

Descriptives 1.Datos**Digital Systems 1****Tutorial - Student Information****Subject**

Digital Systems 1

Matter

M5. ELECTRONIC

Department**responsible**

Electronic Engineering

ECTS credits

4.5

Character

Compulsory

Degree

Diploma in Engineering Technology and Services

Telecommunication

Course

3rd

Specialty

N / A

Academic year

2011-2012

Semester in which**imparts**

First

Language in which**imparts**

Castilian

Website<http://moodle.upm.es/titulaciones/oficiales>**2.Profesorado****NAME****OFFICE****E-mail**

Carlos Carreras Vaquer

C-230

carreras@die.upm.es

Ricardo Cordoba Herralde

B-108

cordoba@die.upm.es

María Jesús Carballo Ledesma

C-201A

mledesma@die.upm.es

Juan Manuel Montero Martinez

B-110

juancho@die.upm.es

Previous 3. Conocimientos required to continue normally the subject

Subjects overcome

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Other results

learning

necessary

- Programming
- Fundamentals of telematics systems
- Digital Electronics

4.

Learning Objectives.

Powers assigned to the subject and level of

ACQUISITION

Code

Competition

Level

CG1-CG5

All subjects contribute Curriculum greater or lesser extent to the achievement of the general skills of the graduate profile.

-

CG6

Use of English.

1

CG9

Use of Information Technologies and Communications.

2

CG12

Organization and planning

1

CECT1

Ability to independently learn new knowledge and techniques for the design, development or operation of systems and services telecommunication.

1

CECT2

Ability to use communication applications and computer (office automation, databases, advanced calculus, project management, visualization, etc..) to support the development and operation of networks, services and applications telecommunications and electronics.

2

CECT3

Ability to use computer tools

search library resources or information related to telecommunications and electronics.

1

CECT6

Ability to design, deploy, organize and manage networks, systems, services and infrastructure telecommunication in residential settings (home, city and digital communities), corporate and institutional responsible for their implementation and improvement continuous and know their economic and social impact

1

CECT9

Capacity for analysis and design of circuits combinational and sequential, synchronous and asynchronous, and use of microprocessors and integrated circuits.

2

CECT11

Ability to use different energy sources and especially solar photovoltaic and thermal, as well as fundamentals of electrical engineering and electronics power.

1

LEGEND: Acquisition Level 1: Basic

Acquisition level 2: Middle

Acquisition Level 3: Advanced

LEARNING OUTCOMES OF THE COURSE

Codi

go

Learning result

Compe-

tencias

associated

Level

of

acquired

position

RA1

Ability to analyze and design electronic circuits, both analog and digital.

CECT6

CECT9

1

RA2

Understanding the structure of computers, microprocessors and microcontrollers and their programming languages, knowledge of Peripheral devices and input / output.

CECT1

CECT2

CG6

CG9

CG12

3

RA3

Ability to design systems based on microprocessors.

CECT3

CECT6

CECT9

CG12

2

RA4

Knowledge of the mechanisms and timing management interrupts.

CECT1

CECT3

CECT9

CG6

CG12

3

RA5

Knowledge of implementation techniques, debugging and testing of systems based on microprocessors.

CECT1

CECT2

CECT9

CG6

CG9

2

RA6

Ability to integrate analog and subsystems digital microprocessor-based systems.

CECT3

CECT6

CECT9

CG12

2

LEARNING OUTCOMES OF THE COURSE

Codi

go

Learning result

**Compe-
tencias**

associated

Level

**of
acquired
position**

RA7

Knowledge and ability to source selection energy, batteries and inverters.

CECT1

CECT11

1

LEGEND: Acquisition Level 1: Knowledge descriptive

Acquisition Level 2: Comprehension / Application

Acquisition Level 3: Analysis / Synthesis / Implementation

5. System evaluation of the subject

ACHIEVEMENT INDICATORS

Ref

Indicator

Related

do with RA

I1

Knowing the basics of a system microcontroller (microcontroller internal registers and buses, functional units, and the units for address calculation), its architecture and functional structure and the instruction execution process. Identify characteristics and applications of different ranges and types processors and memories.

RA1

RA2

RA3

I2

Analysis and assembly language programming, including detailed knowledge of assembler directives, the programming model and instruction set of a microprocessor.

RA2

RA3

RA5

I3

Understand the organization of data in memory modes addressing and the operation of the battery in a system microprocessor.

