

**Bachelor'S Degree Final Project**

Code: 106538  
ECTS Credits: 12

Degree	Type	Year	Semester
2500898 Telecommunication Systems Engineering	OB	4	0

The proposed teaching and assessment methodology that appear in the guide may be subject to changes as a result of the restrictions to face-to-face class attendance imposed by the health authorities.

### Contact

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### Use of Languages

Principal working language: catalan (cat)  
Some groups entirely in English: No  
Some groups entirely in Catalan: Yes  
Some groups entirely in Spanish: No

### Prerequisites

In order to register the subject of TFG, the student must meet the following requirements:

- To have passed all the credits of basic education subjects (Calculus, Algebra, Statistics, Physics, Fundamentals of Computer Science, Fundamentals of Signals and Systems, Theory of Circuits, Organization and Management of Companies and Fundamentals of Engineering), which suppose a total of 63 credits.
- Have approved at least 80% of the credits of compulsory subjects, which suppose a total of 98 credits. To have passed (or to be studying) the subject of Project Management and Legislation.

In total, the student must have passed  $63 + 98 = 161$  credits, which correspond to more than two thirds of the total curriculum.

### Objectives and Contextualisation

The objective of the Final Degree Project (TFG) is to carry out individual work that allows the student to apply and integrate the knowledge and skills acquired throughout the undergraduate studies. The result must be an original work that will be evaluated in public defense in front of a committee of three teachers of the School.

### Competences

- Communication
- Develop personal attitude.
- Develop personal work habits.
- Develop thinking habits.
- Draft, develop and sign projects in the field of telecommunications engineering that, depending on the speciality, are aimed at the conception, development or exploitation of telecommunication and electronic networks, services and applications.
- Resolve problems with initiative and creativity. Make decisions. Communicate and transmit knowledge, skills and abilities, in awareness of the ethical and professional responsibilities involved in a telecommunications engineers work.

## Learning Outcomes

1. Adapt to unforeseen situations.
2. Choose the most suitable software and hardware tools and use them properly.
3. Cite sources of information used in accordance with internationally recognised standards.
4. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
5. Critically evaluate the work done.
6. Defend proposed solutions with logical and coherent arguments.
7. Develop critical thinking and reasoning.
8. Develop curiosity and creativity.
9. Develop independent learning strategies.
10. Develop systemic thinking.
11. Develop the capacity for analysis and synthesis.
12. Efficiently use ICT for the communication and transmission of ideas and results.
13. Evaluate ones knowledge and skills regarding the subject of the project and identify shortcomings.
14. Evaluate the resources and personal and environmental limitations in order to realistically plan a task. Clearly establish the hypotheses for a task and defend their validity in accordance with the results obtained previously by the student or third parties.
15. Explain the strategy for researching information used and show that the most important sources in the field of study have been consulted.
16. Identify regulations (laws, standards, etc.) that can be considered in the end of degree project.
17. Make ones own decisions.
18. Manage available time and resources.
19. Perform an individual, original and professional exercise that consists of a project in the field of the specific technologies of telecommunications engineering, and which synthesises and integrates the skills learned. Present and defend it before a university tribunal.
20. Prevent and solve problems.
21. Read English texts with a high degree of understanding.
22. Reasonably explain the different options considered when establishing how to deal with the initially posed problem.
23. Work autonomously.
24. Work in complex or uncertain surroundings and with limited resources.

## Content

All students who take the subject of TFG must carry out a written report at the end of the work, in accordance with the following recommendations:

### Memory structure

#### 1. Standardized cover

According to the established format (available in the TFG space of the Virtual Campus) and which includes: anagram of the UAB, title of the TFG, degree, name of the author, name of the Director (and co-Director (s) if it is the case), name of the Tutor and date.

#### 2. Certificate of the tutor

The first page of the report is reserved to include the certificate with the signature of the Tutor of the TFG (document available in the TFG space of the Virtual Campus), as the work has been carried out under his supervision. In the case of TFG made to companies or institutions outside the UAB, the Tutor's certificate will be added to this entity as the project has been carried out in an external entity under an agreement signed with the UAB and that the company or institution has knowledge and agrees with the content of the Report.

