# ANX-PR/CL/001-01

# LEARNING GUIDE

## SUBJECT

**103000486 - Models And Methods For Process Improvement And Assessments**

## DEGREE PROGRAMME

10AM - Master Universitario En Ingenieria Del Software

## ACADEMIC YEAR & SEMESTER

2024/25 - Semester 1

# Index

## Learning guide

# 1. Description

## 1.1. Subject details

| | |
|---|---|
| **Name of the subject** | 103000486 - Models And Methods For Process Improvement And Assessments |
| **No of credits** | 4 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** | 2024-25 |

# 2. Faculty

## 2.1. Faculty members with subject teaching role

| Name and surname | Office/Room | Email | Tutoring hours * |
|---|---|---|---|
| Jose Antonio Calvo-Manzano Villalon (Subject coordinator) | 5107 | joseantonio.calvomanzano@upm.es | M - 10:30 - 13:30<br>W - 10:30 - 13:30 |
| Tomas San Feliu Gilabert | 5107 | tomas.sanfeliu@upm.es | M - 10:00 - 13:00<br>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. 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

- Knowledge about the software life cycle processes (activities and tasks)

## 4. Skills and learning outcomes *

### 4.1. Skills to be learned

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

CE9 - Definir, evaluar y mejorar los procesos software de una organización.

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)

CG17 - Habilidades de gestión y capacidad de liderar un equipo que puede estar integrado por disciplinas y niveles distintos

CG18 - Capacidad de trabajar y comunicarse también en contextos internacionales

CG3 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades (RD)

### 4.2. Learning outcomes

RA36 - Posee dotes para liderar el cambio dentro de la organización

RA37 - Está capacitado para introducir mejoras en la organización

RA35 - Es capaz de definir, evaluar y mejorar los procesos software de una organización

* 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

New technologies are changing our way of life: airplanes, trains, communications, e-commerce, etc, and all of them need software to run. However, software is developed with poor quality; overruns in resources, effort and budget; and delays in delivery. It means that organizations must improve their way of producing software. In this context, it appears software process improvement. It consists of applying consistently the practices that provide good results, and changing those that cause problems.

So, enterprises should know their capacity/maturity level in order to develop software. The reference models are CMMI (Capability Maturity Model Integration with the views of Development, Services and Supplier Management), ISO 15504, and ITIL (Information Technology Infrastructure Library) among others. In order to be involved in a process improvement initiative, organizations should follow a process improvement lifecycle.

In this subject, and independently of the reference model used, a generic process improvement lifecycle oriented to large enterprises as well as small and medium-sized enterprises will be explained. In the main phase (the assessment phase), a method to make an assessment will be described. Students will have to make a plan in order to know the estimated hours and costs, resources and schedule involved in a process improvement initiative.

In the same way, a process improvement initiative in a small enterprise will be presented to students and they will have to analyse if the initiative is going to get benefits.

Later, the generic information related to the most known reference model (i.e., CMMI) will be explained

(maturity/capability levels, and institutionalization).

Finally, students will have to assess their estimating process and make a brief analysis and presentation.

## 5.2. Syllabus

1. Introduction
    1.1. Maturity Profile
    1.2. State of the practice
    1.3. Process Improvement (PI) concepts & Justifying PI
2. PI life cycles
    2.1. IDEAL, ISO 15504, Action Focus Improvement Model (AFIM)
    2.2. AFIM: Commitment
    2.3. AFIM: Assessment
    2.4. AFIM: Infrastructure&Action Plans, and Implementation
    2.5. A PI initiative in a small company
3. Reference Process Models
    3.1. CMMI Model
    3.2. The Estimating Process

# 6. Schedule

## 6.1. Subject schedule*

| Week | Type 1 activities | Type 2 activities | Distant / On-line | Assessment activities |
|---|---|---|---|---|
| 1 | **Chapter 1: Maturity Profile Report**<br>Duration: 00:30<br>Lecture<br><br>**Chapter 1: State of the practice. Process Improvement (PI) concepts.**<br>Duration: 01:30<br>Lecture | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 2 | **Chapter 1: Justifying PI**<br>Duration: 00:30<br>Lecture<br><br>**Chapter 2: Process Improvement life cycles**<br>Duration: 00:30<br>Lecture<br><br>**Chapter 2: Process Improvement life cycles: AFIM: Commitment**<br>Duration: 00:30<br>Lecture<br><br>**Exercise related to ROI in Commitment**<br>Duration: 00:30<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 3 | **Chapter 2: Process Improvement life cycles: AFIM: Commitment**<br>Duration: 01:30<br>Lecture<br><br>**Exercise related to ROI in Commitment**<br>Duration: 00:30<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 4 | **Exercise related to ROI in Commitment**<br>Duration: 02:00<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00<br><br>**Exercise related to ROI in Commitment**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 00:10<br><br>**Exercise related to ROI in Commitment: Best Presentation Award**<br>Other assessment<br>Progressive assessment |

