

ANX-PR/CL/001-01

LEARNING GUIDE

SUBJECT

103000488 - Software Metrics

DEGREE PROGRAMME

10AM - Master Universitario En Ingenieria Del Software

ACADEMIC YEAR & SEMESTER

2024/25 - Semester 1

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1. Description

1.1. Subject details

Name of the subject	103000488 - Software Metrics
No of credits	4 ECTS
Type	Compulsory
Academic year of the programme	First year
Semester of tuition	Semester 1
Tuition period	September-January
Tuition languages	English
Degree programme	10AM - Master Universitario en Ingeniería del Software
Centre	10 - Escuela Técnica Superior De Ingenieros Informáticos
Academic year	2024-25

2. Faculty

2.1. Faculty members with subject teaching role

Name and surname	Office/Room	Email	Tutoring hours *
Tomas San Feliu Gilabert (Subject coordinator)	D5106	tomas.sanfeliu@upm.es	M - 10:00 - 13:00 W - 10:00 - 13:00
Jose Antonio Calvo- Manzano Villalon	D5107	joseantonio.calvomanzano@ upm.es	M - 10:00 - 13:00 W - 10:00 - 13:00

* The tutoring schedule is indicative and subject to possible changes. Please check tutoring times with the faculty member in charge.

3. Skills and learning outcomes *

3.1. Skills to be learned

CE10 - Evaluar de forma objetiva los procesos y productos frente a los estándares y normas aplicables.

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

CG2 - Que los estudiantes sean capaces de integrar conocimientos y enfrentarse a la complejidad de formular juicios a partir de una información que, siendo incompleta o limitada, incluya reflexiones sobre las responsabilidades sociales y éticas vinculadas a la aplicación de sus conocimientos y juicios (RD)

3.2. Learning outcomes

RA78 - The student will be able to lead and implement measurement plans for the evaluation of processes and products

RA45 - Es capaz de analizar datos para la estimación, planificación y control de calidad en proyectos software

RA79 - The student will be able to analyze data for estimation, planning and quality control in software projects

RA44 - Es capaz de liderar e implantar planes de medida para la evaluación de procesos y productos

RA11 - Understands the interrelation between product quality and process quality

RA16 - The student will be able to evaluate any software system design.

* 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.

4. Brief description of the subject and syllabus

4.1. Brief description of the subject

The students will:

- Understand the theoretical aspects of software measurements.
- Demonstrate the knowledge of software metrics.
- Demonstrate the knowledge of using software metrics in software development, software maintenance, and software project management.
- Demonstrate the knowledge of developing and maintaining a measurement program.

4.2. Syllabus

1. Introduction to measurement theory
 - 1.1. Why measure?
 - 1.2. Measure elements
2. Measuring Product Attributes
 - 2.1. Internal Product Attributes
 - 2.2. External Product Attributes
3. Measuring Process
4. Designing Metrics Program
 - 4.1. Goal Question Metrics
5. Frameworks for Software Measurements
 - 5.1. ISO 15939
 - 5.2. Practical Software and System Measurement
 - 5.3. Continuous Iterative Development
6. Visualization and Decision Making with Software Measurements

5. Schedule

5.1. Subject schedule*

Week	Type 1 activities	Type 2 activities	Distant / On-line	Assessment activities
1	Chapter 1.1 Why Measure Chapter 1.2 Measure Elements Duration: 02:00 Lecture			
2	Chapter 2.1 Measuring Internal Product Attributes Duration: 02:00 Lecture			Quiz 1 Online test Progressive assessment and Global Examination Not Presential Duration: 00:30
3	Chapter 2.1 Measuring Internal Product Attributes Duration: 02:00 Lecture			
4	Chapter 2.2 Measuring External Product Attributes Duration: 02:00 Lecture			
5	Chapter 3 Measuring Process Duration: 02:00 Lecture			Quiz 2 Online test Progressive assessment and Global Examination Not Presential Duration: 00:30
6	Chapter 4. Designing Metrics Program Duration: 02:00 Lecture			
7	Chapter 4. Designing Metrics Program Duration: 02:00 Lecture			Quiz 3 Online test Progressive assessment and Global Examination Not Presential Duration: 00:30
8	Chapter 4. Designing Metrics Program Duration: 02:00 Lecture			Measurement Goal Definition Group work Progressive assessment and Global Examination Not Presential Duration: 02:00
9	Chapter 4. Designing Metrics Program Duration: 02:00 Lecture			