#### 3. Body of memory

It is recommended that it contain the following sections: objectives, brief review of the state of the art, methodology, development, results, conclusions and bibliography.

#### 4. Back cover

A summary of the TFG (less than 200 words) in Catalan, English and Spanish will be included in the last page.

It is recommended that the student synthesize the content of the report and focus mainly on describing their contribution to the project carried out.

#### Delivery of the report

The student must deliver a copy of the report to each of the members of the TFG court that will evaluate it, during the week prior to the presentation date, which will be duly announced at the news desk of the TFG space of the Virtual Campus.

#### Alternative technical article format

For the body of the memory, the student can choose to use a technical formatd'article according to the template of the IEEE (available in the TFG space of the Virtual Campus) and that must include the same fields as those described above for the body of the report (i.e. objectives, brief review of the state of the art, methodology, development, results, conclusions and bibliography). In this case the minimum extension of the article must be 10 pages in double column format, single space, source 10 for normal TFG and 20 pages for extended TFG (i.e. TFG + Advanced Engineering Project).

The rest of the elements of the report (cover, tutor's certificate and back cover) must be the same as those indicated in the previous point "Structure of the memory".

## Methodology

#### Offer of TFG proposals

The students can consult the TFG offers available through the link "Inscripció al treball de fi d'estudis" of the portal <http://sia.uab.cat>

#### Academic direction and tutoring of the TFG

Each student who curses the subject of TFG will be assigned a teacher who will act as a Tutor and that will ensure that the TFG fulfills its academic objectives. The TFG Tutor must be a teacher of the School with teaching assigned to the subject of TFG. Each TFG will also have a Director, who will be who will direct the student during the realization of the work. In the case of TFG proposed by professors of the School with teaching assigned to the subject of TFG, the professor will act as Tutor and Director of the work. On the other hand, in the case of TFG carried out by an external entity at the UAB, the person responsible for this external entity will be the one who will act as Director of the work.

The Tutor's obligations are:

- To ensure, as the highest academic responsible, the quality of the TFG and the fulfillment of the academic and teaching requirements of a TFG in Telecommunication Systems Engineering.
- Know and apply the teaching guide of the subject of TFG.
- To be part of the TFG evaluating Tribunal of the enrolled student to which it is tutoring.

The obligations of the Director and Co-Directors are:

- Propose a job that meets the academic and teaching requirements for a TFG in Telecommunication Systems Engineering.
- Help the student to define the TFG and set realistic goals, setting a calendar and a good working pace.

- Advise and guide the student during the school period in which he has enrolled in the TFG subject. This monitoring will be carried out periodically through meetings with the student, in order to ensure that the established goals are achieved.

In the event that the TFG is supervised by more than one professor with teaching assigned to the TFG subject, only one of them will act as Director and Tutor while the rest will be considered co-Directors.

UAB teachers who do not have teaching assigned to the TFG subject may only act as Directors (or co-Directors if there is more than one) provided that another teacher with teaching assigned to the subject TFG is responsible and acts as a Tutor.

The TFG can be carried out in an external entity at the UAB. In this case, it will be necessary to sign an agreement between the company or external institution and the UAB, in accordance with the current regulations of the School and the UAB. An external TFG must mandatorily have a teaching teacher assigned to the TFG subject that is responsible and that acts as a Tutor. The person at the company or external institution responsible for the student will act as Director.

#### Organization of TFG proposals

- The organization of the TFG subject falls, by default, on the Coordinator of the degree.
- The departments involved in the TFG will be responsible for designating teachers who make the proposals.
- Each teacher who has assigned teaching to the TFG subject will make a proposal (s) through the procedure established by the person in charge of the subject.
- In case a student wishes to propose a TFG, he must first seek a Director who will eventually make the TFG proposal. In the event that this Director is a professor of the School with teaching assigned to the subject of TFG, the professor will act as Director and Tutor of the student.

