

<b>SUBJECT:</b>	<b>COMPUTER STRUCTURE AND ORGANIZATION</b>
<b>CODE:</b>	<b>780010</b>
<b>DEGREE:</b>	<b>GRADUATE IN COMPUTER SCIENCES</b> <b>GRADUATE IN COMPUTER ENGINEERING</b>
<b>KNOWLEDGE AREA:</b>	<b>COMPUTER ARCHITECTURE AND TECHNOLOGY</b>
<b>CHARACTER:</b>	<b>MANDATORY</b>
<b># ECTS CREDITS:</b>	<b>6</b>
<b>COURSE:</b>	<b>2017/2018</b>
<b>WEB DE LA ASIGNATURA:</b>	<a href="http://atc2.aut.uah.es/~avicente/asignaturas/eoc/eoc_english.htm">http://atc2.aut.uah.es/~avicente/asignaturas/eoc/eoc_english.htm</a>

## 1. CONTENTS

### 1. The data path

- Data path and clock frequency
- The adder
- Integer add acceleration
- Multiply operation
- Multiply division

### 2. Instruction set

- Operations and instructions types
- Addressing modes
- Instructions coding
- Use frequency
- Compilation process and binary compatibility

### 3. The control unit

- Clock frequency and decoding
- Elemental operations
- Execution instruction chronograms
- Microprogramming

### 4. Memory hierarchy

- Memory hierarchy concept
- Cache memory
- Cache memory performance

### 5. The Input / Output System

- Synchronization
- Massive storage
- Buses

## 2. PROFESSORS

### THEORY AND LABORATORY:

Antonio José de Vicente Rodríguez

<http://atc2.aut.uah.es/~avicente/>

Juana M<sup>a</sup>. López Fernández

<http://atc2.aut.uah.es/~juani/>

### 3. SCHEDULING

#### Monday's group

Date	Theory	
11/9/17	INTRODUCTION	Antonio J. de Vicente and Juana M <sup>a</sup> . López
18/9/17	LESSON 1	Antonio J. de Vicente
25/9/17	LESSON 1	Antonio J. de Vicente
2/10/17	LESSON 2	Antonio J. de Vicente
9/10/17	Holiday	Antonio J. de Vicente
16/10/17	LESSON 2	Antonio J. de Vicente
23/10/17	LESSON 3	Juana M <sup>a</sup> . López
30/10/17	LESSON 3	Juana M <sup>a</sup> . López
6/11/17	LESSON 3	Juana M <sup>a</sup> . López
13/11/17	LESSON 3	Juana M <sup>a</sup> . López
20/11/17	PARTIAL EXAM OF LESSONS 1, 2 AND 3 at NA5 and NA8 classrooms.	Antonio J. de Vicente and Juana M <sup>a</sup> . López
27/11/17	LESSON 4	Antonio J. de Vicente
4/12/17	LESSON 4	Antonio J. de Vicente
11/12/17	LESSON 5	Antonio J. de Vicente
18/12/17	LESSON 5	Antonio J. de Vicente
12/01/18*	GLOBAL EXAM (continuous evaluation students. It's a mandatory exam) FINAL EXAM	
12/06/18*	FINAL EXAM (extraordinay)	

\* Check for likely changes of dates on the Website of the Polytechnic School.

#### Tuesday's group

Date	Theory	
12/9/17	INTRODUCTION AND SMALL GROUPS CREATION	Antonio J. de Vicente and Juana M <sup>a</sup> . López
19/9/17	LESSON 1	Antonio J. de Vicente
26/9/17	LESSON 1	Antonio J. de Vicente
3/10/17	LESSON 2	Antonio J. de Vicente
10/10/17	TEAM ACTIVITIES	Antonio J. de Vicente
17/10/17	LESSON 2	Antonio J. de Vicente
24/10/17	LESSON 3	Juana M <sup>a</sup> . López
31/10/17	LESSON 3	Juana M <sup>a</sup> . López
7/11/17	LESSON 3	Juana M <sup>a</sup> . López
14/11/17	LESSON 3	Juana M <sup>a</sup> . López
21/11/17	PARTIAL EXAM OF LESSONS 1, 2 AND 3 at NA5 and NA8 classrooms.	Antonio J. de Vicente and Juana M <sup>a</sup> . López
28/11/17	LESSON 4	Antonio J. de Vicente
5/12/17	LESSON 4	Antonio J. de Vicente
12/12/17	LESSON 5	Antonio J. de Vicente
19/12/17	LESSON 5	Antonio J. de Vicente
12/01/18*	GLOBAL EXAM (continuous evaluation students. It's a mandatory exam) FINAL EXAM	
12/06/18*	FINAL EXAM (extraordinay)	

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## 4. SUBJECT EVALUATION

Subject assessment and evaluation is performed via a continuous evaluation system. Final mark will be composed of a 70% of theoretical marks and a 30% of laboratory marks.

