



Universidad  
de Alcalá

# TEACHING GUIDE

## Project Management

**Bachelor's Degree in  
Computer Engineering  
Computer Science Engineering  
Information Systems Engineering  
Information Systems (G58)**

**University of Alcalá**

**Academic year: 2019-2020**

**3<sup>rd</sup> Year – 2<sup>nd</sup> Semester**

## Syllabus

Course:	<b>Project Management</b>
Code:	<b>780022</b>
Degrees offering the course:	<b>Degree in Computer Engineering Degree in Computer Science Degree in Information Systems Engineering Degree in Information Systems (G58)</b>
Department and knowledge area:	<b>Computer Science: Computer Languages and Systems</b>
Compulsory/optional:	<b>Obligatory</b>
No. of ECTS:	<b>6</b>
Year and semester	<b>3rd Year – 2nd Semesters</b>
Academics involved:	<b>Refer to the departmental Web Site</b>
Office hours	<b>Refer to the departmental Web</b>
Languages:	<b>English</b>

### 1.a PRESENTATION

The *Project Management* course aims at training students in the foundational principles of planning, management and control of projects in all the phases of a project: estimation, planning and operation. This course explores aspects which are common to any type of project like resource management, time planning methods and others which are more connected to projects in informatics like resource estimation in software projects.

The course promotes the understanding of basic concepts while seeking qualification in problem solving combining systematic methodologies with the creation and discussion of alternatives, to facilitate decision making.

The main blocks addressed in this course are as follows: planning and project control, management and monitoring of projects, economic and financial analysis of projects and computer support to project planning.

#### **Prerequisites and Recommendations**

Best benefit from this course requires knowledge and skills of subjects such as Statistics, Calculus, Computing and Business Economics covered during the first and second year of the degree.

Due to the integration of the concepts of planning and management of software projects with software engineering methodologies and the different types of software development life cycles, it is advisable to have attended the *Software Engineering* course of the degree.

## 1.b PRESENTACIÓN

La asignatura Gestión de Proyectos pretende introducir a los alumnos en los conceptos, técnicas y prácticas básicas de la gestión de proyectos en todas sus fases: dimensionado, planificación y operación. Se tratarán aspectos comunes a cualquier tipo de proyecto como la gestión de recursos y los métodos de planificación temporal y otros más propios de los proyectos informáticos como la estimación de recursos en proyectos de software.

La asignatura promueve la comprensión de los conceptos básicos, busca la capacitación para el análisis de problemas, conjugando metodologías sistemáticas con el planteamiento y discusión de alternativas, con el fin de facilitar la toma de decisiones.

Los principales temas a abordar en esta asignatura son: Planificación y control de proyectos, gestión y seguimiento de proyectos, análisis económico y financiero de proyectos y herramientas y apoyo informática para la gestión de proyectos.

### Prerrequisitos y Recomendaciones

Para un buen aprovechamiento de la asignatura, se requieren conocimientos y competencias de las materias de Estadística, Cálculo, Informática y Economía de la Empresa impartidas en el primer y segundo curso del grado.

Debido a la integración de los conceptos de planificación y gestión de proyectos informáticos con las metodologías de ingeniería del software y los distintos tipos de ciclo de vida del software es conveniente haber cursado la asignatura Ingeniería del software.

## 2. COMPETENCES (Professional Skills)

### General skills:

CG1 Ability to conceive, write, organize, plan, develop and sign projects in the field of computer engineering whose purpose, according to the knowledge acquired as provided in paragraph 5 of resolution BOE-A-2009-12977 the design, development or exploitation of systems, services and applications.

CG2 Ability to direct the activities under the projects in the field of information technology in accordance with the knowledge acquired as provided in paragraph 5 of resolution BOE-A-2009-12977.

CG9 Ability to solve problems with initiative, decision making, autonomy and creativity. Ability to communicate and transmit knowledge and skills of the profession of Technical Engineer.

CG10 Knowledge to perform measurements, calculations, assessments, appraisals, surveys, studies, reports, scheduling and similar work computer, according to the knowledge acquired as provided in paragraph 5 of resolution BOE-A-2009 -12,977.

CG11 Ability to analyse and assess the social and environmental impact of technical solutions, understanding the ethical and professional responsibility of the activity of the Technical Engineer.

