Progressive assessment Presential Duration: 00:00</p> <p><b>Assignment: testing a software system (resubmission of part 1)</b> Group work Global examination Not Presential Duration: 00:00</p> <p><b>Assignment: testing a software system (resubmission of part 2)</b> Group work Global examination Not Presential Duration: 00:00</p> <p><b>Black box quiz (second trial)</b> Written test Global examination Presential Duration: 01:00</p>
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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.



## 7. Activities and assessment criteria

### 7.1. Assessment activities

#### 7.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
5	White box quiz	Written test	Face-to-face	01:00	10%	2 / 10	CEM1 CG4 CG7 CG12 CG14 CGI23 CEM4 CEM5
8	Black box quiz	Written test	Face-to-face	01:00	10%	2 / 10	CEM1 CG4 CG7 CG12 CG14 CGI23 CEM4 CEM5
11	Assignment: testing a software system (part 1)	Group work	No Presential	00:00	35%	3 / 10	CEM1 CG4 CG8 CG9 CG13 CGI20 CEM4 CEM5
14	Assignment: testing a software system (part 2)	Group work	No Presential	00:00	35%	3 / 10	CEM1 CG8 CG9 CG13 CGI20 CEM4 CEM5
16	Attendance	Other assessment	Face-to-face	00:00	10%	8 / 10	CG4 CG7 CG12 CG13 CG14

#### 7.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
16	White box quiz (second trial)	Written test	Face-to-face	01:00	10%	3 / 10	CEM1 CG4 CG8 CG9 CG13 CGI20 CEM4 CEM5
16	Assignment: testing a software system (resubmission of part 1)	Group work	No Presential	00:00	35%	5 / 10	CEM1 CG4 CG8 CG9 CG13 CGI20 CEM4 CEM5
16	Assignment: testing a software system (resubmission of part 2)	Group work	No Presential	00:00	35%	5 / 10	CEM1 CG8 CG9 CG13 CGI20 CEM4 CEM5
16	Black box quiz (second trial)	Written test	Face-to-face	01:00	10%	3 / 10	CEM1 CG4 CG8 CG9 CG13 CGI20 CEM4 CEM5

### 7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
White box quiz (third trial)	Written test	Face-to-face	01:00	10%	3 / 10	CEM1 CG4 CG8 CG9 CG13 CGI20 CEM4

						CEM5
Black box quiz (third trial)	Written test	Face-to-face	01:00	10%	3 / 10	CEM1 CG4 CG8 CG9 CG13 CGI20 CEM4 CEM5
Assignment: testing a software system (second resubmission of part 1)	Group work	Face-to-face	00:00	35%	5 / 10	CEM1 CG4 CG8 CG9 CG13 CGI20 CEM4 CEM5
Assignment: testing a software system (second resubmission of part 2)	Group work	Face-to-face	00:00	35%	5 / 10	CEM1 CG4 CG8 CG9 CG13 CGI20 CEM4 CEM5

## 7.2. Assessment criteria

### Progressive evaluation period:

The score of the course is calculated regarding the performance of the student in the different tasks that (s)he has been assigned:

White box testing quiz (10% of the score).

Black box testing quiz (10% of the score).

- Assignment performing testing on a software system (70% of the score). This assignment will be divided into two parts, submitted separately.

It will also be taken into consideration for the score of the course attendance to the lectures (10% of the score). A minimum of 80% of attendance is required to pass this evaluation. **This task is unrecoverable.** Students that have a justification for not being able to fulfill this criterion (e.g. conciliation issues, health problems, etc.) will be offered an alternative to pass it.

### Global evaluation:

When the overall score obtained by the student in the progressive evaluation period is smaller than 5, the student will have to re-submit:

- All quizzes/assignments that do not reach the minimum score required.
- From those assignments that do reach the minimum required, but have a score smaller than 5, the student will choose which ones (s)he wants to re-submit.
- In no case assignments that have a score equal or greater than 5 will be re-submitted.
- In no case quizzes that have a score equal or greater than the minimum required will be repeated.
- The score for the attendance criterion will be taken from the score obtained during the progressive evaluation period. In case the student has not reached the minimum score to pass this criterion during the progressive evaluation period, the global evaluation will be scored out of 9 instead of 10.

Note that during global evaluation, the student can re-submit those exercises/assignments that have been submitted during the progressive evaluation period. It is not possible to submit exercises/assignments for which there is not a submission in the progressive evaluation period.

A minimum score of 5 is needed to pass the course.

### Extraordinary evaluation:

When the overall score obtained by the student in the global evaluation period is smaller than 5, the student will have to re-submit (or submit in case (s)he has not done it before):

- All exercises/assignments that do not reach the minimum score required.
- From those assignments that do reach the minimum required, but have a score smaller than 5, the student will choose which ones (s)he wants to re-submit.
- In no case assignments that have a score equal or greater than 5 will be re-submitted.
- In no case quizzes that have a score equal or greater than the minimum required will be repeated.
- The score for the attendance criterion will be taken from the score obtained during the progressive

evaluation period. In case the student has not reached the minimum score to pass this criterion during the progressive evaluation period, the global evaluation will be scored out of 9 instead of 10.

A minimum score of 5 is needed to pass the course.

## 8. Teaching resources

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### 8.1. Teaching resources for the subject

Name	Type	Notes
B. Beizer. "Software Testing Techniques" 2ª Edición. 1990	Bibliography	
G. J. Myers. "The Art of Software Testing" 2ª Edición. Wiley. 2004.	Bibliography	
P.C. Jorgensen. Software Testing. A Craftsman?s Approach. CRC Press, 1995.	Bibliography	
C. Kaner, J. Falk, H.Q. Nguyen. Testing Computer Software. Wiley, 1999.	Bibliography	
W.E. Perry. Effective methods for software testing. Tercera edición. Wiley. 2006	Bibliography	
S.L. Pfleeger. Ingeniería de software: teoría y práctica. Segunda edición. Prentice Hall. 2002	Bibliography	
IEEE V&V standards	Bibliography	
Sitio Moodle de la asignatura	Web resource	