

Course Unit	Electronics		Field of study	Instrumentation and Biomedical Signals	
Bachelor in	Biomedical Technology		School	School of Technology and Management	
Academic Year	2023/2024	Year of study	1	Level	1-1
Type	Semestral	Semester	2	ECTS credits	6.0
Code	9600-752-1203-00-23				
Workload (hours)	162	Contact hours	T -	TP 60	PL -
			TC -	S -	E -
			OT -	O -	

T - Lectures; TP - Lectures and problem-solving; PL - Problem-solving, project or laboratory; TC - Fieldwork; S - Seminar; E - Placement; OT - Tutorial; O - Other

Name(s) of lecturer(s) José Alexandre de Carvalho Gonçalves, Rui Vitor Pires Fernandes

Learning outcomes and competences

At the end of the course unit the learner is expected to be able to:

1. Select, implement and analyse the limiting circuits widely used and based on diodes and operational amplifiers;
2. Implement and analyse basic amplifier and commutation circuits based on transistors;
3. Integrate and apply circuits widely used in analogue signal processing: addition, subtraction, integral and differential operations; amplification and attenuation; limitation and filtering;
4. Utilize electronic equipment in the implementation, test and analysis of basic electronic circuits in the laboratory, with a good level of autonomy of practical skills;
5. Integrate, extrapolate and apply the acquired knowledge in the implementation, analysis and diagnosis of electronic circuits widely used in practice.

Prerequisites

Before the course unit the learner is expected to be able to:
Analyse basic electric circuits.

Course contents

Fundamental analogue electronics: study of the main electronic components (diodes, transistors and operational amplifiers); implementation and analysis of electronic circuits of signal analogue conditioning (amplification, limitation, addition, subtraction and filtering); implementation of basic switching circuits; study of typical applications; and development of practical laboratorial skills.

Course contents (extended version)

1. Study of the main electronic components:
 - Diodes – applications in limiting and rectifier circuits;
 - Transistors – applications in basic amplifier and switching circuits;
 - Operational amplifiers – application examples.
2. Implementation and analysis of electronic circuits of signal analogue conditioning
 - Amplification.
 - Limitation
 - Addition.
 - Subtraction.
 - Filtering.
3. Implementation of basic switching circuits with transistors.
4. Development of laboratorial skills through the implementation and analysis of typical applications.

Recommended reading

1. Microelectronic Circuits, Adel S. Sedra, Kenneth C. Smith, 2004, Saunders College Publishing;
2. Electronic Devices - Discrete and Integrated, Stephen Fleeman, 1990, Prentice-Hall;
3. Electronics Fundamentals. Circuits, Devices and Applications, Thomas L. Floyd, 2001, Prentice-Hall;
4. Amplificadores Operacionais - Fundamentos e Aplicações, Arthur F. de Gruiter, 1988, McGRAW-HILL;
5. Operational Amplifiers and Linear Integrated Circuits, Robert F. Coughlin, Frederik F. Driscoll, 1998, Prentice-Hall.

Teaching and learning methods

Teaching Methods: lectures, problem-solving sessions and laboratory teaching with supervised simulation and experimental work; Learning Methods: notes from lectures; individual study and with other students to carry out works and solve problems; work in the laboratory.

Assessment methods

- Alternative 1 - (Regular, Student Worker) (Final, Supplementary, Special)
 - Laboratory Work - 30%
 - Final Written Exam - 70%

Language of instruction

Portuguese, with additional English support for foreign students.

Electronic validation

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26-02-2024	27-02-2024	15-03-2024	24-03-2024