CG12 Knowledge and application of basic elements of economics and human resource management, organization and project planning, as well as legislation, regulation and standardization in the field of IT projects, according to the knowledge acquired as provided in paragraph 5 resolution BOE-a-2009-12977.

### Specific skills:

CI1 Ability to design, develop, select and evaluate applications and systems, ensuring their reliability, safety and quality in accordance with ethical principles and legislation and regulations.

CI2 Ability to plan, design, deploy and manage projects, services and systems in all areas, leading its implementation and continuous improvement and assessing their economic and social impact.

CI3 Ability to understand the importance of negotiation, effective work habits, leadership and communication skills in all software development environments.

CI4 Ability to develop the technical specifications of a computer facility that meets the standards and regulations.

CI16 Knowledge and application of the principles, methodologies and life cycles of software engineering.

CI18 Knowledge of the rules and regulation of information at national, European and international levels.

### Learning Outcomes (LO)

- **LO1** To identify and understand the basic concepts of project management and know about the main methodologies for project management
- **LO2:** To identify and understand the basic concepts of project feasibility.
- **LO3:** To analyze the feasibility of a project under different criteria and evaluate the practical consequences based on the calculated values
- **LO4:** To identify and understand the basic concepts of planning and effort and cost estimation of projects.
- **LO5:** To carry out effort and cost estimation of projects by calculating its size and evaluating other indicators through standardized measures and estimation models and methods (both manually and with the help of tools).
- **LO6:** To identify and understand the basic concepts of time planning and phases, resources and a project's calendar.
- **LO7:** To carry out the time, resource and calendar planning of a project, adjusting to its restrictions and specifications, using representation diagrams and planning methods (both manually and with the help of tools).
- **LO8:** To identify and understand the basic concepts of project monitoring and control.
- **LO9:** To carry out the project monitoring from its available control data, calculating indicators and evaluating the consequences and making decisions (both manually and with the help of tools).
- **LO:10** To identify and understand the basic concepts of risk management, security and configuration management and quality.

### 3. Table of Contents

1. Project Management Foundations
  - Concept of Project
  - Project Feasibility
  - Project Management and Organization
  - Project Management Methodologies
2. Planning and Effort Estimation
  - Size Estimation and other factors
  - Effort Estimation
  - Cost Estimation
3. Time planning
  - Project Phases
  - Resources
  - Time management methods
4. Project execution
  - Project tracking and control
  - Risk Management
  - Configuration Management and software quality

Content Blocks*	Total hours
Block 1 Project Management Foundation <ul style="list-style-type: none"> <li>• Unit 1.1 Concept of Project</li> <li>• Unit 1.2 Project Feasibility</li> <li>• Unit 1.3 Project Management and Organization</li> <li>• Unit 1.4 Project Management Methodologies</li> </ul>	12 h
Block 2 Planning and Effort Estimation <ul style="list-style-type: none"> <li>• Unit 2.1 Size Estimation and other factors</li> <li>• Unit 2.2 Effort Estimation</li> <li>• Unit 2.3 Cost Estimation</li> </ul>	20 h
Block 3: Time planning <ul style="list-style-type: none"> <li>• Unit 3.1 Project Phases</li> <li>• Unit 3.2 Resources and calendar</li> <li>• Unit 3.3 Time management methods</li> </ul>	20 h
Block 4 Project execution <ul style="list-style-type: none"> <li>• Unit 4.1 Project tracking and control</li> <li>• Unit 4.2 Risk Management</li> <li>• Unit 4.3 Configuration Management and software quality</li> </ul>	8 h

(\*) Continuous Assessment Tests (CATs) included

The actual order does not necessarily need to follow the order indicated in the previous table. It will be adapted to the student's learning of each one of the parts in which the subject is composed.

## 4. TEACHING-LEARNING METHODOLOGIES TRAINING ACTIVITIES

### 4.1. Distribution of credits (and hours)

Number of contact hours:	Contact hours: 56 h Assessment Tests: 4 h Total: 60 h
Number of hours of the student's own work:	90 hours, including monitoring hours
Total hours	150

### 4.2. Methodological strategies, materials and didactic resources

The module *PROJECT MANAGEMENT* is organized as a four-month subject with 6 ECTS (150 hours).

