Universidad Zaragoza

Academic Year/course: 2022/23

29631 - Electrical Power Systems

Syllabus Information

Academic Year: 2022/23
Subject: 29631 - Electrical Power Systems
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 430 - Bachelor's Degree in Electrical Engineering
ECTS: 6.0
Year: 4
Semester: First semester
Subject Type: Compulsory
Module:

1. General information

1.1. Aims of the course

The course aims to provide the student with training related to electrical energy systems, and more specifically regarding electrical lines and networks, with emphasis on both their operation in permanent and transitory regimes.

The course objectives are aligned with some of the Sustainable Development Goals (SDG) by 2030 (https://www.un.org/sustainabledevelopment/) so that the knowledge provided to the students makes them capable of accomplishing them partially or totally.

- SDG 7: Affordable and Clean Energy
  - 7.1 By 2030, ensure universal access to affordable, reliable and modern energy services
  - 7.3 By 2030, double the global rate of improvement in energy efficiency
- SDG 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation
  - 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

1.2. Context and importance of this course in the degree

The subject is part of the Electrical Engineering and it is taught in the first semester of the fourth year of the Electrical Engineering Degree. It is recommended to have previously passed the subjects of Fundamentals of Electrotechnics, and Electrical Machines, corresponding to the second year.

1.3. Recommendations to take this course

It is advisable to have successfully taken the following subjects: Fundamentals of electrical engineering, Electrical Machines.

2. Learning goals

2.2. Learning goals

The student, to pass this subject, must demonstrate the following results ...

- Know how to use calculation methods and techniques for power lines.
- Know the fundamentals about permanent and transitory regimes of electrical power systems.
- He has the ability to expand knowledge of electrical power systems and their applications in high and low voltage electrical installations.
- He or she is able to work in multidisciplinary and multilingual teams.

- Know the social, environmental, economic and industrial implications of the practice of engineering in electrical networks.

2.3. Importance of learning goals

After passing the subject, the student must have acquired sufficient knowledge to complete their scientific-technical training, especially in relation to electrical energy systems, necessary to develop the corresponding competencies related to the Degree in Electrical Engineering.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that he has achieved the expected learning results through the following evaluation activities

Gradual Global Assessment:

- Laboratory practices (20% of the qualification). The practices will take place throughout the corresponding semester. Each practice will be assessed separately.
- Other assessable activities (10% of the grade). In addition to the laboratory practices, another evaluable activity will be
  carried out during the semester, which may consist of deliverable problems, a written partial test, a practical assignment or other activities.
- Call exam (70% of the grade). It will consist of an assessable written test, to be carried out within the center's examination period.

In order to pass this gradual Global Assessment, it is also necessary to have carried out all the practices in the laboratory, as well as to obtain a minimum score of 4 out of 10 both in the convocation exam and in the laboratory practices.
Students who do not complete all the assessment tests indicated above -in the Gradual Global Assessment section- will be able to pass the course through the final Global Assessment.

Final Global Assessment:

- Call exam (80% of the final grade). It will consist of an assessable written test, to be carried out within the center's examination period.
- Practice exam (20% of the final grade). There will be a test consisting of an exam in the laboratory related to the practices.

To pass the subject, in these two final Global Assessment tests it is necessary to obtain a minimum score of 4 out of 10 in each of them.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The course takes place in various aspects, mainly through classroom sessions (sessions/classes of theory-problems) and practical sessions of laboratory; it can also include other activities.

4.2. Learning tasks

The classroom sessions contain fundamental concepts that are applied to practical exercises, which help to understand those concepts. Primarily the methodology consists of lectures.
The practical sessions contain laboratory experiments, including computer practices, where the analyzed practical situations are often more complex than those studied in the classroom sessions. It also can allow dealing with more extensive analysis. It also includes knowledge of health and safety typical of the work activities of the engineer in the industry.
Other evaluable activities can include written partial exams, problems to be solved, practical works or other activities. Within these activities, a work will be proposed to be carried out in a team of three or more students on the application of the concepts studied in the practice of engineering. Said work will be in English.

4.3. Syllabus

The contents of the classroom sessions are structured in the following sections:

1. Main components of electric power systems.
2. Electric power lines.

3. Electric parameters of lines.
4. Steady-state analysis of electric lines.
5. Power flows in electric power systems.
6. Faults in electric power systems. Transient stability.

The contents of practical sessions of laboratory, as well as other activities, will be related to the classroom sessions.

The practical sessions are structured in the following sections:

1. Sessions to study electric power lines (two sessions).
2. Session to study electric power systems in steady-state (one session).
3. Sessions to study electric power systems in transient states (two sessions).

4.4. Course planning and calendar

Further information concerning the timetable, classroom, office hours, assessment dates, other details and further information regarding this course will be provided on the first day of class or please refer to the EINA (Escuela de Ingeniería y Arquitectura de la Universidad de Zaragoza), website (https://eina.unizar.es)

The course will be held in the weeks corresponding to the first semester of the academic year. During such a semester, the activities will be distributed as follows:

- Three hours per week of classroom sessions.
- Five practical sessions of the laboratory within the set of weeks scheduled for this kind of session by the academic center. Each session will have an approximate extension of three hours.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=29631&Identificador=14514