ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000489 - Verification And Validation

DEGREE PROGRAMME

10AM - Master Universitario en Ingenieria del Software

ACADEMIC YEAR & SEMESTER

2020/21 - Semester 1

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1. Description

1.1. Subject details

Name of the subject	103000489 - Verification And Validation
No of credits	6 ECTS
Type	Compulsory
Academic year ot the programme	First year
Semester of tuition	Semester 1
Tuition period	September-January
Tuition languages	English
Degree programme	10AM - Master Universitario en Ingenieria del Software
Centre	10 - Escuela Tecnica Superior de Ingenieros Informaticos
Academic year	2020-21

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Sira Vegas Hernandez (Subject coordinator)	5105	sira.vegas@upm.es	M - 12:00 - 15:00 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

3.1. Recommended (passed) subjects

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

3.2. Other recommended learning outcomes

- Programming languages C and JAVA

4. Skills and learning outcomes *

4.1. Skills to be learned

CE7 - Elaborar un plan de verificación y validación que permita coordinar y priorizar recursos y actividades para garantizar el nivel de calidad requerido.

CE8 - Aplicar las técnicas de verificación y validación más adecuadas para un proyecto de desarrollo software, enmarcadas en un plan de verificación y validación.

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)

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

CG18 - Capacidad de trabajar y comunicarse también en contextos internacionales

CG19 - Aproximación sistemática a la gestión de riesgos

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 (RD)

4.2. Learning outcomes

RA12 - Knows and applies product and process quality control techniques

RA8 - Knows and determines the most appropriate verification and validation techniques to be applied in a software development project with the aim of assuring the quality level required

RA39 - Conoce y determina las técnicas de verificación y validación más apropiadas para aplicar en un proyecto de desarrollo de software con el objetivo de garantizar el nivel de calidad requerido

* 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

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. Static evaluation
   2.1. Introduction to static evaluation
   2.2. Static evaluation techniques
   2.3. Reading techniques
3. Dynamic evaluation: Software testing
   3.1. Introduction to software testing

3.2. Testing levels

3.3. The testing process

3.4. Software verification and validation plan

3.5. Testing tools

6. Schedule

6.1. Subject schedule*

Week	Face-to-face classroom activities	Face-to-face laboratory activities	Distant / On-line	Assessment activities
1	**Course introduction** Duration: 01:00 Lecture **Introduction to software testing** Duration: 02:00 Lecture		**Course introduction** Duration: 01:00 Lecture **Introduction to software testing** Duration: 02:00 Lecture	
2	**Static evaluation** Duration: 01:00 Lecture **Evaluación dinámica** Duration: 02:00 Lecture		**Static evaluation** Duration: 01:00 Lecture **Evaluación dinámica** Duration: 02:00 Lecture	
3	**Static evaluation** Duration: 01:00 Lecture **Static evaluation** Duration: 01:00 Lecture		**Static evaluation** Duration: 01:00 Lecture **Evaluación dinámica** Duration: 02:00 Lecture	
4	**Static evaluation** Duration: 01:00 Lecture **Evaluación dinámica** Duration: 02:00 Problem-solving class		**Static evaluation** Duration: 01:00 Lecture **Evaluación dinámica** Duration: 02:00 Problem-solving class	
5	**Static evaluation** Duration: 01:00 Lecture		**Static evaluation** Duration: 01:00 Lecture	**White box exercise** Individual work Continuous assessment Presential Duration: 02:00
6	**Evaluación dinámica** Duration: 02:00 Problem-solving class		**Evaluación dinámica** Duration: 02:00 Problem-solving class	**Static techniques exercise** Individual work Continuous assessment Presential Duration: 01:00
7	**Evaluación dinámica** Duration: 02:00 Problem-solving class		**Evaluación dinámica** Duration: 02:00 Problem-solving class	**Static techniques exercise** Individual work Continuous assessment Presential Duration: 01:00