- Theoretical in classroom classes.
- Practical in classroom classes: solving problems.
- Practical in laboratory classes.
- Tutoring: individual and/or in groups

In addition, depending on the nature of the different parts of the subject matter, the following training activities may be used, among others:

- Elaboration of works with individual and collective responsibility but applying information management and working practices as a team.
- Demonstration of students' work: sharing of information, problems and doubts that appear in the execution of the works.
- Organization and realization of public presentations and discussion of the results.
- Making use of the University's Virtual Classroom platform with self-evaluation activities and tests.
- Class activities:
  - In the classroom: demonstration and discussion of basic knowledge of the subject. Approach and resolution of exercises and related case studies. Activities oriented to the teaching of the specific competences of the subject, especially those related to knowledge and the use of quality assurance techniques.
  - In the laboratory: planning and development of practical exercises to solve problems and analyze hypotheses as well as contributing to the development of the ability to analyze results, teamwork, leadership, communication skills, critical reasoning and understanding of the proposed resolution methods. These activities will serve as a foundation for the acquisition of the specific and generic competences described in Section 2.
- Out of the classroom activities:
  - Analysis and assimilation of the contents of the subject, problem solving, bibliographical consultation, preparation of individual and group works, realization of face-to-face exams and self-evaluations. Those oriented towards the development of methods for self-organization and planning of individual and team work will be especially promoted.

- Office hours: individual and group tutoring during the teaching-learning process, either face-to-face or remotely.

## • 5. EVALUATION: Procedures, evaluation criteria and qualification

The evaluation system of the subject will be adjusted to the law (RD 1125/2003) by which the European Credit Transfer and Accumulation System (ECTS) is regulated. The students will benefit from the evaluation procedures according to what is articulated in the UAH Learning Evaluation Regulations. It will be preferably offered to students a system of continuous evaluation that has characteristics of formative evaluation, so that it serves as feedback in the teaching-learning process for the student. As a consequence, the following evaluation criteria are established.

### Evaluation Procedures

#### Course Evaluation

#### Evaluation Criteria (EC)

The Evaluation Criteria are set according to the level of acquisition of competencies acquired by the student. The criteria are defined as follows:

**EC1** The student is able of identifying and understanding the basic concepts of project management and to know the main methodologies through questions and resolution of case studies related to specific situations in projects.

**EC2** The student is able of identifying and understanding the basic concepts of the feasibility analysis of projects through questions and resolution of case studies related to specific situations in projects.

**EC3** The student is able of analyzing the feasibility of a project under different criteria and evaluate the practical consequences from the calculated values (both manually and with the help of tools) for decision making.

**EC4** The student is able of identifying and understanding the basic concepts of planning and estimating effort and costs of a through questions and resolution of case studies related to specific situations in projects.

**EC5** The student is able of estimating the efforts and costs of a project by calculating its size and evaluating other indicators through standardized measures and using estimation models and methods (calculated manually and with the help of tools).

**EC6** The student is able of identifying and understanding the basic concepts of time planning and project phases, resources and deadlines of a project through questions and resolution of case studies related to specific situations in projects.

**EC7** The student is able of developing the temporal, resource and calendar planning of a project, adjusting to its restrictions and specifications, using representation diagrams and planning methods (both manually and with tools).

**EC8** The student is able of identifying and understanding the basic concepts of project monitoring and control through questions and resolution of case studies related to specific situations in projects.



**EC9** The student is able of tracking a project from its control data, calculating indicators and evaluating the consequences as well as making the appropriate decisions (both manually and with tools).

**EC10** The student able of identifying and understanding the basic concepts of project risk and security management as well as project configuration management and software quality through questions and resolution of case studies related to specific situations in projects.

### Evaluation Instruments.

This section indicates the assessment instruments that will be applied to each of the evaluation criteria.

1. Intermediate Assessment Test (IAT1): about theoretical questions of blocks 1 and 2.
2. Intermediate Assessment Test (IAT2): solving practical problems of blocks 1 and 2.
3. Intermediate Assessment Test (IAT3): about theoretical questions of blocks 3 and 4.
4. Intermediate Assessment Test (IAT4): solving practical problems of blocks 3 and 4.
5. Practical Work (PW1): carried out as laboratory sessions focused on blocks 1 and 2.
6. Practical Work (PW2): carried out as laboratory sessions focused on blocks 3 and 4.
7. Complementary and Participatory Activities (CPA1 and CPA2): Consisting in the individual resolution of theoretical-practical problems in the laboratory related to key competences.

