IEE2183 ELECTRICAL MEASUREMENTS LABORATORY

Credits and contact hours: 5 UC credits / 5 hours a week labs

Instructor's name: Enrique Álvarez

Course coordinator's name To be defined

Textbook: None

Course Catalog Description: This course allows the student to acquire an advanced knowledge of the use of typical laboratory instruments such as the multimeter, the osciloscope, the function generator and the power supply. Through the implementation of simple circuits, the student is able to study different measurements techniques of voltage, currents and power variables, and also realize the limitations of the different instruments used. Additionally, this course comprises a final project consisting in the design and implementation in a PCB of a simple circuit, so the student is exposed to the entire design flow typically used in any electric project.

Prerequisite Courses: IEE2123 Electric Circuits

Co-requisite Courses: None

Status in the Curriculum: Required

Course Learning Outcomes:
1. Learn how to use the different instruments available in a typical laboratory such as the multimeter, the oscilloscope, the function generator and the power supply.
2. Determine and verify parameters and properties of circuits using laboratory instruments.
3. Apply different measurement techniques and understand the difference between them.
4. Interpret measurements considering the instruments' precisions and error magins.
5. Learn how to design a PCB through the development of a simple project.

Relation of Course to ABET Criteria:	a. Knowledge of mathematics, science and engineering b. Design and conduct experiments: analyze and interpret data d. Multidisciplinary teams e. Identify, formulate, and solve engineering problems g. Effective communication k. Techniques, skills, and modern tools for engineering practice.
Topics covered:	1. Experience 1 - DC Measurements 1.1. Power suplly configurations 1.2. Multimeter used as amperimeter 1.3. Multimeter used as voltimeter 1.4. Precision of the laboratory instruments 2. Experience 2 - AC Measurements 2.1. Introduction to the osciloscope 2.2. The osciloscope probes 2.3. The function generator 2.4. Power measurements 2.5. Function generator in VCF mode 3. Experience 3 - The Osciloscope 3.1. Aliasing 3.2. Trigger and channel couplings 3.3. Adquisition modes 3.4. Measurement of transient characteristics of circuits 3.5. Measurement of RLC circuits 3.6. Measurement of operational amplifiers transfer curve 3.7. Measurement of jitter 4. Experience 4 - Filters and Operational Amplifiers 4.1. Characterization of different types of passive and active filters using the osciloscope 4.2. Measurement of offset in operational amplifiers 5. Project 5.1. Design and implementation of a simple analog circuit 5.2. PCB design