#### Development of TFG work

The main part of the TFG is the autonomous work that the student must carry out, and therefore, this is an activity that is not eminently non-attended. The student's obligations are:

- To carry out, individually, the work assigned by the Director of the TFG.
- Write a written report, in accordance with the points described in the Contents section of the TFGteaching guide.

The duration of all TFG will be of one semester, with a teaching load equivalent to a subject of 12 ECTS credits and in accordance with the planning indicated in the section of Educational Activities of the teaching guide of the TFG.

As an exception, students enrolled in the subject of "Advanced Engineering Project" may attend this subject as an extension of the TFG. In this way, the total dedication to the TFG can be  $12 + 12 = 24$  credits, which can be distributed over two semesters. In any case, it will be the TFG Director who decides whether the proposed work can be extended to 24 credits or not, and this decision must be explicitly indicated at the time of publishing TFG offers.

Annotation: Within the schedule set by the centre or degree programme, 15 minutes of one class will be reserved for students to evaluate their lecturers and their courses or modules through questionnaires.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Supervised			
TFG development	300	12	1, 5, 14, 3, 4, 6, 10, 9, 11, 8, 7, 19, 2, 15, 22, 12, 18, 16, 21, 17, 20, 23, 24, 13

## Assessment

### Evaluation procedure

- The evaluation of the TFG must be carried out within the same semester in which the student has enrolled to the subject of TFG, either in the February session or in the July session.
- To carry out this evaluation, a committee will be appointed consisting of three members: the Tutor of the TFG and two professors of departments of the School with teaching in the subject of TFG.
- The person in charge of the subject of TFG (who by default will be the Coordinator of the degree) will be in charge of carrying out the composition of the committee and of planning the date of presentation. Both information will be made public, at least two weeks in advance of the filing date.
- The student must deliver a copy of the report to each member of the committee during the week prior to the defense date.
- The presentation of the TFG will be carried out by the student in a public oral session. The estimated time of exposure of each TFG is 15 minutes, followed by a discussion with the members of the committee.
- The student will be evaluated by the committee of the following aspects:
  - TFG report (R). The quality of the prepared material will be evaluated, considering both structure and drafting aspects.
  - Presentation and defense of the TFG (P). The quality of the material prepared, the ability to exhibit and the effectiveness of the answers formulated to the committee will be evaluated.
  - Evaluation of the TFG Tutor (Tut). The Tutor will issue his assessment considering methodological aspects and results obtained. In the case of TFGs carried out within the framework of an internship agreement outside the UAB, the assessment of the student's external director will be included.
  - Overall evaluation of the committee (Com). Where both methodological aspects and results obtained will be taken into account.
  - The final grade (NF) of the TFG will be obtained from  $NF = \min(0.2 \cdot R + 0.2 \cdot P + 0.2 \cdot Tut + 0.4 \cdot Com; R; P)$ . Therefore, both the report and the presentation must be evaluated greater or equal than 5,0 in order to pass the TFG.
- Exceptionally, the TFG can be developed in small groups of two or three students. In any case, the evaluation of the TFG will always be done at the individual level.
- For the TFG carried out within the framework of an internship agreement in the company, the student must provide the committee with an assessment report by his / her director in the company, as is done in the case of external internships.

### Publication of the TFG memory in the UAB digital repository

The committee that evaluates the TFG of the student must approve the publication or not of the report to the digital repository of the UAB ([ddd.uab.cat](http://ddd.uab.cat)), based on the quality of the work and the absence of legal impediments that can refrain from publication (eg confidential data, intellectual property rights, etc.). In case the committee authorizes the publication in the DDD repository, you must indicate it in the rubric sheet together with the rest of the evaluation of the work. Once the committee delivers the rubric to the Academic Management of the School, the head of the subject of TFG will contact the students who have received the approval to inform them about the procedure to follow to publish their report.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
TFG evaluation committee	100%	0	0	1, 5, 14, 3, 4, 6, 10, 9, 11, 8, 7, 19, 2, 15, 22, 12, 18, 16, 21, 17, 20, 23, 24, 13

## Bibliography

In each case, the Director of the TFG will propose the appropriate bibliography based on the work to be carried out.

## **Software**

- To be defined in accordance with the directors.