



## GENERAL INFORMATION

Data of the subject	
Subject name	Electrical Measurements
Subject code	DIE-GITI-341
Main program	<a href="#">Bachelor's Degree in Engineering for Industrial Technologies</a>
Involved programs	Grado en Ingeniería en Tecnologías Industriales [Third year]
Level	Reglada Grado Europeo
Quarter	Semestral
Credits	6,0 ECTS
Type	Obligatoria (Grado)
Department	Department of Electrical Engineering
Coordinator	Ignacio Egido
Schedule	Find it at the official website ( <a href="http://horarios.comillas.edu/ICAIGrado1Sem/Horarios/">http://horarios.comillas.edu/ICAIGrado1Sem/Horarios/</a> )
Office hours	Please contact the professor

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## DESCRIPTION OF THE SUBJECT

### Contextualization of the subject

#### Prerequisites

Electrical circuit analysis

Electromagnetic fields applied to electrical machines

Basic measurement equipment

Basic electrical circuit connection and operation

## Course contents

### Contents

1. Voltage and current regulation
2. Measurement accuracy
3. Measurement of resistance. Basic methods, small resistance, isolation resistance, grounding resistance
4. Oscilloscope
5. Measurement of power and energy
6. Measurement of capacitance and reactance
7. Calibration
8. Sampling and time series analysis
9. Measurement of ferromagnetic materials characteristics in AC

## EVALUATION AND CRITERIA

Evaluation activities	Evaluation criteria	Weight
Mid-term exam + final exam	Theory understanding and application to solving exercises. Analysis of the results	45
Short questions in class	Theory understanding and application to solving exercises	5
Lab sessions	Work in groups. Circuit connection and measuring process. Analysis of measurements and results	50



## Grading

Regular assessment:

- Assessment from class lectures accounts for 50%: first exam (30%), second exam (60%) and short questions in class (10%).
- Lab session accounts for 50%: session preparation, 30%, session report, 30%, final exam, 40%.
- A grade of five is compulsory in both the grade obtained from class content derived from lectures as well as the lab grade in order to pass the subject.

Retakes:

The student has two periods of final evaluation during one academic year. The first one will be carried out at the end of the course (end of the semester). If the subject is not passed, obtaining five or more points, the student has another opportunity for final evaluation at the end of the academic year. The dates of evaluation periods will be announced on the web page. The new grade will be obtained as follows:

- Assessment from class lectures accounts for 50%: retake exam (90%) and short questions in class (10%).
- Lab session accounts for 50%: session preparation, 30%, session report, 30%, retake exam, 40%.
- A grade of five is compulsory in both the grade obtained from class content derived from lectures as well as the lab grade in order to pass the subject.

Course rules :

- Class attendance is mandatory according to Article 93 of the General Regulations (Reglamento General) of Comillas Pontifical University and Article 6 of the Academic Rules (Normas Académicas) of the ICAI School of Engineering. Not complying with this requirement may have the following consequences: students who fail to attend more than 15% of the lectures may be denied the right to do the final exam (and even the retake exam)
- Students who fail to attend three or more lab sessions (out of 9) will be denied the right to take both the final exam and the retake exam.
- Students who commit an irregularity in any graded activity will receive a zero mark in the activity, and the disciplinary procedure will follow (cf. Article 168 of the General Regulations (Reglamento General) of Comillas Pontifical University).

## WORK PLAN AND SCHEDULE

Activities	Date of realization	Delivery date
Lab session 1	Week 3	Week 4
Lab session 2	Week 4	Week 5
Lab session 3	Week 5	Week 6
Lab session 4	Week 7	Week 8
Lab session 5	Week 10	Week 11
Lab session 6	Week 11	Week 12



Lab session 7	Week 12	Week 13
Lab session 8	Week 13	Week 13
Lab session 9	Week 14	Week 14
Final exam	Week 15	

## BIBLIOGRAPHY AND RESOURCES

### Basic References

- Chacón, Francisco J., Medidas eléctricas para ingenieros, Colección ingeniería, Universidad Pontificia Comillas, 2007. (in Spanish)
- Webster, John G., Electrical Measurement, Signal Processing and Displays, CRC press, 2004.
- Tumanski, S., Principles of electrical measurement, Taylor & Francis, 2006.

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