8	**Static evaluation** Duration: 01:00 Lecture		**Static evaluation** Duration: 01:00 Lecture	**Black box exercise** Individual work Continuous assessment Presential Duration: 02:00
9	**Static evaluation** Duration: 01:00 Problem-solving class **Evaluación dinámica** Duration: 02:00 Lecture		**Static evaluation** Duration: 01:00 Problem-solving class **Evaluación dinámica** Duration: 02:00 Lecture	
10	**Static evaluation** Duration: 01:00 Problem-solving class **Evaluación dinámica** Duration: 02:00 Problem-solving class		**Static evaluation** Duration: 01:00 Problem-solving class **Evaluación dinámica** Duration: 02:00 Problem-solving class	
11				**Static techniques presentation** Individual work Continuous assessment Presential Duration: 01:00 **Assignment: testing a software system** Individual work Continuous assessment Presential Duration: 02:00
12	**Evaluación dinámica** Duration: 02:00 Problem-solving class		**Seguimiento práctica evaluación dinámica** Duration: 02:00 Cooperative activities	**Static techniques presentation** Individual work Continuous assessment Presential Duration: 01:00
13	**Seguimiento práctica evaluación dinámica** Duration: 02:00 Cooperative activities		**Seguimiento práctica evaluación dinámica** Duration: 02:00 Cooperative activities	**Static techniques presentation** Individual work Continuous assessment Presential Duration: 01:00
14				**Assignment: testing a software system** Individual work Continuous assessment Presential Duration: 02:00 **Static techniques presentation** Individual work Continuous assessment Presential Duration: 01:00
15	**Static evaluation** Duration: 01:00 Cooperative activities		**Static evaluation** Duration: 01:00 Cooperative activities	**Student's attitude regarding lectures and course in general** Other assessment Continuous assessment Presential Duration: 02:00

16				
17				**Final exam** Written test Final examination Presential Duration: 02:00

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
5	White box exercise	Individual work	Face-to-face	02:00	10%	/ 10	CG12 CE8 CE7
6	Static techniques exercise	Individual work	Face-to-face	01:00	5%	/ 10	CE8 CG12
7	Static techniques exercise	Individual work	Face-to-face	01:00	5%	/ 10	CE8 CG12
8	Black box exercise	Individual work	Face-to-face	02:00	10%	/ 10	CE8 CE7 CG12
11	Static techniques presentation	Individual work	Face-to-face	01:00	5%	/ 10	CE8 CG4 CG12 CG18 CG1
11	Assignment: testing a software system	Individual work	Face-to-face	02:00	20%	/ 10	CE8 CE7 CG4 CG18 CG1 CG19
12	Static techniques presentation	Individual work	Face-to-face	01:00	5%	/ 10	CE8 CG4 CG12 CG18 CG1
13	Static techniques presentation	Individual work	Face-to-face	01:00	5%	/ 10	CE8 CG4 CG12 CG18 CG1
14	Assignment: testing a software system	Individual work	Face-to-face	02:00	20%	/ 10	CE8 CE7 CG4 CG18 CG1 CG19

14	Static techniques presentation	Individual work	Face-to-face	01:00	5%	/ 10	CE8 CG4 CG12 CG18 CG1
15	Student's attitude regarding lectures and course in general	Other assessment	Face-to-face	02:00	10%	0 / 10	CE7 CE8

7.1.2. Final examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
17	Final exam	Written test	Face-to-face	02:00	100%	5 / 10	CG12 CE7 CE8 CG18 CG19 CG1 CG4

7.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Students who have followed the "continuous evaluation" mode, will have to re-submit all assignments that have not reached the minimum score required.	Individual work	Face-to-face	04:00	90%	5 / 10	CE7 CE8 CG18 CG19 CG1 CG4 CG12
Students who have followed the "final test" evaluation mode will have to perform an exam.	Written test	Face-to-face	02:00	100%	5 / 10	CE8 CG18 CG12 CE7 CG19 CG1 CG4

7.2. Assessment criteria

Continuous evaluation mode:

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

- Two exercises applying static techniques to a program (15% of the score each exercise).
- Exercise applying white box techniques to a program (10% of the score).
- Exercise applying black box techniques to a program (10% of the score).
- Assignment performing testing on a software system (40% of the score).

It will also be taken into consideration for the score of the course the participation and attitude of the student during the lectures and regarding the course in general (10%).

Students who fail to submit any of the evaluation tasks (exercises or assignments) will automatically fail the course.

Final exam evaluation mode:

The score of the course is calculated based on the score of the final exam.

Extraordinary evaluation:

Students who have followed the continuous evaluation mode will have to re-submit all evaluation tasks that do not reach the minimum score required.

Students who have followed the final exam evaluation mode will have to repeat the final exam.

8. Teaching resources

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	
Moodle site of the course	Web resource	