

COMPUTER ENGINEERING FOR MANAGEMENT

FIRST YEAR

1293 COMPUTER TECHNOLOGY

7 ECTS / 9 ESP / Annual / Mandatory

OBJECTIVES: Understand the functioning of computers through the study of their typical architecture and the components which make them up.

CONTENTS: Functional units in computers: processor, memory, periphery. Scheme of electronic functioning. Digital systems. Machine and assembly language.

LECTURER: Pedro Luis Sánchez Ortega

DEPARTMENT: Electromechanical Engineering

AREA: Electronic Technology

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1295 ALGEBRAIC STRUCTURES

7 ECTS / 9 ESP / Annual / Mandatory

OBJECTIVES: Introduce students to the concepts and techniques used in Discrete Mathematics and Linear Algebra and in modelling simple problems.

CONTENTS: Introduction to logics. Sets. Algebra of logical variables. Binary relations. Functions. Whole numbers. Induction and recursivity. Linear systems, matrices and determinants. Vectorial spaces. Linear applications. Euclidean vectorial spaces. Diagonalisation.

LECTURER: Serafín Ortega Juncuas, M^a Pilar de las Heras González.

DEPARTMENT: Mathematics and Calculation

AREA: Applied Mathematics

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam

1294 CALCULUS

7 ECTS / 9 ESP / Annual / Mandatory

OBJECTIVES: The course aims to establish thoroughly and by intuition the basic concepts in the different fields of mathematics and to acquire skills in calculus and achieve a clear understanding of the concepts. Students will also learn to interpret results correctly.

CONTENTS: Real and complex numbers, elementary functions, continuity, derivability, definite and indefinite integration, elementary notions of numerical calculus, numerical successions and series, Taylor series, notions of scalar fields.

DEPARTMENT: Mathematics and Calculation

AREA: Applied Mathematics

LECTURER: M^a José Zapatero, Natividad Acha

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam

1297 THE BASICS OF PROGRAMMING

7 ECTS / 9 ESP / Annual / Mandatory

OBJECTIVES: Learn to solve problems from the point of view of programming, choice of data structures and appropriate algorithms. Learn to use the principle of functional decomposition. Apply this knowledge to the programming language C.

CONTENTS: Basic concepts. Introduction to C language. Control sentences (sequential, conditional, repetitive). Structured types of data (arrays, chain records). Modular programming. Files and archives. Recursivity. Algorithms for ordering and searching.

LECTURER: Carlos López Nozal

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1301 BUSINESS ECONOMICS

7 ECTS / 9 ESP / Annual / Mandatory

OBJECTIVES: Introduce students to the basic concepts of business economics.

Offer students a set of conceptual knowledge enabling them to study the subject

Prepare students to be able to apply the theory to real problems and examples.

CONTENTS: Basic economic concepts; Study of supply and demand; The production possibilities curve; indifference curves; Study of the company: classes, functions, basic concepts of planning, organisation, integration of personnel, direction and control; Cost analysis; evaluation of investments (Repayment period; TIR; VAN); concepts of electronic trade (the new economy, marketing on the Internet, evaluation of new technology companies).

LECTURER: Ignacio Fontaneda González

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1300 BUSINESS STUDIES

5 ECTS / 6 ESP / 2nd Semester / Mandatory

OBJECTIVES: Introduction to the study of accounting

CONTENTS: The study of business information systems, analysis of the accounting method and of the accounting process in general

DEPARTMENT: Economics and Business Administration

AREA: Financial Economics and Accounting

LECTURER: Óscar López de Foronda

TEACHING METHOD: Theory and practicals**ASSESSMENT METHOD:** Written exam**1302 THE PHYSICAL BASES OF COMPUTING****5 ECTS / 6 ESP / 1st Semester / Mandatory****OBJECTIVES:** Teach students the bases of electromagnetism and the study of electrical circuits, as well as introducing certain basic concepts about semiconductors and electrical components based on the PN link. The acquisition of this knowledge will allow students to begin to study the subject matter specific to their course in Physics and to deal with specific problems in their work.**CONTENTS:** Theory: Electrostatics, continuous current circuits, alternating current circuits, introduction to semiconductors, diodes, transistors.

Practicals: Exercises and practicals in the laboratory relative to the theory studied.

