**2021/2022**

**Simulation and Design Tools I**

Code: 102693
ECTS Credits: 6

| Degree | Type | Year | Semester |
|---|---|---|---|
| 2500898 Telecommunication Systems Engineering | OT | 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: spanish (spa)

Some groups entirely in English: No

Some groups entirely in Catalan: No

Some groups entirely in Spanish: No

## Teachers

Sergio Lopez Soriano

## Prerequisites

It is desirable that students who want to take this course have broad knowledge in the field of microwaves and antennas, as well as a general vision of communications system.

## Objectives and Contextualisation

This course has been created with a user perspective, oriented towards the acquisition of competences in the use of the CAD software tools that industry generally uses in the field of RF-FEM components manufacturing and Antennas, along with presence in the markets of communications infrastructures, sector of mobile communications, broadcasting, space sector or automotive between many others.

The use of the subject by the student will mean that this acquires new methodologies and skills for the efficient exploitation of software tools available in a wide variety of situations for the development of the profession.

## Competences

- 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.
- Select and devise communication circuits, subsystems and systems that are guided or non-guided by electromagnetic, radiofrequency or optical means to fulfil certain specifications.
- Work in a team.

## Learning Outcomes

1. Contrast numerical and analytical results.
2. Describe the main methodologies of modelling and simulation, and choose the most suitable for the simulation of a certain subsystem.
3. Develop independent learning strategies.
4. Develop the capacity for analysis and synthesis.
5. Measure the parameters of a communication system on the basis of simulation results.
6. Use software tools for electromagnetic and radiofrequency analysis.
7. Work cooperatively.

## Content

1. Introduction

1.1. CAD tools based on Circuit Theory

1.2. CAD tools based on Field Theory

2. Electromagnetic simulation software

2.1. FEKO: the method of moments

2.2. ADS-Momentum: the method of moments

2.3. HFSS: finite element method.

## Methodology

The course will be completely practical. It will be developed in the Laboratories under a strict system of learning by projects. The subject will have an orientation towards analysis and diagnosis. Work will be carried out on the operation of real devices and the obtaining of input functions, but it is not intended to give guidance to the device design.

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: Directed | | | |
| Practical seminars. | 50 | 2 | 1, 2, 3, 4, 5, 7, 6 |
| Type: Supervised | | | |
| Tutorials | 7.5 | 0.3 | 1, 4 |
| Type: Autonomous | | | |
| Preparation of laboratory work. | 92.5 | 3.7 | 1, 2, 3, 4, 5, 7, 6 |

## Assessment

The course is divided into 3 different parts, it is mandatory to pass ALL the parts separately (grade> = 5). Otherwise, the final grade will be 4 at most. As it is a practical subject in its entirety, the work will be continuously evaluated through the reports of the different mini projects that will be carried out in the laboratory

using commercial simulators. Reports are individual but collaborative in terms of laboratory work. The delivery date will be published with the documentation of each mini project,. Any delivery after the deadline will have a 20% penalty in the mini project grade. Therefore, for the same grade, a late delivery must be better than another delivered on time. If the report is not of high enough standard, the student will be advised to resubmit it again and it will be considered as delivered after the deadline.

## Assessment Activities

| Title | Weighting | Hours | ECTS | Learning Outcomes |
| --- | --- | --- | --- | --- |
| Labwork ADS-Momentum | 33% | 0 | 0 | 1, 2, 3, 4, 5, 7, 6 |
| Labwork FEKO | 34% | 0 | 0 | 1, 2, 3, 4, 5, 7, 6 |
| Labwork HFSS | 33% | 0 | 0 | 1, 2, 3, 4, 5, 7, 6 |

## Bibliography

It will be provided by the teacher once the course has begun accordingly to the different mini projects

## Software

ADS, FEKO, HFSS.