

UNIVERSIDAD
POLITÉCNICA
DE MADRID

LEARNING GUIDE

PROJECT MANAGEMENT

MÁSTER EN INGENIERÍA DE TELECOMUNICACIÓN

ACADEMIC YEAR

2026-27

CODE

93001392

COURSE

1

CREDITS

5 ECTS

TYPE

COMPULSORY

SEMESTER

**FIRST
SEMESTER**

LANGUAGE

**ENGLISH,
SPANISH**

ASSIGNED CENTER

E.T.S. DE INGENIEROS DE TELECOMUNICACION

ASSIGNED DEPARTMENT

SEÑALES, SISTEMAS Y RADIOCOMUNICACIONES

COORDINATOR

ANA MARÍA BERNARDOS BARBOLLA - anamaria.bernardos@upm.es

REQUIRED PREREQUISITES

REQUIRED COURSES

RECOMMENDED PRIOR KNOWLEDGE

RECOMMENDED COURSES

OTHER RECOMMENDATIONS

RESULTS

RD-822/2021

Knowledge

KG1 Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación

Skills

HG2 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

Competences

CE16 Capacidad para la elaboración, dirección, coordinación, y gestión técnica y económica de proyectos sobre: sistemas, redes, infraestructuras y servicios de telecomunicación, incluyendo la supervisión y coordinación de los proyectos parciales de su obra aneja; infraestructuras comunes de telecomunicación en edificios o núcleos residenciales, incluyendo los proyectos sobre hogar digital; infraestructuras de telecomunicación en transporte y medio ambiente; con sus correspondientes instalaciones de suministro de energía y evaluación de las emisiones electromagnéticas y compatibilidad electromagnética

CG3 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

CG4 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

CT5 Capacidad para gestionar la información, identificando las fuentes necesarias, los principales tipos de documentos técnicos y científicos, de una manera adecuada y eficiente

CG5 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

CT6 Capacidad para emitir juicios sobre implicaciones económicas, administrativas, sociales, éticas y medioambientales ligadas a la aplicación de sus conocimientos

CT4 Capacidad para trabajar de forma efectiva como individuo, organizando y planificando su propio trabajo, de forma independiente o como miembro de un equipo

CT3 Capacidad para adoptar soluciones creativas que satisfagan adecuadamente las diferentes necesidades planteadas

DESCRIPTION

The course syllabus is designed for the student to learn how to plan and manage the execution of engineering projects (in particular those using information and communication technologies), taking into account the organizational, techno-economic and regulatory environmental conditions. The student will learn basic techniques for project management, including methods for scope definition, resource allocation, time management, budgeting, development of quality and risk plans, definition of communication plans, management of remote teams, etc.

TOPICS

1. Course context and framework.

1.1. Introduction: workplan and motivation.

2. Initial concepts.

2.1. Projects and operations.

2.2. Triple constraint.

2.3. Project and organization.

2.4. Project lifecycles.

2.5. Project Management Institute processes.

2.6. Introduction to the course assignments.

3. On the first constraint: processes about scope and quality.

3.1. Initiating processes. The project portfolio.

3.2. Project scope management: specifications definition.

3.3. Quality planning. Quality in ICT projects.

4. On the second constraint: Time management. Scheduling and planning processes..

4.1. Activity scheduling. PERT-CPM, Gantt, Theory of Constraints.

4.2. Resource allocation planning.

5. On the third constraint: Costs. Budgeting and Cost Planning.

5.1. Definition of the project cost structure.

5.2. Introduction to a project business case.

6. Execution control.

6.1. Earned Value Management Method.

6.2. Risk management.

6.3. Quality control and change control.

7. Transversal competences and other complementary issues.

7.1. Interpersonal communication.

7.2. Efficient meetings.

7.3. Decision making.

ACTIVITIES

Assessment activity



Learning activity


Topic 1: Presentation. Topic 2: First concepts.2.1 Projects and operations 2.2 The Triple Constraint

WEEKS

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E

FORMAT
In person

TOTAL DURATION
02h 00m

LOCATION
Classroom (scheduled)

GROUP
Normal

METHODOLOGY

Lecture

 Topic 7: Transversal skills and others.			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E
FORMAT In person	TOTAL DURATION 01h 00m	LOCATION Classroom (scheduled)	GROUP Normal
METHODOLOGY Lecture			

 2.1 Projects and operations. 2.3 The Triple Constraint			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E
FORMAT In person	TOTAL DURATION 01h 00m	LOCATION Classroom (scheduled)	GROUP Normal
METHODOLOGY Lecture			

