



Subject: Microprocessor Fundamentals
Code: 18479
Institution: Escuela Politecnica Superior
Degree: Telecommunication Technologies and Services Engineering
Level: Graduate
Type: Compulsory
Credit allotment: 6 ECTS credits

MICROPROCESSOR FUNDAMENTALS SYLLABUS

This document includes the set of rules that regulates the Microprocessor Fundamentals subject, which is part of the Telecommunication Technologies and Services Engineering degree. The academic board of the Escuela Politecnica Superior has approved this set of rules. The document is valid for the academic course 2012-2013 and is available to all students in the web page of the Escuela Politecnica Superior. This document can be considered as a contract for registered students.



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COURSE TITLE

Microprocessor Fundamentals

1.1. Code

Telecommunication Technologies and Services Engineering 18479

1.2. Content area

Electronic Circuits and Microprocessors

1.3. Course type

Compulsory

1.4. Course level

Graduate

1.5. Year

2nd

1.6. Semester

1st

1.7. Credit allotment

6 ECTS credits

1.8. Prerequisites

Some previous knowledge of Digital Electronic Circuits is highly advisable.



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1.9. Minimum attendance requirement

In this subject students can choose between two different assessment methods (see section 4). Independent on the selected assessment method, attendance is highly advisable but not mandatory.

1.10. Faculty data

Note: Add @uam.es to all emails.

Theory:

Ivan Gonzalez Martinez (Coordinator)
Department of Electronic and Communications Technology
Faculty: Escuela Politecnica Superior
Office: Building C room C-223
Phone: +34 91 4976212
Email: ivan.gonzalez
Office hours: Request an appointment by email.

Practice:

Miguel Angel García García (Coordinador)
Department of Electronic and Communications Technology
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Email: miguelangel.garcia
Office hours: Request an appointment by email.

Additional faculty data is coming soon.

1.11. Course objectives

- Comprehension of microprocessor structure: CPU, memory and input/output peripherals.
- Know how to use sets of instructions and machine language.
- Capacity to analyze systems architecture based on microprocessors.
- Capacity to use hardware description languages.



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1.12. Course contents

- 1. Digital Design and VHDL**
 - 1.1. Introduction
 - 1.2. Combinational Logic
 - 1.3. Structural Modeling
 - 1.4. Sequential Logic
 - 1.5. Finite State Machines
 - 1.6. Parameterized Modules
 - 1.7. Testbenches
- 2. Arithmetic Logic Unit (ALU)**
 - 2.1. Introduction
 - 2.2. Arithmetic Circuits
 - 2.3. ALU
 - 2.4. Number Systems
- 3. Microprocessor I: Instruction Data Set. Machine Language**
 - 3.1. Introduction
 - 3.2. Assembly Language
 - 3.3. Machine Language
 - 3.4. Programming
 - 3.5. Addressing Modes
 - 3.6. Lights, Camera, Action: Compiling, Assembling, and Loading
 - 3.7. Odds and Ends
- 4. Microprocessor II: Control and Datapath Design. Single-Cycle Processor**
 - 4.1. Introduction
 - 4.2. Performance Analysis
 - 4.3. Single-Cycle Processor
- 5. Microprocessor III: Control and Datapath Design. Multi-cycle Processor**
 - 5.1. Introduction
 - 5.2. Performance Analysis
 - 5.3. Multicycle Processor
 - 5.4. Pipelined Processor
- 6. Memory systems and I/O.**
 - 6.1. Introduction
 - 6.2. Memory System
 - 6.2.1. Caches
 - 6.2.2. Virtual Memory
 - 6.3. Memory-Mapped I/O
 - 6.3.1. Memory map
 - 6.3.2. I/O Devices
 - 6.4. Buses and organization
 - 6.5. Summary



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1.13. Course bibliography

1. Digital Design and Computer Architecture. D.M. Harris y S.L. Harris. Morgan Kaufman Pub. 2007. ISBN: 0123704979. Ref_UAM: INF/621.3/HAR.
2. Estructura y diseño de computadores: La interfaz software/hardware. D.A. Patterson y J.L. Hennessy. Ed. Reverte 2011. ISBN: 9788429126204. Ref_UAM: INF/681.32.3/PAT.
3. Computer Organization And Design: The Hardware/Software Interface. D.A. Patterson y J.L. Hennessy. Morgan Kaufmann. 4ª Ed. 2009. ISBN: 9780123744937. Ref_UAM: INF/681.3.06/PAT.
4. Fundamentos de diseño lógico y de computadores. M.M.Mano y C.R.Kime. Prentice Hall. 2005. ISBN: 8420543993. Ref_UAM: INF/621.3/MAN.
5. Organización de computadores. C.Hamacher, Z.Vranesic y S.Zaky. McGraw-Hill. 5ª Ed. 2003. ISBN: 8448139518. Ref_UAM: INF/681.32.3/HAM.
6. The Student's Guide to VHDL. P. Ashenden. Morgan Kaufman Pub. 1998. ISBN: 1558605207. Ref_UAM: INF/681.3.062/ASH.
7. Diseño de Sistemas Digitales con VHDL. S.A. Pérez, E. Soto y S. Fernández. Thomson. 2002. ISBN: 8497320816. Ref_UAM: INF/681.3.062-V/PER.
8. Diseño digital avanzado con VHDL. F. Machado, S. Borromeo y N. Malpica. Serv. Publicaciones URJC. 2009. ISBN: 9788498494198. Ref_UAM: INF/681.3.062-V/MAC.

Course bibliography related to course contents:

UNIT 1. Digital Design and VHDL.

Main: Ref[1] C4.

Optional: Ref[6] complete, Ref[7] complete, Ref[8] complete.

UNIT 2. Arithmetic Logic Unit (ALU).

Main: Ref[1] C5.

Optional: Ref[2] C3, Ref[3] C3, Ref[4] C5.

UNIT 3. Microprocessor I: Instruction Data Set. Machine Language.

Main: Ref[1] C6.

Optional: Ref[2] C2, Ref[3] C2.

UNIT 4. Microprocessor II: Control and Datapath Design. Single-Cycle Processor.

Main: Ref[1] C7.1 y C7.3.

Optional: Ref[2] C4, Ref[3] C4.

UNIT 5. Microprocessor III: Control and Datapath Design. Multi-cycle Processor.

Main: Ref[1] C7.4.

UNIT 6. Memory systems and I/O.

Main: Ref[1] C8.

Optional: Ref[2] C6, Ref[3] C6, Ref[4] C13.