1. BASIC INFORMATION

Course	Project: electromagnetic physics
Degree program	Bachelor's Degree in Industrial Systems Engineering
School	School of Architecture, Engineering, Science and Computing
Year	1
ECTS	6
Credit type	Basic
Language(s)	English
Delivery mode	Face to face
Semester	S2
Academic year	25-26
Coordinating professor	Jaime Quintana

2. PRESENTATION

This Engineering Project is part of the Physics module of the Degree in Industrial Systems Engineering. The main objective of the course is to guide the student in acquiring a solid foundation in the fundamental aspects of classical Electromagnetism for a better understanding of the origin, evolution, and future of technology. It is intended that the student be able to identify, model, propose and solve practical situations that involve electromagnetic fields and elementary electronic circuits, with a strong component of experimentation. The course is focused on such a way that the student becomes familiar with and incorporates into his way of working the scientific methodology according to the Project Based School model, hallmark of the School of Architecture, Engineering and Design.

3. LEARNING OUTCOMES

Knowledge

KNO1: Understanding and mastery of the basic concepts of the general laws of mechanics, thermodynamics, fields and waves, and electromagnetism and their application to the resolution of engineering problems

- Identify the properties of electric fields
- Defining the properties of magnetic fields
- Describe the properties of electromagnetic waves, their interaction with matter, and the elementary principles of optics
- Associate the classical laws of electromagnetism in the description of electrical and magnetic phenomena, both in a vacuum and in material media

Skills

SK18: Ability to carry out laboratory experiments in the field of physics, chemistry and materials in the industrial area

- Conduct experiments in electromagnetic physics and elementary electrical circuits
- Reporting on laboratory experiments

Competences

CP13: Cooperate with others in the achievement of a shared academic or professional goal, participating actively, empathetically and exercising active listening and respect for all members.

4. CONTENT

- Electricity
- Electric Field and Potential
- Conductors, dielectrics and capacitors
- Electric current
- Magnetism

5. TEACHING-LEARNING METHODOLOGIES

The types of teaching-learning methodologies used are indicated below:

- Master class
- Cooperative learning
- Problem based learning
- Project-based learning (PBL)
- Workshop-based learning
- Simulation environments

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:

Campus-based mode:

Learning activity	Number of hours
Master classes	10
Practical seminars	15
Problem solving	10
Written reports and essays	5
Research and projects	40
Autonomous study	60
Debates and panel discussions	5
Face-to-face assessment test	5

TOTAL	150

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Campus-based mode:

Assessment system	Weight min. %	Weight max.%
Face-to-face assessment test	50	60
Case/problem	15	40
Performance evaluation	5	5
Research / projects	20	40

When you access the course on the *Campus Virtual*, you'll find a description of the assessment activities you have to complete, as well as the delivery deadline and assessment procedure for each one.

1.1. First exam period

Evaluation System	Weight
Work Sessions / Individual Activities	15%
Midterm Written Exam	15%
Comprehensive Written Exam on Electromagnetism (Final)	35%
Integrative Project: PBL	30%
Performance Evaluation	5%

To pass the course in the first exam period, you must obtain:

- Obtain a grade higher or equal to 5.0 out of 10.0 in the evaluation of class exercises and deliverables on the virtual campus.
- Midterm exams are exemptive. To calculate the final grade corresponding to the exams, the following formula is used:

$$N_{final} = 0.15 \cdot N_{\text{midterm}} + 0.35\left(w_1 \cdot N_{\text{midterm}} + w_2 \cdot N_{final}\right)$$

Where: N_{midterm} refers to the grade obtained in the first midterm exam (Electrostatics).If

the student passes the electrostatics section in the final exam, the grade from the midterm will be retained and weighted with w_1, which represents the percentage of electrostatics exercises included in the final exam w_2 corresponds to the percentage of magnetostatics exercises in the final exam.