 2.3 Project and organization 2.4 Life Cycle			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E
FORMAT In person	TOTAL DURATION 02h 00m	LOCATION Classroom (scheduled)	GROUP Normal
METHODOLOGY Lecture			

 2.3 Project and organization 2.4 Life Cycle			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E
FORMAT In person	TOTAL DURATION 01h 00m	LOCATION Classroom (scheduled)	GROUP Normal
METHODOLOGY Lecture			

 2.5 The PMI processes2.6 Presentation of the Case to be developed. Item 3: On the first restriction. 3.1. Project Initiation Processes. The project portfolio			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E
FORMAT In person	TOTAL DURATION 02h 00m	LOCATION Classroom (scheduled)	GROUP Normal
METHODOLOGY Lecture			

	2.5 The PMI processes 2.6 Presentation of the Case to be developed. Item 3: On the first restriction. 3.1. Project Initiation Processes. The project portfolio			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																
FORMAT In person	TOTAL DURATION 02h 00m	LOCATION Classroom (scheduled)	GROUP Normal																	
METHODOLOGY Lecture																				

	3.2 Scope planning: formalization of specifications 3.3 Quality Plans. Quality in the ICT environment			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																
FORMAT In person	TOTAL DURATION 02h 00m	LOCATION Classroom (scheduled)	GROUP Normal																	
METHODOLOGY Lecture																				

	Classwork sessions for teamwork			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																
FORMAT In-person	TOTAL DURATION 10h 00m	LOCATION Classroom (scheduled)	GROUP Reduced																	
METHODOLOGY Project-based learning Cooperative activities Group tutoring																				

	Topic 4: On the second constraint: time.4.1 Planning of activities. PERT-CPM, Gantt.			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																
FORMAT In person	TOTAL DURATION 02h 00m	LOCATION Classroom (scheduled)	GROUP Normal																	
METHODOLOGY Lecture																				

	Topic 4: On the second constraint: time.4.1 Planning of activities. PERT-CPM, Gantt.			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																
FORMAT In person	TOTAL DURATION 02h 00m	LOCATION Classroom (scheduled)	GROUP Normal																	
METHODOLOGY Lecture																				

	Topic 4.2 Planning the allocation of resources. Crashing, leveling.			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																	
FORMAT In person	TOTAL DURATION 01h 00m	LOCATION Classroom (scheduled)	GROUP Normal																		
METHODOLOGY Lecture																					

	Topic 4.2 Planning the allocation of resources.			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																	
FORMAT In person	TOTAL DURATION 01h 00m	LOCATION Classroom (scheduled)	GROUP Normal																		
METHODOLOGY Lecture																					

	Topic 5: On the third constraint: costs. 5.1 Identification of the sources of costs of the project			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																	
FORMAT In person	TOTAL DURATION 02h 00m	LOCATION Classroom (scheduled)	GROUP Normal																		
METHODOLOGY Lecture																					

	Topic 5: On the third constraint: costs.5.1 Identification of the sources of costs of the project			WEEKS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																	
FORMAT In person	TOTAL DURATION 02h 00m	LOCATION Classroom (scheduled)	GROUP Normal																		
METHODOLOGY Lecture																					

Teamwork Hand-outs and Presentations			WEEKS														
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E														
FORMAT	TOTAL DURATION	LOCATION	ASSESSMENT		WEIGHT		MINIMUM GRADE										
In-person	01h 00m	Classroom (scheduled)	Progressive, Global, Retake (Extraordinary)		35%		5 Non-rec.										
RECOVERABLE		JUSTIFICATION															
No		Evaluative activities of teamwork, not recoverable due to the nature of the work experience.															
METHODOLOGY																	
Work in group Team project																	
ASSESSED OUTCOMES																	
KG1 HG2 CG3 CG4 CG5 CT3 CT4 CT5 CT6 CE16																	

5.1 Notions of a project's business case.			WEEKS														
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E														
FORMAT	TOTAL DURATION	LOCATION	GROUP														
In person	02h 00m	Classroom (scheduled)	Normal														
METHODOLOGY																	
Lecture																	

Topic 6: The Control of Execution. 6.1. Earned Value Management Method.			WEEKS														
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E														
FORMAT	TOTAL DURATION	LOCATION	GROUP														
In person	02h 00m	Classroom (scheduled)	Normal														
METHODOLOGY																	
Lecture																	

