Universidad de Alcalá

TEACHING GUIDE

Projects

Degree in
Industrial Electronics and Automatics Engineering

Universidad de Alcalá

Academic Year 2025/2026

4th Year - 1st Semester

Approved by the EPS School Board on June 16th, 2025

TEACHING GUIDE

Course Name:	**Projects**
Code:	**600021**
Degree in:	**Industrial Electronics and Automatics Engineering**
Department and area:	**Ciencias de la Computación** **Computer Science**
Type:	**Compulsory**
ECTS Credits:	**6.0**
Year and semester:	**4th Year, 1st Semester**
Teachers:	María Teresa Villalba de Benito (course coordinator)
Tutoring schedule:	The tutoring timetable will be indicated on the first day of class.
Language:	English

1. COURSE SUMMARY

The course "Projects" is a compulsory course taught in the first semester of the fourth year of the Degree in Industrial Electronics and Automation. Its main objective is to train students in the fundamentals of planning, management and control of projects in industrial environments.

The course fosters the understanding of basic concepts, seeking training for problem analysis, combining systematic methodologies with the approach, and discussing alternatives to assist with sound decision making.

This is a course with a significant degree of practical applicability, which allows working with real examples of various applications.

The main topics to be addressed in this course are as follows: Planning and project control, project management and monitoring project, economic analysis, financial analysis of projects and computer techniques.

Knowledge and skills from Statistics, Calculus, Computer Science and Business Economics courses taught in the first and second degree course are required for satisfactory completion of the course.

2. SKILLS

Basic, Generic and Cross Curricular Skills.

This course contributes to acquire the following generic skills, which are defined in the Section 3 of the Annex to the Orden CIN/351/2009:

en_TR0 - Ability to write, sign and develop projects in the field of industrial engineering that have as their object, in accordance with the knowledge acquired in accordance with the provisions of section 5 of this order, the construction, reform, repair, conservation, demolition, manufacture, installation, assembly or exploitation of: structures, mechanical equipment, energy installations, electrical and electronic installations, industrial plants and plants and manufacturing and automation processes.

en_TR2 - Knowledge in basic and technological subjects, which enables them to learn new methods and theories, and gives them versatility to adapt to new situations.

en_TR3 - Ability to solve problems with initiative, decision making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Engineering.

en_TR4 - Knowledge to carry out measurements, calculations, assessments, appraisals, appraisals, studies, reports, work plans and other similar works.

en_TR5 - Ability to handle specifications, regulations and mandatory standards.

en_TR6 - Ability to analyze and assess the social and environmental impact of technical solutions.

en_TR7 - Ability to apply the principles and methods of quality.

en_TR8 - Ability to organize and plan in the field of the company, and other institutions and organizations.

en_TR9 - Ability to work in a multilingual and multidisciplinary environment.

en_TR10 - Knowledge, understanding and ability to apply the necessary legislation in the exercise of the profession of Industrial Technical Engineer.

en_TRU1 - Capacity of analysis and synthesis.

en_TRU2 - Oral and written competencies.

en_TRU3 - Ability to manage information.

en_TRU4 - Autonomous learning skills.

en_TRU5 - Team work.

Professional Skills

This course contributes to acquire the following professional skills, which are defined in the Section 5 of the Annex to the Orden CIN/351/2009:

en_CI11 - Applied knowledge of business organization.

en_CI12 - Knowledge and skills to organize and manage projects. Know the organizational structure and functions of a project office.

Learning Outcomes

On successful completion of this course, students will be able to:

RAP1. Assess and solve problems and cases related to project management, analysing information from different sources.
RAP2. Identify and apply knowledge of the business organisation, including process management, and re-engineering of industrial processes; human resource management, supply chain, production and logistics in industrial environments.
RAP3. Recognise and apply the precise meaning of a set of economic and financial management concepts essential for the analysis and management of projects, enabling decisions to be made using the theoretical models of the economic and financial management of projects. make decisions using the correct theoretical models according to the different situations, as well as develop the documentation that sets out the results.
RAP4. Apply and analyse economic and management decisions in industrial projects using the correct theoretical models according to the different situations.
RAP5. Design the research, analysis and documentation tasks necessary to support an industrial project from the economic point of view and its planning and control.
RAP6. Identify and evaluate financial models and problems of low complexity, as well as use the most usual methods of financial evaluation of projects (NPV, IRR and others).
RAP7. Identify and apply the usual tools (CPM, PERT, GANNT) through the use of computer applications for project scheduling in terms of time, workloads and develop adequate management of the control and monitoring of a project.
RAP8. Understand the management of procurement, construction and commissioning of an industrial project.
RAP9. Analyse the quality plan (system and management), health and safety, and the feasibility study of the industrial project, as well as its environmental impact.
RAP10. Identify the professional associations and engineering associations, as well as the rules and regulations for the execution of projects and the respective documentation.