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|---|---|---|---|---|
| | | | | Presential<br>Duration: 00:05 |
| 5 | **Chapter 2: Process Improvement life cycles: AFIM: Assessment**<br>Duration: 01:30<br>Lecture<br><br>**Exercise related to ROI in Assessment**<br>Duration: 00:30<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 6 | **Chapter 2: Process Improvement life cycles: AFIM: Assessment**<br>Duration: 01:30<br>Lecture<br><br>**Exercise related to ROI in Assessment**<br>Duration: 00:30<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 7 | **Chapter 2: Process Improvement life cycles: AFIM: Assessment**<br>Duration: 01:30<br>Lecture<br><br>**Exercise related to ROI in Assessment**<br>Duration: 00:30<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 8 | **Exercise related to ROI in Assessment**<br>Duration: 02:00<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00<br><br>**Exercise related to ROI in Assessment**<br>Group work<br>Progressive assessment<br>Presential<br>Duration: 00:15<br><br>**Exercise related to ROI in Assessment: Best Presentation Award**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 00:05 |
| 9 | **Chapter 2: Process Improvement life cycles: AFIM: Action Plans and Implementation**<br>Duration: 01:00<br>Lecture<br><br>**Exercise related to ROI in a Small Enterprise (statement)**<br>Duration: 01:00<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |

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|---|---|---|---|---|
| 10 | **Exercise related to ROI in a Small Enterprise**<br>Duration: 02:00<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00<br><br>**Exercise related to ROI in a Small Enterprise**<br>Group work<br>Progressive assessment<br>Presential<br>Duration: 00:10<br><br>**Exercise related to ROI in a Small Enterprise: Best Presentation Award**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 00:05 |
| 11 | **Chapter 3: CMMI**<br>Duration: 02:00<br>Lecture | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 12 | **Chapter 3: CMMI**<br>Duration: 01:00<br>Lecture<br><br>**Chapter 3: CMMI: Estimating process**<br>Duration: 01:00<br>Lecture | | | **Discussion/Participating in class (NON-RECOVERABLE**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 13 | **Exercise related to Assessment: the Estimating process**<br>Duration: 02:00<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00<br><br>**Exercise related to Assessment: the Estimating process**<br>Group work<br>Progressive assessment<br>Presential<br>Duration: 00:10<br><br>**Exercise related to Assessment: in the Estimating process: Best Presentation Award**<br>Group work<br>Progressive assessment<br>Presential<br>Duration: 00:05 |
| 14 | **Progressive Evaluation: Review**<br>Duration: 02:00<br>Lecture | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00 |

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|---|---|---|---|---|
| 15 | **Progressive Evaluation**<br>Duration: 02:00<br>Problem-solving class | | | **Discussion/Participating in class (NON-RECOVERABLE)**<br>Other assessment<br>Progressive assessment<br>Presential<br>Duration: 02:00<br><br>**Progressive Evaluation**<br>Written test<br>Progressive assessment<br>Presential<br>Duration: 02:00 |
| 16 | | | | **Global Evaluation**<br>Written test<br>Global examination<br>Presential<br>Duration: 02:00 |
| 17 | | | | |

