



Universidad  
de Alcalá

# TEACHING GUIDE

## Degree Final Project

**Degree in**  
Telecommunications Technologies Engineering

**Universidad de Alcalá**

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**Academic Year 2021/2022**

4<sup>th</sup> Year

## TEACHING GUIDE

<b>Course name:</b>	<b>Degree Final Project</b>
<b>Code:</b>	<b>370005 GIEC 390005 GIST 350032 GITT 380008 GIT</b>
<b>Degree in:</b>	<b>Degree in Electronic Communications Engineering (GIEC) Degree in Telecommunications Systems Engineering (GIST) Degree in Telecommunication Technologies Engineering (GITT) Degree in Telematics Engineering (GIT)</b>
<b>Department and area:</b>	<b>Anyone participating in the degree</b>
<b>Type:</b>	<b>Compulsory</b>
<b>ECTS Credits:</b>	<b>12</b>
<b>Year and semester:</b>	<b>4th year, First and second semester</b>
<b>Teachers:</b>	<b>Any teacher belonging to the departments participating in the degree</b>
<b>Tutoring schedule:</b>	<b>To be determined with the teacher</b>
<b>Language:</b>	<b>Spanish/English</b>

## 1. PRESENTATION

The curriculum of the degrees in Electronic Communications Engineering, Telecommunications Systems Engineering, Telecommunication Technologies Engineering and Telematics Engineering of the University of Alcalá (BOE no. 9, march 2011) establishes the course “Degree Final Project” as a compulsory course in the fourth year with a total of 12 ECTS credits, in accordance with the stipulations of Order CIN/352/2009 that regulates the official university qualifications that enable the exercise of the profession of Telecommunication Technical Engineer (BOE no. 20, February 2009)

The degree final project is an original, autonomous and individual work of the student. It must consist in a project in the field of the specific technologies of the Industrial Technical Engineering, of a professional nature, and in which the student applies and develops the competences acquired during the career, constituting a final proof of maturity before moving on to the professional field, and providing its realization an opportunity for the development of his/her creativity. The term “original” means that by no means the work can be plagiarized and should not have been previously presented by any other student, not being necessary to be an unpublished work.

It will be done under the guidance of a tutor. Each student must submit a report describing precisely what this work consisted of, and defend the work done before a court. The report may be presented in Spanish or English.

In addition to what is established in the Order CIN/352/2009, the development of the Degree Final Project will be also governed by the regulations of the University of Alcalá, approved by the governing council on March 24, 2011 and modified by the same Council on March 21, 2013, and also by the specific regulations of the Higher Polytechnic School.

For the completion of the Degree Final Project, it is recommended that the student has passed all the basic subjects, those common to the industrial branch and those of specific technology directly related to the objectives of the project to be developed.

## 2. SKILLS

### Generic skills:

This subject contributes to deepen in the following generic competences defined in section 3 of the Annex of Order CIN/352/2009:

- TR0 Ability to write, develop and sign projects in the field of telecommunication engineering whose purpose is, according to the knowledge acquired as established in section 5 of order CIN/352/2009, the conception and development or the exploitation of telecommunication and electronic networks, services and applications..
- TR1 Knowledge, understanding and ability to apply the necessary legislation during the development of the profession of Telecommunications Technical Engineer and ease of handling specifications, regulations and mandatory standards..
- TR2 Knowledge of basic subjects and technologies, which enables him to learn new methods and technologies, as well as giving him great versatility to adapt to new situations.
- TR3 Ability to solve problems with initiative, decision making, creativity, and to communicate and transmit knowledge, skills and abilities, understanding the ethical and professional responsibility of the Telecommunication Technical Engineer activity.
- TR5 Facility for handling mandatory specifications, regulations and standards.
- TR7 Know and apply basic elements of economics and human resources management, organization and project planning, as well as legislation, regulation and standardization in telecommunications.
- TR8 Ability to work in a multidisciplinary group and in a multilingual environment and to communicate, both in writing and orally, knowledge, procedures, results and ideas related to telecommunications and electronics.

### Cross curricular skills:

- TRU1 – Analysis and synthesis skills.
- TRU2 – oral and written communication skills.

TRU3 – Information management skills.  
TRU4 – Autonomous learning.  
TRU5 – Team work.