Regarding the time duration of each of the tests:

1. IAT1 and IAT2: a 2-hour session will be held in the classroom.
2. PW1 and PW2 will be carried out autonomously in teams of with a maximum of 3 students throughout the established deadlines, combining their autonomous work with tutoring in laboratory sessions and may include public demonstration of their work.
3. CPA1 and CPA2 will be carried out individually in laboratory sessions.

### Quantification of the Qualification Criteria

This section quantifies the evaluation criteria for passing the course. The evaluation criteria to be applied during the course are linked to the competencies that have been defined for it through the learning outcomes, including the generic competences. These criteria are aimed at collecting both the level of understanding of the contents and basic ideas, such as the ability to apply concepts in problem solving, with and without the help of software tools. In addition, the student's attitude of collaboration and pro-activity in the performance of both individual and group tasks and the degree of interest shown in the development and fulfillment of class activities and autonomous work will be considered. Therefore, it will be essential the delivery in time and correct format of all practical activities. The evaluation results will be expressed in the following scale:

- *Outstanding*: the student demonstrates through the evaluation tests its proficiency in all the learning outcomes of all the competencies.

- *Remarkable*: the student demonstrates sufficient capacity in all learning outcomes of all competencies, showing proficiency in some competencies or some of their learning outcomes.
- *Pass*: the student demonstrates sufficient capacity in all competencies or, at least, in key learning outcomes while mastering other competencies or some learning outcomes from other competencies.
- *Partial fail*: the student demonstrates sufficient capacity in a minimum number of learning outcomes and/or does so erroneously in part of them or in some key areas, although the student demonstrated sufficient overall capacity in the set of key learning outcomes.
- *Fail*: the student makes serious mistakes and/or makes them in a large number of learning outcomes, competencies or the student does not reach a minimum level in key learning outcomes or does not provide any relevant results.

As a general criterion, the student needs to master the competences of the subject developed in the theory with their respective key learning outcomes evaluated in the different Intermediate Assessment Tests (IAT). On the other hand, those students who in ordinary session do not attend any of the Intermediate Assessment Tests (IAT) will be considered as *Not Submitted*.

In accordance with the current evaluation regulations, it is established that students who do not meet the minimum percentage of class attendance (classroom and/or laboratory) specified by the lecturer at the beginning of the course, cannot pass the continuous assessment independently of the student's evaluation results.

The key learning outcomes are: LO3, LO5, LO7 and LO9. The learning outcomes will be assessed using a scale with the following values: "complete domain", "partial domain", "sufficient domain", "partial insufficient domain" and "complete insufficient domain".

The competencies are assessed through the aggregation of the evaluations of their learning results measured using the evaluation criteria. The student cannot pass the course with a "complete insufficient domain" in any of the LO (and, in any case, in any of the key LO) of a competence.

### Course Evaluation: Continuous assessment during the course (Option 1)

As part of the continuous assessment, the relationship between the criteria, instruments and qualification is as follows.

Competency		Learning Outcome	Evaluation Criteria	Evaluation Instrument	Weight
CG1 CG2 CG9	CI1, CI2, C3	LO1, LO2, LO3, LO4, LO5	EC1,EC2,EC3, EC4, EC5	IAT1	10%
				IAT2	15%
CG10 CG11 CG12	CI4, CI16, CI18	LO6, LO7, LO8, LO9	EC6,EC7,EC8, EC9	IAT3	10%
				IAT4	15%
CG1 CG2 CG9 CG10 CG11 CG12	CI1, CI2, CI3, CI4, CI16, CI18	LO3, LO5	EC1, EC2	PW1	15%
		LO7, LO9, LOP10	EC3, EC4	PW2	15%
		LO1, LO2, LO3, LO4, LOP5	EC1, EC2	CPA1	10%
		LO6, LO7, LO8, LO9, LO10	EC3, EC4	CPA2	10%

As a general criterion, students who do not complete all the Intermediate Assessment Tests (IATs) or do not deliver all the Assignments - Practical Works - (PWs) during the normal course evaluation assessments will be considered as *Not Submitted*.

