



## GENERAL INFORMATION

Data of the subject	
Subject name	Fundamentals of Power Systems
Subject code	DIE-MSG-511
Mainprogram	Master in Smart Grids
Involved programs	Master in Smart Grids [Primer Curso]
Level	Master
Quarter	Semestral
Credits	3,0 ECTS
Type	Optativa
Department	Department of Electrical Engineering
Coordinator	Ignacio Egido Cortés
Office hours	Request by e-mail

Teacher Information	
Teacher	
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## DESCRIPTION OF THE SUBJECT

### Contextualization of the subject

### Course contents

Contents
1. DC circuit analysis. Ohm's law. Kirchhoff's laws. Mesh and node analysis. Power. Generation and load criteria.
2. AC circuit analysis. Resistance, reactance and capacitor. Sine waves. Complex number algebra. Phasor representation of current and voltage. Power in AC circuits, active, reactive and apparent power
3. Single phase power systems. Generator, transformer, line and load. Per unit calculation.
4. Three phase power systems. Line to line and line to neutral voltages. Current. Power in three phase power



systems. One-line diagram representation. Per unit calculation

5. Voltage control in power systems. Description of the problem. Voltage and reactive power. Elements that contribute to voltage control.

6. Frequency control in power systems. Description of the problem. Frequency and active power. Generators as frequency control providers. Primary and secondary frequency control.

## EVALUATION AND CRITERIA

### Grading

Final and retake exam will consist on one or several problems and/or multiple choice test.

Regular assessment:

In order to pass the course, the mark of the final exam must be greater or equal to 5 out of 10 points.

Retakes

As in the regular assessment period, in order to pass the course, the mark of the final exam must be greater or equal to 5 out of 10 points

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 Academicas) 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 take the final exam during the regular assessment period.

Students who commit an irregularity in any graded activity will receive a mark of zero in the activity and disciplinary procedure will follow (cf. Article 168 of the General Regulations (Reglamento General) of Comillas Pontifical University).

## BIBLIOGRAPHY AND RESOURCES

### Basic References

- Power System Analysis, John Grainger, William Stevenson, McGraw-Hill Education
- Basic Circuit Analysis, John O'Malley, Schaum's outline series, McGraw-Hill
- Power System Stability and Control, Prabha Kundur, McGraw-Hill Education

In compliance with current regulations on the **protection of personal data**, we would like to inform you that you may consult the aspects related to privacy and data [that you have accepted on your registration form](#) by entering this website and clicking on "download"

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