### Professional skills:

This subject allows the acquisition of the professional skill CTFG1, defined in Section 5 of the Annex of Order CIN/352/2009:

- For the degree in Electronic Communications Engineering:
  - Original exercise to be carried out individually and presented and defended before a university court, consisting of a project in the field of Electronic Communications Engineering as a specific Technology of Telecommunications Engineering of a professional nature in which the acquired competences are synthesized and integrated in the teachings.
- For the degree in Telecommunications Systems Engineering:
  - Original exercise to be carried out individually and presented and defended before a university court, consisting of a project in the field of Telecommunications Systems Engineering as a specific technology of Telecommunications Engineering of a professional nature in which the acquired competences are synthesized and integrated in the teachings.
- For the degree in Telecommunication Technologies Engineering:
  - Original exercise to be carried out individually and presented and defended before a university court, consisting of a project in the field of Telecommunications Technology Engineering as a specific technology of Telecommunication Engineering of a professional nature in which the acquired competences are synthesized and integrated in the teachings.
- For the degree in Telematics Engineering:
  - Original exercise to be carried out individually and presented and defended before a university court, consisting of a project in the field of Telematics Engineering as a specific technology of Telecommunication Engineering of a professional nature in which the competences acquired in the teachings are synthesized and integrated.

### Learning outcomes

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

- RATFG1. Adequately interpret the characteristics of a technical telecommunication engineering project, understand them and design an approach to the problem with creativity and own initiative.
- RATFG2. Develop projects related to technical telecommunication engineering with the appropriate quality standards.
- RATFG3. Transmit the information and results of a telecommunication technical engineering project orally and in writing.

- RATFG4. Define all the regulatory aspects of the projects in the specific field of telecommunication technical engineering.
- RATFG5. Integration of the competences acquired in the teachings in the development of a technical telecommunication engineering project.
- RATFG6. Search and manage the necessary information to respond to the challenges posed by a telecommunication technical engineering project.
- RATFG7. Plan the tasks to be carried out for the development of a technical telecommunication engineering project.
- RATFG8. Prepare reports and reports of scientific-technological quality, describing in a clear and structured way, a technical telecommunication engineering project, the necessary bibliographical references, an evaluation of the results and a proposal for improvements.
- RATFG9. Present and defend a project in the field of Telecommunication Technical Engineering.
- RATFG10. Work autonomously, looking for feasible solutions to the problems encountered.

### 3. CONTENTS

The content of each project will be initially defined in the preliminary draft approved by the department in which the work is carried out. The final report will reflect the adequate development of that content, which will have to be adjusted to the 12 ECTS credit load corresponding to the Degree Final Project.

According to the regulations of the Higher Polytechnic School on the realization of the Degree Final Projects, these should be framed in one of the following types:

1. Design and realization (partial or total) of an application or computer system or original engineering that constitutes a contribution to engineering techniques.
2. Preparation of a computer or engineering project consisting of a set of sections that allow the manufacture or installation of a system or a series of them
3. Theoretical study of a computer system or engineering, material or computer technology or advanced engineering, of interest for its novelty, recent implementation, etc. and that has a practical application
4. Work developed in official centers or companies, national or foreign, by virtue of agreements or agreements to that effect. For this modality it will be necessary to have an additional tutor (co-tutor), belonging to the institution where the project will take place. Since external practices are a subject in the curriculum, the memory of practices cannot be used as a Degree Final Project, without prejudice to the existence of a thematic relationship, in accordance with the requirements established in this regulation.
5. Research projects proposed by professors belonging to the departments, Research Groups or Business Chairs.
6. Experimental, theoretical or review work and bibliographic research related to the degree, which may be developed in departments, Centers of the University of Alcalá or in the scope of the Research Groups and Business Chairs.

7. Other works, theoretical or practical, that correspond to the offers of the departments or of the students themselves, not adjusted to the previous modalities.

## 4. TEACHING-LEARNING METHODOLOGIES. FORMATIVE ACTIVITIES.

### 4.1. Credits distribution

Number of on-site hours:	Those agreed between the student and the tutor (Scheduled and follow-up tutoring hours)
Numbers of hours of student work:	300 h, including on-site hours
Total hours	300 h

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

The training activities of this subject focus on the personal work of the student, which will include as many tasks as are necessary for the fulfilment of the objectives of the Degree Final Project: documentation, field and laboratory work, writing of the final report, presentation of results.