10	Chapter 4. Designing Metrics Program Duration: 02:00 Lecture			
11	Chapter 4. Designing Metrics Program Duration: 02:00 Lecture			
12	Chapter 5. Frameworks for Software Measurements Duration: 02:00 Lecture			Quiz 4 Online test Progressive assessment and Global Examination Not Presential Duration: 00:30
13	Chapter 5. Frameworks for Software Measurements Duration: 02:00 Lecture			
14	Chapter 6 Visualization and Decision Making with Software Measurements Duration: 02:00 Lecture			Quiz5 Online test Progressive assessment and Global Examination Not Presential Duration: 00:30
15	Chapter 6 Visualization and Decision Making with Software Measurements Duration: 02:00 Lecture			Final Report Group work Progressive assessment and Global Examination Not Presential Duration: 02:00
16				Final Test Online test Progressive assessment and Global Examination Not Presential Duration: 02:00
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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.

6. Activities and assessment criteria

6.1. Assessment activities

6.1.1. Assessment

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
2	Quiz 1	Online test	No Presential	00:30	5%	0 / 10	CG18 CE10 CG2
5	Quiz 2	Online test	No Presential	00:30	5%	4 / 10	CE10
7	Quiz 3	Online test	No Presential	00:30	5%	4 / 10	CG18 CE10 CG2
8	Measurement Goal Definition	Group work	No Presential	02:00	20%	4 / 10	CE10 CG12
12	Quiz 4	Online test	No Presential	00:30	5%	4 / 10	CG2 CG18 CE10
14	Quiz5	Online test	No Presential	00:30	5%	0 / 10	CG18 CE10 CG2
15	Final Report	Group work	No Presential	02:00	25%	4 / 10	CG2 CG12 CG18 CG1
16	Final Test	Online test	No Presential	02:00	30%	5 / 10	CE10 CG2 CG12 CG18 CG1

6.1.2. Global examination

Week	Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
2	Quiz 1	Online test	No Presential	00:30	5%	0 / 10	CG18 CE10 CG2

5	Quiz 2	Online test	No Presential	00:30	5%	4 / 10	CE10
7	Quiz 3	Online test	No Presential	00:30	5%	4 / 10	CG18 CE10 CG2
8	Measurement Goal Definition	Group work	No Presential	02:00	20%	4 / 10	CE10 CG12
12	Quiz 4	Online test	No Presential	00:30	5%	4 / 10	CG2 CG18 CE10
14	Quiz5	Online test	No Presential	00:30	5%	0 / 10	CG18 CE10 CG2
15	Final Report	Group work	No Presential	02:00	25%	4 / 10	CG2 CG12 CG18 CG1
16	Final Test	Online test	No Presential	02:00	30%	5 / 10	CE10 CG2 CG12 CG18 CG1

6.1.3. Referred (re-sit) examination

Description	Modality	Type	Duration	Weight	Minimum grade	Evaluated skills
Final Test	Written test	Face-to-face	00:30	100%	5 / 10	CE10 CG2 CG18

6.2. Assessment criteria

The final evaluation of the students is based on five questionnaires (25%), a definition of initial measurement objectives (20%), a final report (25%) and an individual questionnaire (30 %).

In case of failure, the tests and exams may be repeated in the ordinary evaluation period, using the new marks together with those obtained in the individual and group exercises and the student's participation in the previous period to calculate the final grade for the subject.

All assessment activities are recoverable.

Finally, in the special evaluation period, there will be a final test to calculate the final grade for the subject.

7. Teaching resources

7.1. Teaching resources for the subject

Name	Type	Notes
Metrics and Models in Software Quality Engineering	Bibliography	Stephen Kan, Metrics and Models in Software Quality Engineering, Addison Wesley 2003
Measuring the Software Process	Bibliography	Anita Carleton, Measuring the Software Process, Addison Wesley
The big book of Six Sigma training games	Bibliography	Chris Chen and Hadley Roth, The big book of Six Sigma training games, McGraw-Hill, 2005

8. Other information

8.1. Other information about the subject

All student work is required to be their own. While we encourage research and reuse, all submissions must be your own, original creation.

Copying/ Plagiarism is NOT tolerated. This is standard policy.

This applies to ALL work, be it code related or written/ essay style submission.

Use of a GPT/ AI, you may use GPT or other AI tools for searching and/ or reference, with the following conditions:

1.- If you use a GPT (ChatGPT or other, similar tools) you must also do the following:

- Submit your prompts for GPT (as a separate file) as part of your work
- Provide a confirming statement that GPT was used as reference only, and your work is original.

2.-If ANY of your work is found to be copied (from online sources OR ChatGPT/ AI), you would be subject to serious penalties which could be one or more of the following:

- Zero on the assignment
- Zero on the final grade