3. CONTENTS

Contents Blocks	Total number of hours
Introduction to Business Organisation. Introduction to business organisation, organisational structure, process management, process re-engineering, human resource management, supply chain, production and logistics in industrial environments.	4 hours
Project Management. What is a project and what is project management. Nature and types of projects. Stages for the elaboration of a project. Methodologies for project planning.	4 hours
Economic and financial analysis. The economic analysis of the project. Types of costs and earnings. Activity-based systems. Standards and budgets. Financial budgets. Elements of financial mathematics. Criteria for making financial decisions.	6 hours
Planning and Controlling. Project Schedule Management and Phases of a Project. Goals and objectives. Types of objectives. Setting priorities. Preventive and corrective control. Resources and control schedule management, scheduling techniques. Multi-project scheduling. Resource allocation methods. Time Planning Methods: The PERT method.	6 hours
Management and Monitoring. Project Organisation. Project Monitoring Management. Project Quality Management. Project Resource Management.	10 hours
Computer techniques. Planning and control techniques. Preparation and monitoring of budgets. Process management. Document control. Quality management. Planning, control and allocation of resources.	26 hours

4. TEACHING - LEARNING METHODOLOGIES. FORMATIVE ACTIVITIES.

4.1. Credits Distribution

Number of on-site hours:	58 hours (56 hours on-site +2 exams hours)
Number of hours of student work:	92
Total hours	150

4.2. Methodological strategies, teaching materials and resources

The teaching strategy of the course is divided into 3 sections:

Lectures in combination with hands-on labs	Throughout the course, students will be offered activities and tasks, both theoretical and practical. Different hands-on activities will be carried out in coordination with the teaching of the theoretical concepts, so that the student can experiment both individually and in groups, thus consolidating the concepts acquired. To carry out the hands-on labs for the development of the competences on computer techniques, the student will have a workstation in the laboratory with the required software. Throughout the learning process in the subject, the student will have to make use of different bibliographic or electronic sources and resources, so that they become familiar with the documentation environments that they will use professionally in the future.
Group and cooperative work	The problems and case studies will be worked on in groups using cooperative learning and gamification techniques. As complementary didactic resources, individual or group work may be used, among others, with the corresponding public exhibition before the rest of the classmates to encourage debate.
Self-study	The student's self-study is essential for the successful completion of the subject. The student must study the subjects and ask any questions that arise as he/she progresses through the subject and according to the teacher's instructions.

5. ASSESSMENT: procedures, evaluation and grading criteria

Preferably, students will be offered a continuous assessment model that has characteristics of formative assessment in a way that serves as feedback in the teaching-learning process.

5.1. PROCEDURES

The evaluation must be inspired by the criteria of continuous evaluation (Learning Assesment Guidelines, LAG, art 3). However, in compliance with the regulations of the University of Alcalá, an alternative process of final evaluation is made available to the student in accordance with the Learning Assesment Guidelines as indicated in Article 10, students will have a period of fifteen days from the start of the course to request in writing to the Director of the Polytechnic School their intention to take the non-continuous evaluation model adducing the reasons that they deem convenient. The evaluation of the learning process of all students who do not apply for it or are denied it will be done, by default, according to the continuous assessment model. The student has two calls to pass the subject, one ordinary and one extraordinary.

Regular exam period

Regular Assessment:

Consisting of the completion and passing of the hands-on labs and the corresponding continuous assessment tests throughout the four-month period. The main assessment tools will be:

1. **Hands-on labs (PL)**. Consisting of carrying out hands-on labs in groups, submitting the corresponding group reports in due time and form, and taking the corresponding assessment tests. Students must attend 100% of the laboratory sessions.
2. **Intermediate Mid-term Tests (PEI)**. Written tests (PEI1 and PEI2) focused on both practical and theoretical aspects of the subject. The PEI2 will take place on the date assigned in the official exam calendar (published on the Engineering School's website) and may cover any question related to the complete syllabus, as well as, the hands-on labs work.
3. **Complementary and participation activities (ACP)**. Consisting of the individual resolution of theoretical-practical problems related to key competencies and other virtual or face-to-face activities.