The student will perform the tasks under the supervision of his tutor. Apart from the support provided by the tutor, the departments may authorize the student to access the laboratories needed to develop the project, provided they have an approved draft and are in the phase of conducting the Degree Final Project.

The means necessary to carry out the Degree Final Project can be financed by:

1. The department to which the tutor is assigned or any other of the university interested in the development of the system.
2. Any company, organization or institution interested in the exercise carried out.
3. The student himself.

The report presented by the student must comply with the rules of format and content, and in general all those defined in the regulations on TFGs of the Higher Polytechnic School.

## 5. ASSESSMENT: procedures, evaluation and grading criteria

### 5.1. Evaluation criteria

The objective of the evaluation process is to assess the degree and depth of the competences acquired by the student.

For the evaluation of the competences and of the learning results described above, the following evaluation criteria will be used:

#### **Related to the Project carried out:**

- CE1. Integrates the skills acquired in the teachings.
- CE2. Solves problems with initiative, decision making and creativity.
- CE3. Has the capacity to handle mandatory specifications, regulations and standards
- CE4. Develops projects related to Telecommunications Technical Engineering with the appropriate quality standards
- CE5 Defends a project in the field Telecommunications Technical Engineering.

#### **Related to the development of the work:**

- CE6. Finds the information necessary to carry out the work and analyses it to extract the one that is of interest.
- CE7 Synthesizes the information obtained from different sources and the own knowledge in a global and structured vision of the "state of the art" of the project, correctly referencing the information obtained from third parties.
- CE8 Demonstrates initiative, ability to make decisions and autonomous learning ability.
- CE9. Plans the work, and is able to follow the planning and analyse and justify possible deviations on planning.

#### **Related to the oral exposition:**

- CE10. Orally exposes the contents of the work with precision and clarity and in the proper order to facilitate understanding
- CE11 Uses the appropriate vocabulary in each circumstance making proper use of the technical lexicon when necessary.
- CE12. Shows empathy with the audience by transmitting security in what is said using the appropriate tone and volume.
- CE13. Makes the work exhibition in the time available for it.

### **Related to the presented report:**

- CE14. The memory follows the expected structure for an engineering project taking into account the guidelines set by the regulations.
- CE15. The memory is written treating the different topics with the necessary depth and adequately referencing the sources of information.
- CE16. When the memory describes a system, product, prototype, ... realized, the content of this one coincides with the system, product, prototype, ... developed.
- CE17. The memory is written clearly, using appropriate vocabulary and with good use of spelling and grammar rules.

## **5.2 Procedures**

Both for the ordinary and the extraordinary call, the evaluation instruments that will be used to measure the degree of acquisition of the learning outcomes are those detailed below:

- Project and development of the work: Work developed by the student in the different stages of development of the Degree Final Project described in the Preliminary Project.
- Memory: Scientific-technological quality of the developed memory, as well as making a memory that respects the norms of format and contents that are detailed in the regulations of the Higher Polytechnic School.
- Oral presentation: Presentation and defence of the work carried out and the results obtained.

In the case of not passing the subject in the ordinary call, the student may submit to the extraordinary call, presenting a new memory and, where appropriate, a new application, device or system, or a new version thereof that includes the modifications and improvements recommended by the board in the ordinary call.

## **5.3 Grading criteria**

In accordance with the evaluation criteria described above, the qualification of the Degree Final Project, both in the ordinary and in the extraordinary call, will be carried out in accordance with the attached rubric.

With regard to the rubric, the maximum weights proposed for each block (5 points, 2 points and 3 points) are for guidance purposes. It is the court that, depending on the nature of the work, will establish those weights, as well as decide if the weights and grades are detailed for each evaluation criterion, or globally for each block.



## 6. BIBLIOGRAPHY

Specific for each Degree Final Project.

## Tutor's report on the Degree Final Project

Mr./Mrs./Ms. \_\_\_\_\_, tutor of the final degree project:

“ \_\_\_\_\_ ”, made by

Mr./Mrs./Ms. \_\_\_\_\_ hereby  
issues the following report on the aforementioned work.

Favourable

Unfavourable

COMMENTS (**ONLY** must be included if the report is unfavourable):

Alcalá de Henares, \_\_\_\_\_, \_\_\_\_\_, 20\_\_\_\_\_.

Signed: \_\_\_\_\_.

