

COMPUTER ORGANIZATION AND ARCHITECTURE

Code: 322012

Main Scientific Area: Computer networks and architecture

Lecturer: José Manuel Viamontes Martins

Language of Instruction: Portuguese

Regime: S1

Contact Hours: 60h Total Workload: 108h

ECTS: 6,0

Objectives

This unit will present the basic concepts of architecture and function of personal computers, concerning processing, storage and data movement. These topics are presented in a perspective of historical evolution. Students will work with some of these technologies, namely the processors, core storage, interfaces and peripherals. The unit will enable students to understand and evaluate different aspects of personal computer architecture.

Learning Outcomes

1. Identify components in a personal computer, relating them with its function inside the computer;
2. Use logic operators and digital circuits to implement logic functions;
3. Apply Karnaugh maps to logic function simplification;
4. Build logic combinatory circuits to implement logic functions;
5. Understand microprocessor internal structure and function;
6. Understand how processor, memory and peripherals connect and work together;
7. Benchmark components to compare computer performance;
8. Understand and implement fault tolerant systems.

Course Contents

1 Personal Computer Architecture

- 1.1 Information processing
 - 1.2 Computer Basic Structure
 - 1.3 The evolution of computers
- #### 2 Digital systems
- 2.1 Number representation
 - 2.2 Logic Circuits
 - 2.3 Combinatory Circuits
 - 2.4 Sequential Circuits
 - 2.5 Functional modules

- 2.6 Multiplexers
- 2.7 ROMs
- 2.8 Sequential Circuits
 - 2.8.1 Flip-flops
 - 2.8.2 Records
 - 2.8.3 Counters
 - 2.8.4 State Transition Table
- 3 Micro-processors
- 4 Memory Technologies
- 5 Peripherals and interfaces
- 6 Computer benchmarking
- 7 Fault tolerant systems

Recommended Bibliography

"Arquitetura de Computadores", José Delgado, Carlos Ribeiro, FCA;
"Curso Técnico de Hardware", José Gouveia e Alberto Magalhães, FCA;
"Fundamental dos Sistemas Digitais", Carlos Pedro Baptista, FCA.

Learning and Teaching Methods

An objective of this unit is the study of the distinct components of a Computer. this is studied in chapters 3,4,5 and 7.

Another objective is the use of logical operators and digital circuits to implement logical functions and also expression simplification using Karnaugh maps.This is studied in chapter 2.

The last objective is performance analysis of computers, studied in chapter 6.

Assessment Methods

Evaluation by two written tests and a practical assignment.

Practical assignement will have a 40% weight in the final grade and the tests weigh 60% (30% each).

The tests and the practical assignement are mandatory, with a minimum score of 7 points, on a scale 0-20.

The students that eventually fail in continuous evaluation, will have the opportunity to do an exam with all the subjects included on the theoretical part