

Course guide

804039 - ACI-M - Computer Architecture and Configuration

Last modified: 22/06/2023

Unit in charge: Image Processing and Multimedia Technology Centre
Teaching unit: 804 - CITM - Image Processing and Multimedia Technology Centre.

Degree: BACHELOR'S DEGREE IN MULTIMEDIA STUDIES (Syllabus 2009). (Compulsory subject).

Academic year: 2023 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Manresa Robledo, Antonio Ricardo

Others:

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

4. Distinguish between the types of components of a computer and their main operating parameters.
5. Provide a basic diagnosis of the features of a computer and a network.
6. Analyse the security needs of communications.

Transversal:

1. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.
2. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.
3. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

TEACHING METHODOLOGY

Sessions divided into several areas of activities:

- Acquisition of new knowledge.
- Questions, doubts, exposition and defense of concepts and / or exercises.
- Periodic checks and partial examinations.
- Perform theoretical or practical exercises.
- Presentations by the students
- Lab session with Linux

LEARNING OBJECTIVES OF THE SUBJECT

(ENG)

1. Entendre l'arquitectura d'un ordinador: parts i funcionament.
2. Comprendre el funcionament i operació dels Elements Bàsics d'un sistema informàtic incloent el processador, la memòria i l'entrada / sortida.
3. Diferenciar els tipus de components d'un ordinador i els principals paràmetres de funcionament.
4. Diagnosticar de forma bàsica les prestacions d'un ordinador.
5. Relacionar l'arquitectura d'un ordinador amb el sistema operatiu.
6. Configurar i operar en un entorn de treball Linux.
7. Aplicar els coneixements assolits a la realització d'una tasca en funció de la importància, decidint la forma de dur-ho a terme i el temps que fa falta dedicar i seleccionant les fonts d'informació més adequades.
8. Planificar i utilitzar la informació necessària per a un treball acadèmic a partir d'una reflexió crítica sobre els recursos d'informació utilitzats.
9. Comunicar-se de forma clara i eficient en presentacions orals i escrites.

STUDY LOAD

Type	Hours	Percentage
Hours medium group	60,0	40.00
Self study	90,0	60.00

Total learning time: 150 h

CONTENTS

Unit 1 - Introduction

Description:

- Evolution of computers to justify and detail the course agenda. Explanation of the methodology followed in the subject.
- Von Neumann architecture.
- Motherboard: format, components, BIOS.

Related competencies :

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

Full-or-part-time: 16h

Theory classes: 6h

Self study : 10h

Unit 2 - The microprocessor

Description:

- Basic characteristics of the microprocessor
- Architectures RISC, CISC, VLIW (or EPIC)
- Parallelism
 - * At the level of instruction: segmentation, superscalarity
 - * At the processor level: multi-core. Processes Threats
- Processor performance, cost.
- Amdahl's law
- Improvements in performance with segmentation and scalability
- Comparative performance analysis

Related competencies :

- 10.2. Provide a basic diagnosis of the features of a computer and a network.
10.1. Distinguish between the types of components of a computer and their main operating parameters.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Full-or-part-time: 36h

Theory classes: 16h

Self study : 20h

Unit 3 - Memory

Description:

- Evolution of memories.
- Hierarchy of memories.
- Internal architecture.
- Memory operation parameters.
- Types of memories.
- Classification of RAM memories.
- Evaluation of the performance of the memory system.
- Memory management from the Operating System. Virtual memory.
- Calculation of memory system performance.
 - * Average access time.
 - * Impact on overall performance: CPU time.
- Cache design parameters.
- Virtual memory.
- Use of simulation tools for the architecture of a computer.

Related competencies :

- 10.2. Provide a basic diagnosis of the features of a computer and a network.
10.1. Distinguish between the types of components of a computer and their main operating parameters.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Full-or-part-time: 25h

Theory classes: 10h

Self study : 15h



Unit 4 - Input and output devices and buses

Description:

- Types of devices, operation and characteristics
- RAID architecture
- Type of communication
- Performance

Related competencies :

10.2. Provide a basic diagnosis of the features of a computer and a network.

10.1. Distinguish between the types of components of a computer and their main operating parameters.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

Full-or-part-time: 6h

Theory classes: 2h

Self study : 4h

Unit 5 - Data centers and current communication models

Description:

- Characteristics of DC
- Internal interconnection networks
- External interconnection
- Current communication models and near future

Related competencies :

10.2. Provide a basic diagnosis of the features of a computer and a network.

10.1. Distinguish between the types of components of a computer and their main operating parameters.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Full-or-part-time: 12h

Theory classes: 4h

Self study : 8h



Weeks 8 and 14: Evaluation

Description:

First and second midterm exam

Related competencies :

10.2. Provide a basic diagnosis of the features of a computer and a network.

10.7. Analyse the security needs of communications.

10.1. Distinguish between the types of components of a computer and their main operating parameters.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

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Full-or-part-time: 14h

Theory classes: 4h

Self study : 10h

Weeks 9 and 15: Presentations

Description:

Towards the end of the first third of the course, teachers will present possible topics of interest related to this subject. At the end of this session, students will be asked to form groups of 3 people and choose one of the topics presented (there is also the possibility that students propose a topic). For the next 3 weeks, each group must prepare (outside class hours) a 15/20 minute presentation on the chosen topic. At the end of these 3 weeks, each group will present their presentation in class and answer the questions of the other students and teachers.