Assessment by application for the final exam:

Consisting of the completion and passing of the hands-on labs and the final assessment tests in a single call published by the Academic Head of the School of Engineering. This kind of assessment is aimed only at those students who have waived regular assessment, requested in due time and form the assessment by means of a final exam and have received positive notification from the Academic Head of the School of Engineering. In the case of assessment by means of a final exam, the assessment elements to be used will be the following:

1. **Hands-on labs (PL).** Students who have passed the final assessment must contact the lecturer to request information regarding the hands-on labs to be carried out. Similarly to the continuous assessment, but individually, they must hand in the hands-on work reports and take the exam on the date published in the official exam calendar.
2. **Final Evaluation Test (PEF).** A written test focused on both practical and theoretical aspects of the subject.

Special exam period

It will consist of a final evaluation test of the PEF consisting of questions and/or problems of all the contents and a laboratory test that will evaluate the acquisition of competences related to the laboratory practices.

The teaching-learning methodology and the assessment process will be adapted as needed, in accordance with the guidelines of the Diversity Support Unit, to implement curricular adaptations for students with specific needs.

5.2. EVALUATION

ASSESSMENT CRITERIA

The assessment criteria measure the level at which the competences have been acquired by the student. For that purpose, the following are defined::

CE1. The student shows an ability to apply knowledge of the business organization, process management and resource management.

CE2. The student shows that he/she is able to carry out feasibility reports on an industrial project, analysing the economic and financial aspects of each possible alternative.

CE3. The student is able to carry out the complete planning of a project with methodological criteria based on the analysis of requirements and the disaggregated structure of work.

CE4. The student shows the ability and initiative in solving practical problems associated with the development of projects in a precise manner.

CE5. The student has acquired the technical knowledge to carry out an adequate control and

monitoring of a project that has been planned, as well as appropriate management of the quality plan of a project.

CE6. The student is able to use software tools to support the management of processes and for the planning, control, and monitoring of an industrial project, as well as to know the rules and regulations for the completion of projects.

ASSESSMENT TOOLS

The work of the student is graded in terms of the assessment criteria above, through the following tools:

- **Hands-on labs (PL):** Group hand-in of results and conclusions of the hands-on labs in a report following the specifications given in the lab guide and individual assessment tests. Attendance to the laboratory practicals is compulsory.
- **Intermediate Mid-term Tests (PEI)**: Assessment tests of the theoretical and practical contents of the course, consisting of several questions and problems on the theoretical and practical contents.
- **Complementary and participation activities (ACP)**: Individual resolution of theoretical-practical exercises related to key competencies and other virtual or face-to-face activities.
- **Final Evaluation Test (PEF)**: A single test with the same characteristics as the PE, but to be taken only by those students who opt for the final assessment.

GRADING CRITERIA

In the regular assessment the relationship between the competences, learning outcomes, criteria, and evaluation instruments is as follows.

Skill	Learning Outcomes	Assessment criteria	Grading Tool	Contribution to the final mark
TR0, TR2, TR3, TR4, TR8, TR9 CI11, CI12 TRU1, TRU2, TRU4	RA1-RA4, RA6	CE1, CE2, CE4	PEI1	30%
TR0, TR3, TR5, TR8, TR9, TR10 CI11, CI12 TRU1, TRU2, TRU3, TRU4, TRU5	RA1, RA7-RA10	CE1, CE2, CE4, CE6	PL1	15%
TR0, TR3, TR5, TR8, TR9, TR10 CI11, CI12 TRU1, TRU2, TRU3, TRU4, TRU5	RA1, RA7-RA10	CE1, CE2, CE4, CE6	ACP1	5%
TR0, TR2, TR3, TR4, TR7, TR9 CI12 TRU1, TRU2, TRU4	RA1, RA5, RA7-RA10	CE3, CE4, CE5	PEI2	30%
TR0, TR3, TR5, TR6, TR7, TR8, TR9, TR10 CI12 TRU1, TRU2, TRU3, TRU4, TRU5	RA6	CE3, CE4, CE5, CE6	PL2	15%
TR0, TR3, TR5, TR6, TR7, TR8, TR9, TR10 CI12 TRU1, TRU2, TRU3, TRU4, TRU5	RA6	CE3, CE4, CE5, CE6	ACP2	5%

Passing the regular assessment:

Students will be considered to have passed the continuous assessment when they demonstrate that they have acquired the learning outcomes measured through the above qualification criteria. To do so,

the student must meet the following conditions:

- Have taken the intermediate assessment tests (PEI1 and PEI2).
- Satisfactorily pass the assessment of the competences related to the theoretical tests. It will be understood that a student acquires these competences when his/her mark in the set of related tests (PEI1 and PEI2) is equal to or higher than 50% of the maximum mark for this criterion.
- The student must have acquired the learning outcomes related to the practical laboratories. For this, attendance to the laboratory classes, satisfactory completion of all practical laboratories and obtaining in the corresponding assessment tests a mark equal to or higher than 50% of the maximum mark established for this assessment criterion is required.

