Last update: 13-07-2018

820129 - SEPEE - Electric Power Systems

Coordinating unit: 295 - EEBE - Barcelona East School of Engineering

Teaching unit: 709 - EE - Department of Electrical Engineering

Academic year: 2018

Degree: BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory)
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ECTS credits: 6 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: JUAN JOSÉ MESAS GARCÍA

Others: JUAN JOSÉ MESAS GARCÍA, JORGE EL MARIACHET CARREÑO, JOSEP SEGARRA MULLERAT

Opening hours

Timetable: Specified by the professor during their first class, and then available in Atenea.

Prior skills

Those acquired in the subjects CALCULUS, ALGEBRA AND MULTIVARIABLE CALCULUS, NUMERICAL CALCULUS - DIFFERENTIAL EQUATIONS, ELECTRICAL SYSTEMS, CIRCUITS AND SIGNALS, ELECTRICAL MACHINES I / II, LOW AND HIGH VOLTAGE ELECTRICAL INSTALLATIONS I.

Requirements

To have passed the subjects CALCULUS, ALGEBRA AND MULTIVARIABLE CALCULUS, NUMERICAL CALCULUS - DIFFERENTIAL EQUATIONS, ELECTRICAL SYSTEMS, CIRCUITS AND SIGNALS, ELECTRICAL MACHINES I / II, LOW AND HIGH VOLTAGE ELECTRICAL INSTALLATIONS I.

Degree competences to which the subject contributes

Specific:

CEELE-23. Carry out calculations for the design of power lines and electric power transmission systems.

CEELE-24. Understand electrical power systems and their applications.

Transversal:

07 AAT N3. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

Teaching methodology

The teaching methodology used in this subject can be divided into three parts:

- Master classes: theory and problems (30%)
- Laboratory sessions (10%)
- Individual work based learning (60%)

Learning objectives of the subject

Last update: 13-07-2018

820129 - SEPEE - Electric Power Systems

To provide knowledge on overhead line calculation and electric power systems:

- Components, structure and functions of the electric power transmission and distribution system.
- Overhead lines: Electrical parameters. Equivalent circuits. Steady state analysis. Overhead line calculation by using the per unit system (p.u.).
- Transformers: Types, connections and equivalent circuits.
- Load flow in power systems: Bus admittance matrix. Problem statement. Algorithms for resolution.
- Overhead line mechanical calculation: Types of supports. Calculation of the sag. Calculation of cable stresses. Influence of temperature and other atmospheric conditions. Calculation of state change. RLAT.

Study load

Total learning time: 150h	Hours large group:	45h	30.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	10.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

Last update: 13-07-2018

820129 - SEPEE - Electric Power Systems

Content

Introduction

Learning time: 6h 30m
Theory classes: 1h 30m
Self study : 5h

Description:
Components, structure and functions of the electric power transmission and distribution system.

Overhead lines 1

Learning time: 17h 30m
Theory classes: 4h 30m
Laboratory classes: 3h
Self study : 10h

Description:
Electrical parameters. Equivalent circuits.

Overhead lines 2

Learning time: 35h
Theory classes: 12h
Laboratory classes: 3h
Self study : 20h

Description:
Steady state analysis.

Overhead lines 3

Learning time: 11h
Theory classes: 3h
Laboratory classes: 3h
Self study : 5h

Description:
Overhead line calculation by using the per unit system (p.u.).

Transformers

Learning time: 35h
Theory classes: 12h
Laboratory classes: 3h
Self study : 20h

Description:
Types, connections and equivalent circuits.

Last update: 13-07-2018

820129 - SEPEE - Electric Power Systems

Load flow in power systems	Learning time: 32h Theory classes: 9h Laboratory classes: 3h Self study : 20h

Description:
Bus admittance matrix. Problem statement. Algorithms for resolution.

Overhead line mechanical calculation	Learning time: 13h Theory classes: 3h Self study : 10h

Description:
Types of supports. Calculation of the sag. Calculation of cable stresses. Influence of temperature and other atmospheric conditions. Calculation of state change. RLAT.

Qualification system

The final Mark of the Subject (N_Asig) is calculated, rounded to the nearest tenth, using the formula

N_Asig = MAX (0.25 · N_ExPar + 0.55 · N_ExFin + 0.20 · N_Prac ; 0.80 · N_ExFin + 0.20 · N_Prac)

where

N_ExPar is the Midterm Exam Mark
N_ExFin is the Final Exam Mark
N_Prac is the Practice Mark

IMPORTANT REMARK: This subject does NOT have a Re-assessment Exam.

Regulations for carrying out activities

- The Midterm Exam and the Final Exam are individual, in-person and written.
- In addition to writing utensils, it is only permitted to have one sheet with formulas (a single original handwritten A4 sheet) to be delivered to the professor at the end of each of the exams, and a calculator without external connectivity (no mobile phone or tablet can be used as such).
- Maximum punctuality is kindly requested.

Last update: 13-07-2018

820129 - SEPEE - Electric Power Systems

Bibliography

Basic:

Ramírez Rosado, Ignacio J. [et al.]. Problemas resueltos de sistemas de energía eléctrica. Madrid: Thomson, cop. 2007. ISBN 9788497324083.

Bergen, Arthur R. Power systems analysis. 2nd ed. Upper Saddle River, N.J: Prentice-Hall, cop. 2000. ISBN 0136919901.

Elgerd, Olle Ingemar. Electric energy systems theory : an introduction. 2nd ed. New York [etc.]: McGraw-Hill, cop. 1982. ISBN 0070192308.

Glover, J. Duncan; Sarma, Mulukutla S. Power system analysis and design : with personal computer applications. 2nd ed. Boston: PWS Publishing Company, 1994. ISBN 0534939600.

Ras Oliva, Enrique. Teoría de líneas eléctricas : de potencia, de comunicación, para transmisión en continua. 2ª ed. Barcelona: Marcombo, 1985. ISBN 8460058921.

Stevenson, William D., Jr. Elements of power system analysis. 4th ed. New York [etc.]: McGraw-Hill, cop. 1982. ISBN 0070612781.