

## Foundations of Engineering

Code: 103798  
ECTS Credits: 6

Degree	Type	Year	Semester
2500895 Electronic Engineering for Telecommunication	FB	1	1
2500898 Telecommunication Systems Engineering	FB	1	1

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

Name: Francesc Serra Graells  
Email: Francesc.Serra.Graells@uab.cat

### 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

### Teachers

Pau Aguila Moliner  
Javier Martin Martin  
Jordi Bonache Albacete

### Prerequisites

No official requirements are defined for this course.

### Objectives and Contextualisation

This course is scheduled for the first year and first semester of the degree.

The general aim of this course is to show the student what it means to be an engineer, beyond the technical know-how of each engineering field. In particular, the course will focus on the way of rational thinking, facing new problems, organizing work and projects so the student can apply it successfully to face their studies.

The course is fundamentally practical. Taking as a basis the team work, it is sought that the student confronts and solves for the first time with the help and supervision of the teachers a series of topics to deal in their professional life: reading articles in English and scientific journals, consulting the state of the art on a topic, writing of patents, selecting sources of information, applying heuristic methods to solve problems, organizing human teams, definition of objectives, scheduling of projects and proposals, risk assessment, contingency plans, executive reports, etc.

### Competences

Electronic Engineering for Telecommunication

- Apply basic elements of economics and human resource management, organisation and planning of projects.
- Communication
- Develop personal work habits.
- Develop thinking habits.
- Learn new methods and technologies, building on basic technological knowledge, to be able to adapt to new situations.
- Work in a team.

#### Telecommunication Systems Engineering

- Apply basic elements of economics and human resource management, organisation and planning of projects.
- Communication
- Develop personal work habits.
- Develop thinking habits.
- Learn new methods and technologies, building on basic technological knowledge, to be able to adapt to new situations.
- Work in a team.

## Learning Outcomes

1. Assume and respect the role of the different members of a team, as well as the different levels of dependency in the team.
2. Communicate efficiently, orally and in writing, knowledge, results and skills, both professionally and to non-expert audiences.
3. Critically evaluate the work done.
4. Develop critical thinking and reasoning.
5. Develop systemic thinking.
6. Efficiently use ICT for the communication and transmission of ideas and results.
7. Establish the development phases of a simple engineering project using basic knowledge.
8. Establish the phases of development of a simple engineering project using basic knowledge.
9. Make ones own decisions.
10. Manage available time and resources.
11. Manage available time and resources. Work in an organised manner.
12. Plan the organisational and economic aspects of a simple engineering project.
13. Prevent and solve problems.
14. Work autonomously.
15. Work cooperatively.

## Content

1. Engineering. Science, Technology, Engineering and Science. Skills of an engineer.
2. Historical introduction to Engineering. Engineering specialization fields.
3. Problem solving in Engineering.
4. Concept of system. Modeling of systems.
5. Information sources. Database. Reliability
6. Communication in Engineering.
7. Studies in Electronic Engineering and Telecommunications Systems. Career opportunities.
8. Solutions to the technological challenges of the future. Work in group.

## Methodology

The teaching methodology followed in this course is based on a series of training activities that require the presence of the student in the classroom or in the laboratory (oriented activities), plus a series of activities to be carried out in groups of 4-5 people under the supervision of the teacher (supervised activities) that must be completed necessarily with a personal work by the student (autonomous activities); all with an eminently practical orientation.

The "Training activities" table specifies the teaching / learning activities. Lectures are given in large groups, while subjects exposed in seminars are discussed within smaller groups. Finally, practical cases are presented to students, who must solve them and return solutions to the teacher.

Along the course, students groups are assigned different practical cases in which they have to face the identification-resolution of problems and the approach of solutions proposals with increasing difficulty. Supported by the teaching team, groups of students must analyze the cases, propose solutions, prepare a report and defend in front of their peers the analysis made and the decisions taken. Both the delivery of exercises in the seminars as well as the reports and the defense of the works has a weight in the final evaluation of the student.

## Activities

Title	Hours	ECTS	Learning Outcomes
Type: Directed			
Conferences	4	0.16	2, 6
Lectures	18	0.72	5, 4
Workshops	13	0.52	2, 5, 4
Type: Supervised			
Team working	50	2	1, 3, 2, 7, 6, 12, 9, 13, 15
Tutorial sessions	16	0.64	3, 7, 12, 13
Type: Autonomous			
Individual exercises	6	0.24	11, 9, 14
Self study	37	1.48	5, 4, 7, 11, 12, 14

## Assessment

The evaluation of the acquired skills will be done on the basis of the activity developed in lectures (resolution of exercises), and of the reports and presentations of the works performed in teams. Since all these activities are carried out in groups, a individual exam has been included, with a weight in the final mark of 40%, which allows the student's personal assessment. The individual exam consists of a test and a second writing part where students must answer synthetically and accurately some questions about both theoretical and practical topics developed in the course.

The evaluation activities and their weights in the final qualification are specified in the following table. To pass the course it is necessary:

1. Obtain a qualification of more than 3 in activities 1, 2, 3 and 4.
2. That the weighted average of the global qualification obtained is 5.

Not gradable: The student will be non-gradable if he/she has not submitted any of the assessment activities 1, 2 and 4.

Review of exams and claims: Together with the publication of the final notes, the students will be able to review the tests on the virtual campus of the course, comment on the note with the teacher and review the final grades. Qualifications of the different evaluation activities. In this context, claims can be made about the final grade that will be evaluated by the responsible professor.

Recovery mechanism for the evaluation of the course. The evaluation recovery mechanism is linked to evaluation activities 1,2 and 4. Given that activity 3 is a collection of different exercises each with a weight less than 15%, the recovery is not considered of this part as a whole.

- Individual exams will be compensated through a new exam common to all students who have not achieved the minimum grade of 3. The final grade of this activity will be the last exam done.
- With regard to activities 1 and 4, the compensation will consist of repeating the exercise presenting a new report taking into account the recommendations made by the professors in the oral presentation. In this case, there will be no oral defense and therefore the score relative to the oral defense is not recoverable.

Second (and later) enrollments: Students who are not enrolled for the first time of the subject and who have submitted for evaluation in previous editions without having passed the course have the option of presenting themselves only to the final exam if and only if in the last assessment they obtained a qualification of activities 1 and 2 equal to or greater than 5. In this case, the final grade of the course will be the qualification obtained in the writing exam, without taking into account any of the qualifications obtained in previous editions. The student will have to apply for this option by communicating it to the responsible professor.

## Assessment Activities

Title	Weighting	Hours	ECTS	Learning Outcomes
1. Problem solving. Report.	20%	2	0.08	3, 15
2. Challenge planning. Report and oral presentation.	25%	2	0.08	1, 3, 2, 5, 4, 7, 8, 6, 10, 11, 12, 9, 13, 15, 14
3. Individual exercises.	15%	0	0	5, 4, 9
4. Writing exam.	40%	2	0.08	11, 14

## Bibliography

- [1] Brockman, Jay B. *Introduction to engineering: modeling and problem solving*. John Wiley & Sons, Inc., 2009.
- [2] Wright, Paul H. *Introducción a la ingeniería*. Tercera edición. Limusa Wiley, 2004.
- [3] Gómez-Senent, Eliseo et al. *Introducción a la ingeniería*. Editorial UPV, 2007.
- [4] Grech, Pablo. *Introducción a la ingeniería: un enfoque a través del diseño*. Prentice Hall, 2001.
- [5]. Gómez, Alan G et al. *Engineering your future: a project-based introduction to engineering*. Great Lakes Press, Inc., 2006.