The grade of "Not attended/taken" will be awarded to the student who, having opted for the regular assessment procedure, fulfils any of the following requirements:

- The student has failed to attend at least 60% of the classes in small groups.
- The student has not handed in at least 60% of the work requested.

In the **regular exam period-final assessment,** the relationship between the competences, learning outcomes, criteria, and evaluation instruments is as follows.

Skill	Learning Outcomes	Evaluation criteria	Grading Tool	Contribution to the final mark
TR0, TR3, TR5, TR6, TR7, TR8, TR9, TR10 CI11, CI12	RA1-RA10	CE1, CE2, CE3, CE4, CE5, CE6	PL	30%
TR0, TR2, TR3, TR4, TR7, TR8, TR9 CI11, CI12	RA1-RA4, RA6-RA10	CE1, CE2, CE3, CE4, CE5	PEF	70%

Passing the special assessment:

The student will be considered to have passed the continuous assessment when he/she demonstrates that he/she has acquired the learning outcomes measured through the above qualification criteria and the following conditions are met:

- To have acquired the learning outcomes related to the hands-on labs by satisfactorily completing all the hands-on labs (PL1 and PL2) and obtaining in the related assessment tests a mark equal to or higher than 50% of the maximum mark established for this assessment criterion.
- Having satisfactorily passed the assessment of the competences related to the theoretical tests. It will be understood that a student acquires these competences when their mark in the related tests (PEF) is equal to or higher than 50% of the maximum mark for this criterion.

Special exam period

For all students, the special exam period will consist of:

- A final assessment test (PEF) consisting of questions and/or problems of all the contents (70% of the mark).
- A laboratory test that will assess the acquisition of skills related to laboratory practices (30%).

6. BIBLIOGRAPHY

6.1. Basic Bibliography

- Knowledge (PMBOK® Guide), Fifth Edition.Web
- Marlon Dumas, Marcello La Rosa, Jan Mendling , Hajo A. Reijers. Fundamentals of Business Process Management. Second edition. Springer-Verlag GmbH Germany. ISBN 978-3-662-56508-7. 2018.
- Lester, Albert. *Project Management, Planning and Control*. Oxford: Elsevier Science & Technology, 2017. Web
- Horine, Greg. Project Management [electronic Resource] : Absolute Beginner's Guide / Gregory M. Horine. 3rd ed. Indianapolis, IN: Que, 2013. Web
- Siegel, Neil G. Engineering Project Management. Newark: John Wiley & Sons, Incorporated, 2020. Web
- Callahan, Kevin R., Gary S. Stetz, and Lynne M. Brooks. Project Management Accounting : Budgeting, Tracking, and Reporting Costs and Profitability / Kevin R. Callahan, Gary S. Stetz, Lynne M. Brooks. 1st ed. 2007. Web
- Campbell, G Michael. Project Management. 1st ed. 2014. Idiot's Guides Project Management. Web
- Kloppenborg, Timothy J., and Joseph A. Petrick. Managing Project Quality / Timothy J. Kloppenborg, Joseph A. Petrick. 1st ed. 2002. Project Management Essential Library. Web
- Project Management Institute. Practice Standard for Work Breakdown Structures.Web

6.2. Additional Bibliography

- Wysocki, Robert K. Effective Project Management [electronic Resource]: Traditional, Agile, Extreme / Robert K. Wysocki. 5th ed. Indianapolis, Ind.: Wiley Pub., 2009. Web
- Jerbrant, Anna. "Organising Project-based Companies: Management, Control and Execution of Project-based Industrial Operations." International Journal of Managing Projects in Business 6.2 (2013): 365-78. Web
- Kozhovska, Emilija. "Integration of Health, Safety and Environmental Principles into Industrial Project Management." European Project Management Journal 8.1 (2018): 33-39. Web
- BIAFORE, B., Microsoft Project 2010: The Missing Manual, O'Reilly, 2010
- Kerzner, Harold. Project Management Best Practices. 3rd ed. Vol. 9781118657010. Somerset: John Wiley & Sons, Incorporated, 2014. Web
- Project Management Institute. Construction Extension to the PMBOK® Guide, 2016. https://bibliobuscador.uah.es/permalink/f/qr2o34/TN_safari_s9781628251746

Disclosure Note

During the evaluation tests, the guidelines set out in the Regulations establishing the Rules of Coexistence of the University of Alcalá must be followed, as well as the possible implications of the irregularities committed during said tests, including the consequences for committing academic fraud according to the Regulation of Disciplinary Regime of the Students of the University of Alcalá.