Topic 6: The Control of Execution 6.1. Earned Value Management Method.			WEEKS														
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E														
FORMAT	TOTAL DURATION	LOCATION	GROUP														
In person	01h 00m	Classroom (scheduled)	Normal														
METHODOLOGY																	
Lecture																	

6.2. Risk Management 6.3. Quality Control and Change Control.			WEEKS														
			1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E														
FORMAT	TOTAL DURATION	LOCATION	GROUP														
In person	02h 00m	Classroom (scheduled)	Normal														
METHODOLOGY																	
Lecture																	

Individual Hand-outs on Teamwork				WEEKS																	
				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																	
FORMAT	TOTAL DURATION	LOCATION	ASSESSMENT	WEIGHT	MINIMUM GRADE																
In person	02h 00m	Classroom (scheduled)	Progressive	15%	5																
METHODOLOGY																					
Other assessment																					
ASSESSED OUTCOMES																					
KG1 HG2 CG3 CG4 CG5 CT3 CT4 CT5 CT6 CE16																					

Management tools				WEEKS																
				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																
FORMAT	TOTAL DURATION	LOCATION	GROUP																	
In person	02h 00m	Laboratory	Reduced																	
METHODOLOGY																				
Laboratory assignments																				

Compilation Test. Progressiv Evaluation.				WEEKS																	
				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																	
FORMAT	TOTAL DURATION	LOCATION	ASSESSMENT	WEIGHT	MINIMUM GRADE																
In person	01h 00m	Exam Classroom	Progressive	50%	5																
TOPICS																					
T1 T2 T3 T4 T5 T6 T7																					
METHODOLOGY																					
Written exam																					
ASSESSED OUTCOMES																					
KG1 HG2 CG3 CG4 CG5 CT3 CT4 CT5 CT6 CE16																					

Project presentation.				WEEKS																
				1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 E																
FORMAT	TOTAL DURATION	LOCATION	GROUP																	
In person	04h 00m	Laboratory	Reduced																	
TOPICS																				
T1 T2 T3 T4 T5 T6 T7																				
METHODOLOGY																				
Other activities																				

Final exam. Global and Extraordinary Evaluation.

WEEKS

123456789101112131415E

FORMAT	TOTAL DURATION	LOCATION	ASSESSMENT	WEIGHT	MINIMUM GRADE
In person	02h 00m	Exam Classroom	Global, Retake (Extraordinary)	65%	5

TOPICS

T1T2T3T4T5T6T7

METHODOLOGY

Written examProblem-solving exam

ASSESSED OUTCOMES

KG1HG2CG3CG4CG5CT3CT4CT5CT6CE16

WEEKLY SCHEDULE

[illegible]

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	E
 3.2 Scope planning: formalization of specifications 3.3 Quality Plans. Quality in the ICT environment				•												
 Classwork sessions for teamwork				•			•		•		•		•			
 Topic 4: On the second constraint: time.4.1 Planning of activities. PERT-CPM, Gantt.					•											
 Topic 4: On the second constraint: time.4.1 Planning of activities. PERT-CPM, Gantt.					•											
 Topic 4.2 Planning the allocation of resources. Crashing, leveling.							•									
 Topic 4.2 Planning the allocation of resources.							•									
 Topic 5: On the third constraint: costs. 5.1 Identification of the sources of costs of the project								•								
 Topic 5: On the third constraint: costs.5.1 Identification of the sources of costs of the project								•								
 Teamwork Hand-outs and Presentations			•		•			•		•			•			
 5.1 Notions of a project's business case.									•							
 Topic 6: The Control of Execution. 6.1. Earned Value Management Method.										•						
 Topic 6: The Control of Execution6.1. Earned Value Management Method.										•						
 6.2. Risk Management 6.3. Quality Control and Change Control.											•					
 Individual Hand-outs on Teamwork		•		•		•		•								
 Management tools												•				
 Compilation Test. Progressiv Evaluation.													•			

Activity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	E
 Project presentation.													•			
 Final exam. Global and Extraordinary Evaluation.																•

ASSESSMENT CRITERIA

General criteria

IMPORTANT: The team work must be done MANDATORY during the teaching period in order to pass the course in any call. That is, in order to pass the extraordinary call, it will be necessary to develop the group work during the teaching period.

The development of the teaching of the English group will require the student to attend the lectures in English language and prepare all hand-outs (work, reports), presentations and exams in English.