### Course Evaluation: Single Final Evaluation (Option 2)

For students not taking the continuous assessment, the Complementary and Participatory Activities (CPAs) qualification instrument will be replaced with a higher weight of their corresponding Intermediate Assessment Tests (IATs). The practical assignments PW1 and PW2 will be submitted accordingly before the official exam day designated (in which the IATs are carried out).

Competency		Learning Outcome	Evaluation Criteria	Evaluation Instrument	Weight
CG1 CG2 CG9	CI1, CI2, C3	LO1, LO2, LO3, LO4, LO5	EC1,EC2	IAT1	35%
CG1 CG2 CG9 CG10 CG11 CG12	CI1, CI2, CI3, CI4, CI16, CI18	LO3, LO 5	EC1, EC2	PW1	15%
		LO7, LO9, LO10	EC3, EC4	PW2	15%

## Course Evaluation: Extraordinary Final Evaluation

Those students demonstrating sufficient capacity in the key *Learning Outcomes* results in the ordinary call do not have to retake exams while retaining their respective qualifications (PE1-PE2-CPA1, PW1, PE3-PE4- CPA2 and PW2). However, student who failed any of the key LO in any of the evaluation tests must retake exams for the entire corresponding block.

Competency		Learning Outcome	Evaluation Criteria	Evaluation Instrument	Weight
CG1 CG2 CG9	CI1, CI2, C3	LO1, LO2, LO3, LO4, LO5	EC1,EC2	IAT1	35%
CG10 CG11 CG12	CI4, CI16,CI18	LO6, LO7, LO8, LO9, LO10	EC3,EC4	IAT2	35%
	CI1, CI2, CI3, CI4, CI16, CI18	LO3, LO 5	EC1, EC2	PW1	15%
		LO7, LO9, LO10	EC3, EC4	PW2	15%

## 6. BIBLIOGRAPHY

### Main bibliography

- Notes and materials available on the virtual classroom

### Books in Spanish

- GUTIERREZ DE MESA, J.A. y PAGES, C. Planificación y gestión de proyectos informáticos. Servicio de publicaciones UAH, 2008.
- PIATTINI, M., CALVO-MANZANO, J.A., ECRVELO, J. y FERNÁNDEZ, L., Análisis y diseño de aplicación informáticas de gestión. LO-MA, 2003.
- DÍAZ D. LUIS, CASTILLO S. JOSÉ LUIS, NAVARRO H. MIGUEL, “Gestión de la Cartera de Proyectos de TIC”, Servicio de Publicaciones Universidad de Alcalá, ISBN: 978-84-16133-56-7, Depósito Legal: M-8342-2015

### Further reading

<b>Block 1</b>	<ul style="list-style-type: none"> <li>Project Management Institute, <b>A Guide to the Project Management Body of Knowledge. PMI 2000.</b></li> </ul>
----------------	---

<b>Block 2</b>	<ul style="list-style-type: none"><li>• Garmus, D. and Herrón, D: "<b>Function Point Analysis: Measurement Practices for Successful Software Projects</b>"; Ed. Addison-Wesley; Diciembre de 2000.</li><li>• Center for Systems and Software Engineering, <b>COCOMO® II</b> <a href="http://csse.usc.edu/csse/research/COCOMOII/cocomo_main.html">http://csse.usc.edu/csse/research/COCOMOII/cocomo_main.html</a></li></ul>
<b>Block 3</b>	<ul style="list-style-type: none"><li>• University of South Carolina, Arnold School of Public Health, Dept. of Health Services Policy and Management Courses and Curricula, <b>Critical Path Method (CPM)</b>: <a href="http://hadm.sph.sc.edu/Courses/J716/CPM/CPM.html">http://hadm.sph.sc.edu/Courses/J716/CPM/CPM.html</a></li><li>• Piattini, M.G. et al, <b>Análisis y Diseño Detallado de Aplicaciones Informáticas de Gestión. Cap. 4.</b> Ed Ra-Ma. 2007, Romero López, C., Técnicas de Programación y Control de Proyectos. Ed. Pirámide. 6ª Edición 2002</li></ul>
<b>Block 4</b>	<ul style="list-style-type: none"><li>• Burke, R., <b>Project Management: Planning and Control Techniques.</b> Ed. Wiley, 1999.</li><li>• Connell, S., <b>Desarrollo y Gestión de Proyectos Informáticos.</b> Ed. McGraw-Hill Iberoamericana, 1997.</li></ul>