



# COMILLAS

UNIVERSIDAD PONTIFICIA

ICAI

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CIHS

**Syllabus**  
**2025 - 2026**

## GENERAL INFORMATION

Data of the subject	
Subject name	Electromagnetic Fields
Subject code	DIE-GITT-221
Mainprogram	<a href="#">Bachelor's Degree in Engineering in Telecommunication Technologies</a>
Involved programs	Grado en Ingeniería en Tecnologías de Telecomunicación [Second year] Grado en Ingeniería en Tecnologías de Telecom. y Grado en Análisis de Negocios/Business Analytics [Second year] Grado en Ing. en Tecnologías de Telecom. y Grado en Análisis de Negocios/Bachelor in Busi. Analytics [Second year]
Level	Reglada Grado Europeo
Quarter	Semestral
Credits	6,0 ECTS
Type	Básico
Department	Department of Electrical Engineering
Coordinator	Francisco Javier Herraiz Martínez
Office hours	Contact by e-mail

Teacher Information	
Teacher	
Name	Francisco Javier Herraiz Martínez
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Teacher	
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## DESCRIPTION OF THE SUBJECT

Contextualization of the subject
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## Course contents

Contents
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## **THEMATIC UNIT 1: Fundamentals of Electromagnetic Fields**

- 1.1. Electrostatics. Conductors. Electric fields in matter.
- 1.2. Electric current.
- 1.3. Magnetic field.
- 1.4. Electromagnetic induction.

## **THEMATIC UNIT 2: Maxwell's Equations and Electromagnetic Waves**

- 2.1. Maxwell's equations in the time and frequency domains.
- 2.2. Energy and the Poynting vector.
- 2.3. Homogeneous plane waves.
- 2.4. Plane waves and obstacles.
- 2.5. Guided waves.

## **THEMATIC UNIT 3: Devices for Emission and Reception of Electromagnetic Waves**

- 3.1. Introduction to electromagnetic radiation and antennas.

## **EVALUATION AND CRITERIA**

The use of AI to produce full assignments or substantial parts thereof, without proper citation of the source or tool used, or without explicit permission in the assignment instructions, will be considered plagiarism and therefore subject to the University's General Regulations.

Evaluation activities	Evaluation criteria	Weight
<ul style="list-style-type: none"><li><b>Exams:</b> Mid-term exam Final exam</li></ul>	<ul style="list-style-type: none"><li>Theory understanding.</li><li>Application of concepts to the resolution of practical problems.</li><li>Analysis and interpretation of the results obtained in solving problems.</li><li>Written communication.</li></ul>	85
<b>Continuous performance assessment</b>	<ul style="list-style-type: none"><li>Follow-up test</li><li>Theory understanding.</li><li>Application of concepts to the resolution of practical problems.</li><li>Analysis and interpretation of the results obtained in solving problems.</li><li>Written communication.</li><li>Attendance and attitude in class.</li><li>Class attendance level.</li><li>Class participation.</li></ul>	15

## **Grading**

- **Ordinary call:**
  - 5% participation in class



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- 10% follow-up test
- 25% mid-term exam mark
- 60% mark of the final exam
- **If a retake exam is required (extraordinary call):**
  - 3.75% participation in class
  - 7.5% follow-up test
  - 18.75% mid-term exam
  - 70% retake exam
- Failure to attend more than 15% of the classes may result in the loss of the right to take the ordinary call exam (and even the retake exam) of the subject (article 93.3 of the General Regulations, and articles 7.2 and 7.3 of the Academic Norms).
- The use of AI to produce complete assignments or significant parts thereof, without citing the source or the tool, or without explicit authorization in the assignment instructions, will be considered plagiarism and will be subject to the University's General Regulations.
- AI cannot be used in any exam or intermediate assessment test.

## BIBLIOGRAPHY AND RESOURCES

### Basic References

Course materials in Moodle

### Additional References

- E. M. Purcell. Electricidad y Magnetismo, 2ª edición. Reverté 1994.
- T.A. Moore. Six ideas that shaped physics, Unit. E. 2ª ed. McGraw-Hill
- David K. Cheng. Fundamentals of Engineering Electromagnetics. Pearson. 1993
- F.T. Ulaby, U. Ravaioli. Fundamentals of Applied Electromagnetics. Pearson. 2015 Global Edition

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