RA2

ACHIEVEMENT INDICATORS

Ref

Indicator

Related

do with RA

I4

Know the different types of peripherals in a microcontroller, groups of terminals, the configuration transfer by the external bus access and the concept of Direct Memory. Analyze analog and digital circuits as basic peripherals that connect to external bus.

Know and set the power management system of a microprocessor.

RA1

RA2

RA4

RA5

RA7

I5

Designing the memory map of a microprocessor system, configure the memory system and implement the map memory using hardware circuitry or programming Software.

RA2

RA3

I6

Knowing the types of exceptions in a processor, the processing the same, the distinction between exceptions and interruptions, the different types of interruptions and concepts of priority and interrupt mask.

Analyze and configure the operation of the interrupt a microprocessor programmed to analyze and routines attention thereto.

RA4

I7

Knowing the characteristics of parallel communications and in series with a microcontroller, as well as key connection and communication standards. Analyze and schedule the use of ports in parallel and in series is one when connected to individual peripherals including implementation of protocols from the program.

RA2

RA3

I8

Knowing the characteristics of a timer module, being able to analyze your performance and set for capture input and output comparisons.

Knowing the operation and configuration of a modulator PWM pulse width, and their application to the speed control of DC motors.

RA2

RA3

I9

Knowing the internal structure and features of static and dynamic memories as well as the concept of caches. Designing memories composed of several

memory chips to get the word size or from desired capacity available chips commercially.

RA3

I10

Analysing and designing complete systems based on the use of microprocessors

RA3

RA6

Summative

Brief description of the assessable activities

Time

Place

Weight

in the

calif.

Evaluation issues 1-5

26/11/2012

A designate

35

Assessment items 6, 7 and integration knowledge

Call

official

A designate

50

Continuous assessment of participation and problems posed in class

Weeks 1 to

15

Classroom

15

Total: 100%

Qualification Criteria

In ordinary exam, students will be assessed by continuous assessment.

However, students who wish may be evaluated by a single final test so long as expressed through formalized in writing

ETSI Telecommunications registration and to the Director of the Department of Electronic Engineering or before **October 5, 2012 (end of week 5)**. The presentation of this paper constitute a waiver automatic continuous assessment.

REGULAR CALL: CONTINUOUS ASSESSMENT METHOD

The course will be approved when getting a grade greater than or equal to 5 points on a total of 10. This rating is the sum of the ratings for the various assessment activities, with the following weights:

- Evaluation issues 1-5 (partial): 35%
- Assessment items 6, 7 and integration (official announcement): 50%
- Participation and delivery problems in class: 15%

The evaluation of the issues 1-5 will be released in case of obtaining a rating N1a equal or greater than 4 points. Should you get less than 4 points or want up note, the student must be submitted to the recovery in the official examination, obtaining N1b note. The final note of the partial examination in such cases is calculated

as $N1a + N1b * 0.2 * 0.8$.

REGULAR CALL: EVALUATION BY A SINGLE TEST

FINAL

The 100% of qualifying students who submit the referral is written above awarded based on a single test at the end to celebrate the official announcement.

EXTRAORDINARY

The evaluation of the subject in his extraordinary call will be made by one final test to be held on a date determined by Head of Studies, with Regardless of the option chosen in the ordinary call.

6. Content and Learning Activities

SPECIFIC CONTENT

Block / Theme /

Chapter

Paragraph

Indicators

Related

two

Topic 1: The system

microprocessor

1.1 Elements of a microprocessor system. System microprocessor. Applications. Functional structure. The Central Unit Process. Executing a command. The main memory. Peripherals. The connecting lines. The memory map.

1.2 The microprocessor market. Types of processors and memories.

Ranges

processor.

The

market

semiconductors. The market for microcontrollers. The family ColdFire. The ColdFire MCF5272.

II

Item 2:

Programming

Family

ColdFire

2.1 Programming in assembler. Components of a program.

Assembly language syntax. Assembler directives. The assembly process. Development and debugging programs.

2.2 The ColdFire programming model. Model

programming. Execution modes. Organization in memory. Stack. Addressing Modes. Access to data structures.

2.3 The ColdFire instruction set: data. Movement data. Data transfer with the stack. Handling bits. Click lógincas. Shift Instructions. Instructions arithmetic. Extended Arithmetic. Compare and test instructions.

2.4 The ColdFire instruction set: control. Control agenda. Unconditional jumps. Subroutines and parameter passing by the stack. Conditional statements. Mode Control System user and supervisor mode.