Continuous evaluation of theory is composed of two exams and following activities. First exam will be done on November. This exam will count a 30% of the total mark. The exam will be composed of theory questions and problem solving activities. Students with a mark greater or equal than 1.2 will be dispensed of exam about lessons from 1 to 3 in the global exam.

10% of the final mark will be divided into two different activities: an oral presentation involving technological issues (6%) and a set of following activities of lessons 1, 2, 4, and 5 (4%)

Second exam will be a Global one and the date to do it will be published by Polytechnic School. This exam will be formed of theory questions and problem solving activities too. Global exam will be the 30% of the total mark and it will include whole subject contents. Global exam is mandatory.

Continuous evaluation of practice activities is composed of 2 partial exams and 4 practical activities in the laboratory. Each exam adds 1 point to the final mark. The remaining point belongs to the practices marks (0,25 each one). Laboratory attendance is mandatory.

Continuous evaluation	First theory exam	Following activities	Global exam	Practices
Students with a mark greater or equal to 1.2 during first theory exam	30% (lessons 1 to 3)	10%	30% (lesson 4 and 5)	30% (2 exams, 1 point each one) (4 practices, 0.25 each one)
Students with a mark less than 1.2 during first theory exam.	30% (lessons 1 to 3)	10%	30% (lesson 4 and 5) 30% (lessons 1 to 3)	30% (2 exams, 1 point each one) (4 practices, 0.25 each one)
Students with a mark greater or equal to 1.2 during first theory exam and a practice mark less than 1.2.	30% (lessons 1 to 3)	10%	30% (lesson 4 and 5)	30% (new practical exam)
Students with a mark less than 1.2 during first continuous exam and a practice mark less than 1.2.	30% (lessons 1 to 3)	10%	30% (lesson 4 and 5) 30% (lessons 1 to 3)	30% (new practical exam)

Final exam will be composed of two exams. A theory exam, which will be formed of theory questions and problem solving activities. And a practical exam, which will be formed of practical questions and program activities. Marks of these exams will be as following:

Final evaluation	Theory exam	Practice exam
Students with a mark greater or equal to 1.2 during practices continuous evaluation	70%	30% ( <b>previous</b> practices mark)
Students with a mark less than 1.2 during practices continuous evaluation. Students enrolled into final evaluation.	70%	30% ( <b>new</b> practical exam)

## 5. LABORATORY

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Practical work is focused on the Intel 80x86 assembly language and how to access to different part of the computer using it. Skill in using debugging tools to modify an executable program will be also achieved. Microsoft Assembler 5.1 is used to program the practices.

### **Lesson 1: Assembly language fundamentals**

i8086 structure. Assembly program structure. Instruction types. Transference instructions. Arithmetical instructions. How to build an executable program. Using debugger program Code View.

### **Lesson 2: How to display data on the screen. The ROM-BIOS**

Flag register. More transference instructions. Control instructions. More arithmetical instructions. Interrupts and types. MS-DOS services. ROM-BIOS services.

### **Lesson 3: Memory segmentation and addressing modes**

Memory segmentation. Addressing modes. Relative addressing mode. Shift instructions. Logical instructions. String memory accesses by using relative to base and relative to index addressing modes.

### **Lesson 4: The stack, procedures and macros**

The stack. Bit instructions. Procedure definition. NEAR and FAR procedures. Passing parameters to a procedure. Structures and parameters. Macros and procedures.

### **Lesson 5: Instruction format. Directives, string instruction and how to build executable files from several object files.**

Instruction formats. MASM directives. String instructions. Several object files assembling and linking.

