ELECTRONICS

Code: 10003

Main Scientific Area: Electronics and Instrumentation

Lecturer: Nuno Sérgio Mendes Dias

Language of Instruction: Portuguese

Regime: S2

Contact Hours: 60h Total Workload: 100h

ECTS: 6,0

Objectives

With the course of Electronics, it is intended to instruct students with a solid training in the basic devices of electronics, circuits and analog and digital systems. The laboratory classes try to exemplify through practical experience the theoretical concepts taught. These consist of the realization of projects that include the analysis, simulation and testing of electronic circuits.

Learning Outcomes

At the end of the course, students should be able to:
Understand the operation of capacitors, inductors, RC and RL circuits;
Understand the chain of production, processing and transportation of electricity;
Understand the operation of diodes and rectification circuits;
Understand, design and size of the circuits for small signal amplifiers based on operational amplifiers;
Understand, design and scale amplifier and filtering circuits.

Course Contents

Revisions toPrinciplesofElectricity
Capacitancesandinductances
Capacitor and concept ofcapacitance
Associationof capacitors
RC circuits,passivefiltersand other applications
Principlesofelectromagnetism
Inductor andconcept ofinductance
Associationof inductors
RLcircuits
Generation, Transmission andDistributionof Electricity
Chain ofgeneration, transmission anddistributionof electricity
ReviewoffundamentalsofAlternating Current
Diodes
Regulatorsandlimitercircuits
Transformers
Energytransportand power supplies
Circuits withOperational Amplifiers
Introduction totransistorsandsignal amplifiers
Operational amplifiers(OpAmp)
Amplifiers withnegative feedback

Linear circuitswithOpAmp
Activefilters:optimalandapproximateresponse;passivevs.active filters

Recommended Bibliography

Otavio Markus, Circuitos Elétricos: Corrente Continua e Corrente Alternada, Editora Erica, 2004.
Albert Paul Malvino, Princípios de Electrónica, Mc Graw-Hill, 2000.
Allan Robbins e Wilhelm Miller, Circuit Analysis: Theory and Practice, Delmar Cengage Learning; 3ª edição, 2003.

Learning and Teaching Methods

Students whosuccessfullycompletethis courseshouldbe able to understandthe chain ofproduction, transportation andprocessingof electric energy.Thusit isessential to addressthe operationof:capacitors andinductorsas well asRCand RLcircuits;diodesand rectificationcircuits; transformers;andstabilizationcircuitsbased onzenerdiodes.

Students shouldalso beable to designand calculateanalog circuitsbased onsimpleoperational amplifier,able toprovide conditioningof small signalsinmedical instrumentation systems.In addition to understandingthe functioningandproperly useofthe oscilloscope andfunction generator, students mustunderstand the operationof:operational amplifiers,feedback amplifiers;active and passive filters;andcomparatorcircuits.

Assessment Methods

The evaluation of the curricular unit comprises a theoretical component and a practical component:

The theoretical component consists of two written tests (T1 and T2) to be performed during classes;

The practical component consists of two practical assignments (TP1 and TP2) to be carried out during the semester, on which students must prepare and submit a report in groups of up to 2 elements;

The final classification (CF) of the discipline is given by the following formula:

CF = T1 / 4 + T2 / 4 + TP1 / 4 + TP2 / 4

On what, the following restrictions must be verified:

Mean (T1, T2)> 8.0 values

TP1> 10.0 values

TP2> 10.0 values

CF> 9.5 valuesIn appeal and special evaluation seasons, the T1 and T2 tests are replaced by a final exam (EF) weighing 50% in the final classification. The grades of TP1 and TP2 achieved in regular season remain valid in the final classification of the appeal and special seasons, according to the following formula:

CF = EF / 2 + TP1 / 4 + TP2 / 4