LECTURER: Dr. Manuel Calvo Rathert**DEPARTMENT:** Physics**AREA:** Applied Physics**TEACHING METHOD:** Theory and practicals**ASSESSMENT METHOD:** Written exam and project work**1306 ENGLISH I****5 ECTS / 6 ESP / 1st Semester / Mandatory****OBJECTIVES:** Understand and correctly interpret the content of technical computer texts. Recognise the structure and aim of the technical computer text. Access directly the original sources of technical computer texts. Apply extralinguistic resources for the interpretation of technical computer texts.**CONTENTS:** COMPUTERS TODAY: Computer applications, configuration, inside the system, bits and bytes, buying a computer. INPUT / OUTPUT DEVICES: Type and click, capture your favourite image, viewing the output, choosing a printer, I / O devices for the disabled. STORAGE DEVICES: Floppies, hard drives, optical breakthrough. BASIC SOFTWARE: Operating systems, the graphical user interface, a walk through word processing, spreadsheets, databases, faces of the Internet. CREATIVE SOFTWARE: Graphics and design, desktop publishing, multimedia. PROGRAMMING: Program design, languages, the postscript evolution, jobs in computing. COMPUTERS TOMORROW: Electronic communications, Internet issues, LANs and WANs, new technologies.**LECTURER:** M^a Cruz Medino Peral**DEPARTMENT:** Philology**AREA:** English Philology**TEACHING METHOD:** Theory and practicals**ASSESSMENT METHOD:** Written exam and project work**1310 ELECTRONIC TECHNOLOGY****5 ECTS / 6 ESP / 2nd Semester / Mandatory****OBJECTIVES:** Provide students with the knowledge they need concerning electronic elements through the study of the basic theoretical concepts of digital and analogical electronics and their application, design and analysis of circuits.**CONTENTS:** The subject is divided into 5 sections:

I.- Semiconductors : diodes and sources of power.

II.- The bipolar transistor .

III.- Operational amplifier: circuits

IV.- Logical and bi-stable families.

V.- Sequential systems: design methods.

LECTURER: Javier Sedano Franco**DEPARTMENT:** Electromechanical Engineering**AREA:** Electronic Technology**TEACHING METHOD:** Theory and practicals**ASSESSMENT METHOD:** Written exam and project work**1309 OFFICE AUTOMATION****5 ECTS / 6 ESP / 2nd Semester / Mandatory****OBJECTIVES:**

Provide students with the basic tools necessary to use word processors, internet and management applications with the database, through practical sessions.

Explain the difference between file systems and database and the suitability of each for the type of problem in hand.

Introduce students to the conceptual modelling of the database with the entity-relation model.

Introduce students to declarative consultation languages.

CONTENTS:

Theory and Practical with Databases (Introduction to Databases, Introduction to the Relational Modelling of data, Introduction to SQL, an overview of databases, SQL incorporated).

Theory and Practical with Networks and Internet.

Practicals with Word processors.

LECTURER: M^a Belén Vaquerizo García**DEPARTMENT:** Civil Engineering**AREA:** Computer Languages and Systems**TEACHING METHOD:** Theory and practicals**ASSESSMENT METHOD:** Written exam and project work**SECOND YEAR****1296 ANALYSIS AND ENGINEERING OF SOFTWARE****10 ECTS / 12 ESP / Annual / Mandatory****OBJECTIVES:** This course aims to take a close look at the properties, analysis, design and maintenance of management software, as well

as the planning and management of computer projects, and the analysis of management applications.

Software Engineering must be understood as a discipline which integrates methods, tools and procedures for the development of the software of the computer.

Study and understanding of the different paradigms of the life cycle of software development.

Study and understanding of the different phases in the life cycle of software development, explaining the importance of the analysis phase in the life cycle of software development and command of some techniques.

CONTENTS:

Introduction to software engineering.

Project life cycle.

Tools for structured analysis.

Software design.

Software configuration management. software maintenance, software reusing, real-time systems, complex software systems.

Computer assisted software engineering

Computing project development: project planning and management

Software testing strategies, software quality, software metrics

Orientation so objects. introduction and evolution towards orientation to objects. uml: a standard in object-oriented software engineering:

LECTURER: M^a Belén Vaquerizo García

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1290 STATISTICS

7,5 ECTS / 9 ESP / Annual / Mandatory

OBJECTIVES: Acquisition and understanding of the concepts indicated in the section on contents.

CONTENTS: Descriptive statistics, probability and random variables, models of probability distribution, point estimation and by intervals, hypothesis tests, analysis of variance, regression models.

LECTURER: Ana Lorente Marín

DEPARTMENT: Mathematics and Calculation

AREA: Applied Mathematics

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1292 DATA STRUCTURES

10 ECTS / 12 ESP / Annual / Mandatory

OBJECTIVES: The course will teach students the role played by types of abstract data. Introduction to the methodology of data: abstraction. Separation of the specification of a data type, and its implementation; students will therefore work and solve problems with specification of types, without reference to their implementation. Study of the most important

types of abstract data, both elementary and non elementary in principle memory. Study of the most important types of abstract data, both elementary and non elementary in secondary memory. Efficient use of abstract types available to students in the programmes they construct, choosing the most suitable.

CONTENTS:

Teaching Unit A: Introduction to data structures: Generalities. Abstraction of data. Types of pre-defined data such as TAD.

Teaching Unit B: Linear data structures: Linear lists. Connected lists. Piles and ends. Recursivity.