## 6. LABORATORY SCHEDULING (4 groups)

MONDAY'S GROUPS MR. ANTONIO J. DE VICENTE (10:00-12:00. OL24)		WEDNESDAYS' GROUP Ms. JUANA M <sup>a</sup> . LÓPEZ (15:00-17:00. NL5)	
DATE	ACTIVITIES	DATE	ACTIVITIES
11/09/2017		13/09/2017	
18/09/2017	PRACTICE 1	20/09/2017	PRACTICE 1
25/09/2017	PRACTICE 2	27/09/2017	PRACTICE 2
02/10/2017	PRACTICE 2	04/10/2017	PRACTICE 2
09/10/2017	HOLYDAY	11/10/2017	PRACTICE 2
16/10/2017	PRACTICE 2	18/10/2017	PRACTICE 3
25/10/2017*	PARTIAL EXAM OF LESSONS 1 AND 2	25/10/2017*	PARTIAL EXAM OF LESSONS 1 AND 2
30/10/2017	PRACTICE 3	01/11/2017	HOLYDAY
06/11/2017	PRACTICE 3	08/11/2017	PRACTICE 3
13/11/2017	PRACTICE 3	15/11/2017	PRACTICE 3
20/11/2017	PRACTICE 4	22/11/2017	PRACTICE 4
27/11/2017	PRACTICE 4	29/11/2017	PRACTICE 4
04/12/2017	PRACTICE 4	06/12/2017	HOLYDAY
11/12/2017	TEAM ACTIVITIES	13/12/2017	PRACTICE 4
20/12/17*	PARTIAL EXAM OF LESSONS 3, 4 AND 5	20/12/17*	PARTIAL EXAM OF LESSONS 3, 4 AND 5

  

FRIDAY'S GROUP MR. ANTONIO J. DE VICENTE (8:00-10:00. OL24) Ms. JUANA M <sup>a</sup> . LÓPEZ (12:00-14:00. NL5)	
DATE	ACTIVITIES
15/09/2017	
22/09/2017	PRACTICE 1
29/09/2017	PRACTICE 2
06/10/2017	PRACTICE 2
13/10/2017	PRACTICE 2
20/10/2017	PRACTICE 3
25/10/2017*	PARTIAL EXAM OF LESSONS 1 AND 2
03/11/2017	PRACTICE 3
10/11/2017	PRACTICE 3
17/11/2017	PRACTICE 4
24/11/2017	PRACTICE 4
01/12/2017	PRACTICE 4
08/12/2017	HOLYDAY
15/12/2017	TEAM ACTIVITIES
20/12/17*	PARTIAL EXAM OF LESSONS 3, 4 AND 5

\* Partial exams will be on Wednesdays and from 14:00 to 14:55. Examination classrooms will be published later.

## 7. REFERENCES

This subject hasn't a single reference book. Included references in the Teaching guide are a short selection for suggested readings. Choosing one instead of another will depend on student preferences.

### THEORY:

- *Fundamentos de los computadores. Pedro de Miguel Anasagasti. Paraninfo, 1992.*
- *Estructura y diseño de computadores. Interficie circuitería/programación. David A. Patterson y John L. Hennessy. Editorial Reverté, 2000.*
- *Arquitectura de computadores. Un enfoque cuantitativo. John L. Hennessy y David A. Patterson. Mc Graw Hill, 1993.*
- *Organización y arquitectura de computadores. William Stallings. Prentice Hall, 5ª edición, 2000.*
- *Organización de Computadores. Carl Hamacher, Zvonko Vranesic y Safwat Zaky. McGraw Hill, 2003.*
- *Estructura de computadores. José M<sup>a</sup> Angulo. Paraninfo, 1997.*
- *Structured Computer Organization. Andrew S. Tanenbaum. Prentice Hall, 4th edition, 1999.*
- *Arquitectura de computadoras. M. Morris Mano. Prentice Hall, 1993.*

- *Arquitectura de computadores. José A. de Frutos y Rafael Rico. Servicio de Publicaciones de la Universidad de Alcalá, 1995.*
- *Problemas de estructura de computadores. Pedro de Miguel Anasagasti y otros. Paraninfo.*

**LABORATORY:**

- *El lenguaje ensamblador de los 80x86. J. Beltrán de Heredia. Anaya Multimedia*
- *8088-8086/8087 programación ensamblador en entorno ms-dos. M. A. Roselló. Anaya Multimedia.*
- *Microprocesadores: el 8088/86. F. Remiro Domínguez y A. Martín García. AKAL-Biblioteca Tecnológica*
- *Programación ensamblador en entorno MS-DOS. M. A. Rodríguez Roselló. 8088-8086/8087. Editorial Anaya, 1988.*
- *The 8086 book. R. Rector y G. Alexy. OSBORNE/McGraw Hill, 1980.*