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 |
|---|---|---|---|---|---|---|---|
| 1 | Discussion/Participating in class (NON- RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 2 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 3 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 4 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 4 | Exercise related to ROI in Commitment | Other assessment | Face-to-face | 00:10 | 10% | 5 / 10 | CG1<br>CG3<br>CG18<br>CG17<br>CE9<br>CE10 |
| 4 | Exercise related to ROI in Commitment: Best Presentation Award | Other assessment | Face-to-face | 00:05 | 0% | 0 / 10 | CG3<br>CG18 |
| 5 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG18<br>CG1 |
| 6 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG18<br>CG1 |
| 7 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 5 / 10 | CG1<br>CG18 |
| 8 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 8 | Exercise related to ROI in Assessment | Group work | Face-to-face | 00:15 | 20% | 5 / 10 | CG1<br>CG3<br>CG18<br>CG17<br>CE9<br>CE10 |
| 8 | Exercise related to ROI in Assessment: Best Presentation Award | Other assessment | Face-to-face | 00:05 | % | 0 / 10 | CG3<br>CG18 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 10 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 10 | Exercise related to ROI in a Small Enterprise | Group work | Face-to-face | 00:10 | 15% | 5 / 10 | CG1<br>CG3<br>CG18<br>CG17<br>CE9<br>CE10 |
| 10 | Exercise related to ROI in a Small Enterprise: Best Presentation Award | Other assessment | Face-to-face | 00:05 | % | 0 / 10 | CG3<br>CG18 |
| 11 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 12 | Discussion/Participating in class (NON-RECOVERABLE | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 13 | Discussion/Participating in class (NON-RECOVERABLE | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 13 | Exercise related to Assessment: the Estimating process | Group work | Face-to-face | 00:10 | 10% | 5 / 10 | CG1<br>CG3<br>CG18<br>CG17<br>CE9<br>CE10 |
| 13 | Exercise related to Assessment: in the Estimating process: Best Presentation Award | Group work | Face-to-face | 00:05 | % | 0 / 10 | CG3<br>CG18 |
| 14 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 15 | Discussion/Participating in class (NON-RECOVERABLE) | Other assessment | Face-to-face | 02:00 | 1% | 0 / 10 | CG1<br>CG18 |
| 15 | Progressive Evaluation | Written test | Face-to-face | 02:00 | 30% | 5 / 10 | CG1<br>CG3<br>CG18<br>CE9<br>CE10 |

### 7.1.2. Global examination

| Week | Description | Modality | Type | Duration | Weight | Minimum grade | Evaluated skills |
|---|---|---|---|---|---|---|---|
| 16 | Global Evaluation | Written test | Face-to-face | 02:00 | 85% | 5 / 10 | CG1<br>CG3<br>CG18<br>CG17<br>CE9<br>CE10 |

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

| Description | Modality | Type | Duration | Weight | Minimum grade | Evaluated skills |
|---|---|---|---|---|---|---|
| Final Test | Written test | Face-to-face | 03:00 | 100% | 5 / 10 | CG1<br>CG3<br>CG18<br>CG17<br>CE9<br>CE10 |

## 7.2. Assessment criteria

The assessment activities are the following:

1. Attendance and Active participation of students during the classes (15%). This is a NON-RECOVERABLE activity because the specific class and its discussion is not going to be repeated. This is an INDIVIDUAL activity.
2. Group Exercises related to Return on Investment (ROI) in Commitment (10%), Assessment (20%).. These are TEAM activities.
3. Group Exercise related to ROI in a Small enterprise (15%). This is a TEAM activity
4. Group Exercise related to the Assessment of the Estimating Process (10%). This is a TEAM activity.
5. Individual Progressive evaluation exam (25%) related to the main concepts of the subject. This is an INDIVIDUAL activity.

It should be noted that to motivate students in making presentations, there are some Best Presentation Award activities. The way to choose the best presentation is by voting with the rest of the students (but you cannot vote for the team to which you belong to). The team that wins the best presentation award will have 0.1 extra points in the final grade for the subject.

The previous assessment activities can be recovered (except activity 1), if failed, in the Global Evaluation Test (16 week)

Students should have a rating greater or equal than 5.0 (over 10) to pass each activity (except activity 1). If not, the activities can be recovered in the Global Evaluation Test.

In the global evaluation (week 16), the grade of this exam computes the 85% of the final grade. The remaining 15% corresponds to the rating obtained in the previous activity 1.

## 8. Teaching resources

### 8.1. Teaching resources for the subject

| Name | Type | Notes |
|---|---|---|
| Subject Moodle Site | Web resource | Students will be able to get the slides and other resources from the Moodle platform. |
| IDEAL | Bibliography | McFeeley, B.; IDEAL: A User's Guide for Software Process Improvement;<br /> Handbook CMU/SEI-96-HB-001; February 1996 |
| SCAMPI | Bibliography | SCAMPI Upgrade Team; Standard CMMI® Appraisal Method for Process Improvement (SCAMPI) A, Version 1.3: Method Definition Document; Handbook CMU/SEI 2011-HB-?001; March 2011 |
| ITIL | Bibliography | ITIL -Information Technology Infrastructure Library<br /> (Service Strategy, Service Design, Service Transition, Service Operation, Continual Service Improvement) |
| CMMI Model V2.0 | Bibliography | CMMI Institute, CMMI V2.1 Model, December 2018 |