By the end of the second third of the course, each group will have another 3 weeks to prepare a new topic. While the first presentation will be about past and present technologies, the topics of this second presentation will be about the technology of the future.

Full-or-part-time: 19h

Theory classes: 4h

Self study : 15h



ACTIVITIES

Lab - Linux work environment

Description:

- Linux virtual machine installation.
- Introduction to the Linux work environment.
- Linux OS performance monitoring.
- Process management in Linux.

Material:

Linux Ubuntu desktop distribution

Delivery:

A guided report at the end of each session

Related competencies :

10.1. Distinguish between the types of components of a computer and their main operating parameters.

10.2. Provide a basic diagnosis of the features of a computer and a network.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

Full-or-part-time: 12h

Theory classes: 4h

Self study: 8h

Two oral presentations

Description:

Towards the end of the first third of the course, teachers will present possible topics of interest related to this subject. At the end of this session, students will be asked to form groups of 3 people and choose one of the topics presented (there is also the possibility that students propose a topic). For the next 3 weeks, each group must prepare (outside class hours) a 15/20 minute presentation on the chosen topic. At the end of these 3 weeks, each group will present their presentation in class and answer the questions of the other students and teachers.

By the end of the second third of the course, each group will have another 3 weeks to prepare a new topic. While the first presentation will be about past and present technologies, the topics of this second presentation will be about the technology of the future.

Related competencies :

10.1. Distinguish between the types of components of a computer and their main operating parameters.

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

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Full-or-part-time: 16h

Theory classes: 4h

Self study: 12h



Two midterm exams

Description:

A midterm exam will be conducted on the first two topics.

A second midterm exam will be held at the end of the course on the other topics.

Each midterm exam will contain test questions and problems.

Related competencies :

10.1. Distinguish between the types of components of a computer and their main operating parameters.

10.2. Provide a basic diagnosis of the features of a computer and a network.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

04 COE. EFFICIENT ORAL AND WRITTEN COMMUNICATION. Communicating verbally and in writing about learning outcomes, thought-building and decision-making. Taking part in debates about issues related to the own field of specialization.

Full-or-part-time: 18h

Theory classes: 4h

Self study: 14h

Final exam

Description:

Final exam of the subject on all units.

The exam will contain test questions and problems.

Related competencies :

10.7. Analyse the security needs of communications.

10.2. Provide a basic diagnosis of the features of a computer and a network.

10.1. Distinguish between the types of components of a computer and their main operating parameters.

07 AAT. SELF-DIRECTED LEARNING. Detecting gaps in one's knowledge and overcoming them through critical self-appraisal. Choosing the best path for broadening one's knowledge.

06 URI. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Full-or-part-time: 10h

Theory classes: 2h

Self study: 8h

GRADING SYSTEM

The grade is the result of a weighted sum of three components, the continuous evaluation (EC), the practical works (TP) and the participation and attitude (PA).

$$\text{Final Note} = 55\% \text{ EC} + 35\% \text{ TP} + 10\% \text{ PA}$$

The grade of the continuous evaluation (EC) is calculated as follows:

- 25%: Midterm test and problems of the first part of the course.
- 25%: Second midterm of theory and problems of the second part of the course.
- 50%: Final exam with contents of the entire course.

The mark of the practical works (TP) is calculated as follows:

- 37.5%: Note of the first presentation.
- 37.5%: Note of the second presentation.
- 25%: Note of the practice of operating systems with Linux.

In the case of suspending the subject, there is the possibility of reassessing the evaluation continued with the recovery exam. Keep in mind that the mark of this exam only affects 55% of the final grade, the practical work and participation and attitude notes cannot be recovered. The maximum final grade that can be achieved with this recovery exam is 5.

EXAMINATION RULES.

The two midterm exams will include a written part of theory and problems.

In the final exam, there will be a written part of theory and problems. The contribution of each part in points to the total exam grade will be indicated.

Regarding the two presentations, the evaluation considers both the material and the manner in which it was presented taking into account three criteria: understanding of the subject, order in the presentation, ability to synthesize.

The practice part with operating system is evaluated with the delivery of a report at the end of each session and a final delivery at the end of the course.

Les revisions i / o reclamacions respecte als exàmens es realitzaran exclusivament durant les dates i horaris establerts en el Calendari Acadèmic.

BIBLIOGRAPHY

Complementary:

- Stallings, William. Organización y arquitectura de computadores [on line]. 7ª ed. Madrid: Prentice Hall, 2006 [Consultation: 13/11/2020]. Available on: http://www.ingebook.com/ib/NPcd/IB_BooksVis?cod_primaria=1000187&codigo_libro=1266. ISBN 9788489660823.
- Herrerías Rey, Juan Enrique. Manual fundamental de el PC : hardware y componentes : edición 2010. Madrid: Anaya Multimedia, 2010. ISBN 9788441527171.
- Miguel Anasagasti, Pedro de. Fundamentos de los computadores. 9ª ed. Madrid: Thomson Paraninfo, 2004. ISBN 8497322940.