Universidad Zaragoza

Year : 2020/21

26911 - Physical Techniques I

Syllabus Information

Academic Year: 2020/21
Subject: 26911 - Physical Techniques I
Faculty / School: 100 - Facultad de Ciencias
Degree: 447 - Degree in Physics
ECTS: 8.0
Year: 2
Semester: Annual
Subject Type: Compulsory
Module: ---

1.General information

1.1.Aims of the course

1.2.Context and importance of this course in the degree

1.3.Recommendations to take this course

2.Learning goals

2.1.Competences

2.2.Learning goals

2.3.Importance of learning goals

3.Assessment (1st and 2nd call)

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

4.Methodology, learning tasks, syllabus and resources

4.1.Methodological overview

The methodology followed in this course is oriented towards achievement of the learning objectives and acquire the specific skills. A wide range of teaching and learning tasks are implemented, such as:

- Lecture classes
- Problems sessions
- Laboratory sessions
- Assignment proposal
- Seminars and projects
- Electronic laboratory sessions
- Laplace transform
- Frequency spectrum project
- Measurement planning
- Specific instrumentation in physics
- EDA tools
- Assessment and self-assessment test

Students are expected to participate actively in the class throughout the semester.

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other learning resources such as self?assessment tests, laboratory material (data sheet, manuals, etc). Further information regarding the course will be provided on the first day of class.

4.2.Learning tasks

The 8 ECTS course includes the following learning tasks:

- Lectures, practice sessions and assessment tests: (5 ECTS): Lecture notes problems sets will be available for the students. At the end of each topic, some of the problems will be solved in class by the teacher and the rest will be done individually or in a group.
- Laboratory sessions: 3 ECTS: 4-hour sessions where students are provided with the practical exercises' instructions to be done as well as a theoretical introduction to the session's contents. The students must do a previous test on line.

4.3.Syllabus

The course will address the following topics

Lectures

Section I Basics

1. Types of signals
2. Physical and electrical variables
3. Foundations and modeling of physical sensors. Applications.
4. Fundamental laws and equivalences

Section II Transformed Field

1. Circuits in the transformed field
2. Network Function
3. Permanent sinusoidal regime

Section III Systematic methods of analysis

1. Circuit analysis

Section IV Equivalent circuits and systems

1. Thévenin and Norton
2. Quadrupole

Section V Metrology

1. Basics of metrology
2. Quality in metrology
3. Introduction to units and patterns

Section VI Basic Instrumentation

1. Basic instrumentation
2. Features of an electronic system

Section VII Basic measurement characteristics

1. Characteristics related to design
2. Characteristics related to behavior
3. Characteristics related to reliability
4. Selection criteria

Laboratory sessions:

- Session 1: Measurement of physical and electrical variables
- Session 2: Types of signal processing
- Session 3: Filtering and signal conditioning
- Session 4: Radiation metrology with a Geiger counter
- Session 5: Application of statistical tools to measure physical quantities

- Session 6: Electronic measurement and actuation system for physical magnitudes

4.4.Course planning and calendar

Further information concerning the timetable, classroom, assessment dates and other details regarding this course, will be provided on the first day of class o r please refer to the Faculty of sciences website.

4.5.Bibliography and recommended resources