I2

I3

Item 3:

Architecture

hardware

MCF5272

3.1 System Architecture. MCF5272 Block Diagram. The ColdFire core. Pipelined architecture. Instruction Timing. MCF5272 local memory. The system integration module (SIM). MCF5272 Modules. MCF5272 terminals. The bus external. Transfer Modes. Power circuits, clock and reset. Booting.

3.2 Configuration of the memory system. System memory the MCF5272. Setting internal devices. Access external devices. Chip select signals. The module MCF5272 chip selection. Programming a map memory. Direct Memory Access (DMA).

I1

I4

I5

SPECIFIC CONTENT

Block / Theme /

Chapter

Paragraph

Indicators

Related

two

Item 4:

Exceptions

system

microprocessor

4.1 Exceptions. Definition and exception types. Vector table exception. Setting the vector table. Priority between exceptions. The exception processing. Subroutines versus exceptions. Reset error and stopping the system bus.

4.2 Interrupts. Vectored interrupts and autovectorizadas.

Probe against interruptions. Priorities and masking. MCF5272 interrupt sources. The interrupt controller the MCF5272. Interrupt configuration.

4.3 Management of consumption. The power management module of

MCF5272. Low-power modes. Setup for low power consumption.

I4

I6

Item 5:

In / Out

into the system

microprocessor

5.1 Input / Output. Interfaces and peripheral input / output. Types communication. Coding Standards symbols. Types parallel communication. MCF5272 parallel ports. Control a matrix keyboard. Handling an LCD display. Communication asynchronous serial. Circuits and asynchronous communication errors. Synchronous serial communication. Serial communication standards. The simplified MCF5272 UART module.

I7

I10

Item 6:

Modules

timing

into the system

microprocessor

Programmable Timers 6.1. Elements of a timer.

Resolution and range. The input capture: circuits and applications. The output compared: circuits and applications. The timer module the MCF5272. Setting the input capture. Configuration Output of the comparison. Combination and input capture output comparison.

6.2 pulse width modulation. Modulation PWM.

Block diagram of a PWM modulator. The PWM module MCF5272. PWM module configuration. Application to the control of speed of a DC motor.

I8

I10

Item 7:

Memories in the

system

microprocessor

7.1 Memory VLSI integrated. Types nonvolatile memories. Type volatile memory. The memory chip. Memory hierarchy SRAM and RAM. Expanding word size and number of words.

7.2 Dynamic Memory. DRAM. Entries in memories DRAM. Structure of a DRAM memory. Elements in memories DRAM. The refresh process. DRAM controllers.

I9

Lectures

It presents the concepts, language programming, modules and devices to be used in Digital Systems.

CLASSES

PROBLEMS

Resolve practical problems related to the analysis of complete system based on a microprocessor and also part of the same design. These problems always offer the student prior to the resolved as personal work. Classes are participatory with the possibility of continuous assessment of students in the classroom.

CLASSES

DEMONSTRATIVE

During this session (only one in the entire course), which performed in the laboratory, students are presented with a case Practical use of the development environment microprocessor. Each student must submit a small summary / test on it.

WORK

Al along the course, some of the problems to be resolved by the student as part of their personal work must be submitted and posted as part of its ongoing evaluation.

TUTORING

Are performed in accordance with regulations

11

8. Teaching resources

TEACHING RESOURCES

REFERENCES

- C. Carreras et al., Digital System Design with ColdFire microcontroller 5272, ETSI Telecommunications.
- R. San Segundo et al., Introduction to Systems Digital MCF5272 microcontroller, Ed Marcombo.
- A Clements, Microprocessor Systems Design. 68000 Hardware, Software and Interfacing, PWS-Kent Publishing.
- J. Septien et al., Meet the MC68000. Language assembler: Connecting and programming interfaces, Ed Synthesis.
- Freescale ColdFire Family Programmer's Reference Manual, www.freescale.com
- Freescale ColdFire 2/2M Version Processor Core User's Manual, www.freescale.com
- Freescale ColdFire MCF5272 Integrated Microprocessor User's Manual, www.freescale.com

WEB RESOURCES

Website of the subject

<http://moodle.upm.es/titulaciones/oficiales>

EQUIPMENT

Classroom: Assigned by Head of Studies
Digital Systems Laboratory B-043

12

9. Work schedule of the course

Week

Classroom Activities

Activities

Laboratory

Individual Work

Workgroups

Activities

Evaluation

Others

Week 1

(5 h)