The faculty reserve the right to use automatic plagiarism detection tools and automatic generation of content, which in case of positive results, will invalidate the submissions made. The faculty may propose the use of AI tools for specific training purposes.

Depending on the type of written tests (test, questions with multiple solutions, open cases, etc.), their solutions may not be published.

Assessment criteria for the regular exam period. Progressive assessment

Assessment criteria

The progressive evaluation of the course throughout the four-month period consists of two main components:

1. Development of a group work based on PBL techniques in which the student will face as a group the preparation of a project proposal to solve an engineering problem, from the definition of the scope to the management of financial aspects. The development of the group work is a compulsory activity that the student must perform during the period of teaching (Progressive Evaluation) and its evaluation consists of three elements: hand-outs in different formats (partially to be in-class prepared) and a presentation of compulsory attendance for the work team; each element will be evaluated independently by the teaching team. The total weight of this evaluation is 35%.

2. Individual assessment and activities. 15%.

3. Exam. The total weight of this evaluation is 50%.

In order to pass the course, it will be necessary to attend the special lectures/talks organized throughout the course and also the delivery of specific practices/exercises to be carried out preferably during lecture time. These events will be conveniently pointed out in advance.

The grades of the different parts (Individual Evaluation, Presentation of the Work, Work Reports) obtained through progressive evaluation, as long as the minimum grade is exceeded, will be valid throughout the same academic year.

Activities

- Teamwork Hand-outs and Presentations (35%)
- Individual Hand-outs on Teamwork (15%)
- Compilation Test. Progressiv Evaluation. (50%)

Assessment criteria for the regular exam period. Global assessment

Assessment criteria

Students who do not pass the course through progressive evaluation will have the possibility of taking the individual evaluation test in the global evaluation period with the same weight as the one taken in the progressive evaluation. The format of the exam does not have to be the same that in progressive evaluation (i.e., it can have one format in progressive evaluation and another in global evaluation). The evaluation will check if the students have acquired the competences of the subject. Therefore, the evaluation in the extraordinary call will use the same types of evaluation techniques that are used in the evaluation of the ordinary call (EX, TG). The exam will represent 65% of the final grade.

Activities

- Teamwork Hand-outs and Presentations (35%)
- Final exam. Global and Extraordinary Evaluation. (65%)

Assessment criteria for the retake (extraordinary) exam period

Assessment criteria

Students who do not pass the course through progressive evaluation will have the possibility of taking the individual evaluation test in the global evaluation period with the same weight as the one taken in the progressive evaluation. The format of the exam does not have to be the same that in progressive evaluation (i.e., it can have one format in progressive evaluation and another in global evaluation). The evaluation will check if the students have acquired the competences of the subject. Therefore, the evaluation in the extraordinary call will use the same types of evaluation techniques that are used in the evaluation of the ordinary call (EX, TG). The exam will represent 65% of the final grade.

Activities

- Teamwork Hand-outs and Presentations (35%)
- Final exam. Global and Extraordinary Evaluation. (65%)

RESOURCES

Bibliography

A guide to the Project Management Body of Knowledge (PMBOK guide) and the Standard for project management. PMI Standards Committee. Project Management Institute, 2021.

H. Kerzner. Project management. A systems approach to planning, scheduling and controlling. 12th ed. John Wiley & Sons. 2017.

B. W. Taylor. Introduction to Management Science 7th Ed. Prentice Hall, 2001. ISBN: 0-13-033190-2.

A. J. Shenhar, D. Dvir. Reinventing Project Management. Ed. Harvard Business School Press. 2007. ISBN: 978-1-59139-800-4.

H. Kerzner. Project Management. Case Studies (2nd ed.). Wiley. 2010. ISBN: 978-0-471-75167-0.

Web

Sitio del Project Management Institute (<http://www.pmi.org>)

Sitio Moodle de la asignatura (<http://moodle.upm.es/titulaciones/oficiales/course/view.php?id=5004>)

Bibliography

S. Shirodka. Learning Microsoft Project 2019: Streamline project, resource, and schedule management with Microsoft's project management software.

A. Nieto-Rodriguez. Project Management Handbook: How to Launch, Lead, and Sponsor Successful Projects. Harvard Business Review. 2021.

OTHER INFORMATION

The calendar and syllabus can be modified during the course.



UNIVERSIDAD
POLITÉCNICA
DE MADRID



Firmado Por	Firma Automatizada	16/07/2026	Página 15/15
-------------	--------------------	------------	--------------