Minimun requirements to calculate the weighted average_

- Score at least 5 out of 10 on the Comprehensive Written Exam on Electromagnetism.
- Score at least 5 out of 10 on the Group Project, meeting the requirement of scoring at least 5 points on both the report and the laboratory.
- Comply with the school's attendance policy: at least 50% attendance.

When the minimum required to carry out the weighted average of the evaluable activities is not met (the minimum is not reached in any of the previous points), the final grade will be:

- the weighted mean if its value is less than or equal to 4
- 4 if the value of the weighted mean is greater than 4

The grade in the first exam period will be considered as NP (Not Presented) when the student has not delivered any evaluable activity of those that are part of the weighted average.

1.2. Second exam period

To pass the course in the second exam period, you must obtain:

- To pass any failed midterm exam of the course, the student must obtain a grade equal to or higher than 5.0 out of 10.0. Only then will the grade be eligible to be averaged with the rest of the course activities. This make-up exam will be held on a date, time, and location that will be duly communicated to the students.Complete all the practical and hand in the corresponding report.
- Obtain a grade greater than or equal to 5.0 out of 10.0 in the final exam.

When the minimum required to carry out the weighted average of the evaluable activities is not met (the minimum is not reached in any of the previous points), the final grade will be:

- the weighted mean if its value is less than or equal to 4
- 4 if the value of the weighted mean is greater than 4

The grade in the second exam period will be considered as NP (Not Presented) when the student has not delivered any evaluable activity of those that are part of the weighted average.

The student must deliver the activities not successfully completed in the first exam period after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This table shows the delivery deadline for each assessable activity in the course:

Campus-based mode:

Assessable activities	Deadline
Unit 1	weeks: 1, 2, 3, 4, 5
Unit 2	week: 6
Unit 3	weeks: 7, 8, 9
Unit 4	weeks: 10,11,12
Unit 5	week: 13
Unit 6	week: 14

This schedule may be subject to changes for logistical reasons relating to the activities. The student will be notified of any change as and when appropriate.

9. BIBLIOGRAPHY

The main reference work for this subject is:

- F.W. Sears, M.W. Zemansky, H.D.Young Y R.A. Freedman "Física Universitaria", , Vol. 1 y 2, Ed. Addison-Wesley Longman. 2004

The recommended Bibliography is:

- P.A. Tipler, G. Mosca, “Física para la Ciencia y la Tecnología, Vol. 1 y 2”, 6ª ed., Ed. Reverté, (2010).
- R.A. Serway y J.W. Jewett, “Física para Ciencias e Ingenierías, Vol. 1 y 2”, 7ª ed., Cengage Learning Ed. (2008).
- M. Alonso y E.J. Finn, Física, Addison-Wesley Iberoamericana, 1995
- H.D. Young, R.A. Freedman, F.W. Sears y M.W. Zemansky, “Física universitaria, Vol. 1 y 2”, 12ª ed., Pearson Education (2013).
- R.A. Serway, R. J. Beichner, Física, McGraw Hill, 2002, 2 vols.

10. EDUCATIONAL GUIDANCE, DIVERSITY AND INCLUSION UNIT

From the Educational Guidance, Diversity and Inclusion Unit we offer support to our students throughout their university life to help them reach their academic achievements. Other main actions are the students inclusions with specific educational needs, universal accessibility on the different campuses of the university and equal opportunities.

From this unit we offer to our students:

1. Accompaniment and follow-up by means of counselling and personalized plans for students who need to improve their academic performance.
2. In terms of attention to diversity, non-significant curricular adjustments are made in terms of methodology and assessment for those students with specific educational needs, pursuing an equal opportunities for all students.
3. We offer students different extracurricular resources to develop different competences that will encourage their personal and professional development.
4. Vocational guidance through the provision of tools and counselling to students with vocational doubts or who believe they have made a mistake in their choice of degree.

Students in need of educational support can write to us at:

orientacioneducativa@universidadeuropea.es

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the “surveys” section in virtual campus or via e-mail.

Your assessment is necessary for us to improve.

Thank you very much for your participation.