- Presentation (0.5 h)
- Item 1.1 (2 h)
- Topic 1.2 (0.5 h)
- Study and review theory of previous concepts (2 h)
- Possibility

continuous assessment

Classroom

Week 2

(5 h)

- Topic 2.1 (1.5 h)
- Item 2.2 (1.5 h)
- Study of theory and Examples (2 h)

- Possibility

continuous assessment

Classroom

Week 3

(9 h)

- Topic 2.3 (2h)
- Item 2.4 (1 h)
- Demonstration

environment

development (1.5 h)

-

Study of theory and examples (1.5 h)

-

Troubleshooting proposed (2 h)

-

Preparation of the test on
demonstration in
laboratory (1 h)
• **Demonstration**
the laboratory
Groups of three
• **Possibility**
continuous assessment
Classroom
Week 4
(5 h)
• **Problems (2 h)**
• **Item 3.1 (1 h)**
• **Study of theory (1 h)**
• **Review of problems**
proposed (1 h)
• **Possibility**
continuous assessment
Classroom
• **Delivery of test on**
demonstration in
laboratory

13
Week
Classroom Activities
Activities
Laboratory
Individual Work
Workgroups
Activities
Evaluation
Others
Week 5
(8 h)
• **Item 3.1 (1 h)**
• **Item 3.2 (1 h)**
• **Problems (1 h)**
• **Study of theory (2 h)**
• **Troubleshooting**
proposed (3 h)
• **Possibility**
continuous assessment
Classroom
Week 6
(5 h)
• **Problems (2 h)**
• **Item 4.1 (1 h)**
• **Review of problems**

proposed (2 h)

- Possibility

continuous assessment

Classroom

Week 7

(7 h)

- Item 4.2 (1.5 h)

- Item 4.3 (1 h)

- Problems (0.5 h)

- Study of theory and

Examples (2 h)

- Troubleshooting

proposed (2h)

- Possibility

continuous assessment

Classroom

Week 8

(6 h)

- Problems (2 h)

- Theme 5 (1 h)

- Study of theory and

Examples (1 h)

- Troubleshooting

proposed (2h)

- Possibility

continuous assessment

Classroom

Week 9

(7 hours)

- Item 5 (2h)

- Problems (1 h)

- Review of problems

proposed (2 h)

- Resolution of problems

deliver Item 4 (2 h)

- Possible

continuous assessment

Classroom

Week 10

(8 hours)

- Problems (2.5 h)

- Problems delivered

(0.5 h)

- Study of theory and

Examples (2 h)

- Troubleshooting

proposed (3 h)

- Possibility

continuous assessment

Classroom

- Delivery of problems
Proposed Item 4

14

Week

Classroom Activities

Activities

Laboratory

Individual Work

Workgroups

Activities

Evaluation

Others

Week 11

(9 hours)

- Item 6.1 (2.5 h)

- Item 6.2 (0.5 h)

- Review of problems

proposed (2 h)

- Resolution of problems

deliver Item 5 (2 h)

- Test Preparation

part (2 h)

- Possibility

continuous assessment

Classroom

Week 12

(12 h)

- Problems delivered

(0.5 h)

- Problems (2.5 h)

- Study of theory and

Examples (2 h)

- Troubleshooting

proposed (3 h)

- Test Preparation

part (4 h)

- Possibility

continuous assessment

Classroom

- Delivery of

problems

proposed Item 5

Week 13

(8 h)

- Problems (1.5 h)

- Resolution of the review

partial (0.5 h)

- Item 7.1 (1 h)
- Review of problems proposed (1.5 h)
- Resolution of problems deliver Item 6 (2 h)
- Solution in Common midterm exam
- Midterm Exam (11/26/2012) (1.5 h)
- Possibility continuous assessment Classroom Week 14 (8 h)
- Item 7.2 (1 h)
- Problems handed (1 h)
- Problems (1 h)
- Study of theory and Examples (2 h)
- Troubleshooting proposed (3 h)
- Possibility continuous assessment Classroom
- Delivery of problems proposed Item 6

15
 Week
 Classroom Activities
 Activities
 Laboratory
 Individual Work
 Workgroups
 Activities
 Evaluation
 Others
 Week 15
 (8 h)

- Problems (3 h)
- Review of problems proposed (1.5 h)
- Exam Preparation end (3.5 h)
- Possibility continuous assessment

Classroom
Period
before
examination
final
(10 h)

- Exam Preparation
final (7 pm)
- Final Evaluation (3
h)

Note: For each activity specified in hours dedication to the student involved.
The weeks are outlined effective teaching (not calendar weeks)