Degree Final Project defence act

Degree Final Project defence record. Academic year \_\_201\_\_ / \_\_201\_\_

**Title:**

**Author:**

**DNI/Passport:**

**Degree:**

**Tutor:**

**Cotutor (if applicable):**

**Department:**

**The court has decided to grant the qualification of:**

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**Proposed for Honours \* (mark with an X)**

YES

NO

\* The Court may propose for a distinction of Honours a Degree Final Project with an outstanding qualification. The student who accepts this proposal, voluntarily resigns to the request of issuance of the Graduate Degree until the end of the academic year, at which time the grant of Honours is resolved

*Alcalá de Henares, ....., ....., .....*

<b>President</b>	<b>1<sup>st</sup> Vocal</b>	<b>2<sup>nd</sup> Vocal</b>
<b>Signed:</b>	<b>Signed:</b>	<b>Signed:</b>

## RUBRIC FOR THE EVALUATION OF THE DEGREE FINAL PROJECT

Learning outcomes	Evaluation criteria	Weight	Qualif.	Comments of the court
<p>BLOCK 1: Project</p> <ul style="list-style-type: none"> <li>• Project related to the corresponding field with the appropriate quality standards (RATFG2)</li> <li>• Regulatory aspects of projects in the specific field (RATFG4)</li> <li>• Integration of the acquired competences (RATFG5)</li> </ul>	<ul style="list-style-type: none"> <li>• Integrates the skills (CE1)</li> </ul>			
	<ul style="list-style-type: none"> <li>• Initiative, decision-taking and creativity (CE2)</li> </ul>			
	<ul style="list-style-type: none"> <li>• Handle specifications, regulations and standards (CE3)</li> </ul>			
	<ul style="list-style-type: none"> <li>• Project with the appropriate quality standards (CE4)</li> </ul>			
	<ul style="list-style-type: none"> <li>• Defends a project in the field of the profession (CE5)</li> </ul>			
	<p><b>Maximum weight / Qualification (Suggested maximum weight 5 points)</b></p>			
<p>BLOCK 2: Development of the work</p> <ul style="list-style-type: none"> <li>• Interpret, understand and design an approximation to the problem with creativity and initiative. (RATFG1)</li> <li>• Work autonomously (RATFG10)</li> <li>• Search and manage the necessary information to respond to the challenges posed by the project (RATFG6)</li> <li>• Task planning (RATFG7)</li> </ul>	<ul style="list-style-type: none"> <li>• Information search (CE6)</li> </ul>			
	<ul style="list-style-type: none"> <li>• Synthesize the information, global vision and state of the art (CE7)</li> </ul>			
	<ul style="list-style-type: none"> <li>• Initiative, decision-taking capacity and self-learning (CE8)</li> </ul>			
	<ul style="list-style-type: none"> <li>• Planification of the work. Analysis/Justification of deviations (CE9)</li> </ul>			
	<p><b>Maximum weight / Qualification (Suggested maximum weight 2 points)</b></p>			

<p>BLOCK 3: Report and oral presentation</p> <ul style="list-style-type: none"> <li>• Transmit information, oral and writing (RATFG3)</li> <li>• Quality of the report, state of the art, results and their interpretation, future lines of work (RATFG8)</li> <li>• Presentation and defence (RATFG9)</li> </ul>	The report follows the format regulations (CE14)			
	Report written with enough depth and good references (CE15)			
	Report and work coincide (CE16)			
	Report written clearly (CE17)			
	Good, precise and correct oral presentation (CE10)			
	Adequate use of the vocabulary in the presentation (CE11)			
	Social aptitudes (CE12)			
	Presentation adjusted to the time (CE13)			
	<b>Maximum weight / Qualification (Suggested maximum weight 3 points)</b>			

**Note 1:** With regard to the rubric, the maximum weights proposed for each block (5 points, 2 points and 3 points) are for guidance purposes. It is the court that, depending on the nature of the work, will establish those weights, as well as decide if the weights and grades are detailed for each evaluation criterion, or globally for each block

**Note 2:** Block 2 will be evaluated mainly by the tutor.

## **Disclosure Note**

The University of Alcalá guarantees to its students that, if due to health requirements the competent authorities do not allow the total or partial attendance of the teaching activities, the teaching plans will achieve their objectives through a teaching-learning and evaluation methodology in online format, which will return to the face-to-face mode as soon as these impediments cease.

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