Teaching Unit C: Non linear data structures: Trees. Specialisations of the TAD binary tree. Other trees. Graphs. Advanced classification techniques and internal searches. Other structures of data in memory.

Teaching Unit D: Permanent data structures: Files, sequential files. External organisation. Direct and Indexed files.

Teaching Unit E: Objects.

LECTURER: Carlos Pardo Aguilar, Juan José Rodríguez Díez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1590 DATABASE MANAGEMENT SYSTEMS

5 ECTS / 6ESP / 1st Semester / Mandatory

OBJECTIVES: 1. Conocer las características y arquitectura de un sistema de base de datos y comprender su modo general de funcionamiento. 2. Dominar el manejo de una base de datos relacional utilizando el lenguaje SQL.

3. Conocer los formalismos que sirven de soporte al SQL: lógica de primer orden, lógica trivaluada, álgebra y cálculo relacional, programación lógica.

4. Ser capaz de desarrollar aplicaciones informáticas basadas en bases de datos relacionales, a un nivel muy básico. (SQL embebido, ODBC, trabajo con procedimientos almacenados y triggers).

5. Realizar correctamente el diseño lógico de una base de datos relacional a través de la teoría de la normalización.

CONTENTS: Theme 1: The Reference Model ANSI/SPARC, Theme 2: Interfaces of programming of Applications on a Database Management System, Theme 3: Conceptualisation of the Relational Model, Theme 4: Relational languages, Theme 5: Normalisation, Theme 6: Conceptualisation of Active Databases, Theme 7: Activity in Standards and Commercial Systems

LECTURER: Jesús Maudes Raedo

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1299 OPERATING SYSTEMS

5 ECTS / 6 ESP / 1st Semester / Mandatory

OBJECTIVES: Learn the basic theory of operating systems and the practical working of the Linux Operating System

CONTENTS:

Introduction to Operating Systems.

Processes.

Stop signals in Unix.

Administration of memory.

Archive systems.

Input/Output.

Blockages.

Study of Unix

LECTURER: Luis Antonio Antolín Sánchez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1303 INFORMATION MANAGEMENT

5 ECTS / 6 ESP / 1st Semester / Mandatory

OBJECTIVES: Give students a vision of the strategic importance of Information for companies, analysing the different types. Study the different Information Systems existing in companies and the Information Technologies on which they are based. To do this we will study each of the phases of the process of acquisition, maintenance and management of the security of these Information Technologies.

CONTENTS: Information as a strategic resource. Information Systems (IS) in the company. Types of IS. Acquisition of IS/ Information Technologies. The Security of Information. Quality of IS. Auditing of IS.

LECTURER: Santiago Arcos Arcos

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam

1307 THE COMPUTATIONAL LABORATORY

5 ECTS / 6 ESP / 1st Semester / Mandatory

OBJECTIVES: Know some mathematical algorithms for Numerical Calculation and Cryptography, use them in a programming language, for example MATLAB.

CONTENTS: Algorithms. Computational complexity. Numerical resolution of equations: algorithms. Numerical resolution of systems: algorithms. Segmentary interpolation: algorithms. Introduction to Cryptography and error correction codes.

LECTURER: M^a Pilar de las Heras González

DEPARTMENT: Mathematics and Calculation

AREA: Applied Mathematics

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam

1298 THE METHODOLOGY OF PROGRAMMING

5 ECTS / 6 ESP / 2nd Semester / Mandatory

OBJECTIVES: Understand the concepts and basic techniques used in programming under the paradigm oriented towards objects. Correct use of these techniques in programming language oriented towards objects.

CONTENTS:

1. Introduction.

2. Static structure: Classes.

3. Dynamic structure: Objects.

4. Genericity.

5. Design under contract.

6. Formal verification.

7. Programme tests.

8. Hereditary techniques.

LECTURER: Juan José Rodríguez Diez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1591 FURTHER OPERATING SYSTEMS

2,5 ECTS / 3 ESP / 2nd Semester / Mandatory

OBJECTIVES: Learn the theory of the Windows NT Server operating system

CONTENTS: Introduction

Installation

Domains

Filing systems

Users and groups

Security

Auditing

LECTURER: Luis Antonio Antolín Sánchez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1304 COMPUTER MANAGED PRODUCTION

5 ECTS / 6 ESP / 2nd Semester / Mandatory

OBJECTIVES: Give students a vision of how production is managed in an industrial company, looking at both traditional techniques and new tendencies.

CONTENTS: Planning. Programming and Control of Production. Capacity. Aggregate planning, Master Plan, MRP, JIT, OPT/TOC. Quality Management.

LECTURER: Miguel Angel Mariscal Saldaña

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam

THIRD YEAR

1308 TRANSMISSION PATHS

5 ECTS / 6 ESP / 1st Semester / Mandatory

OBJECTIVES: Know the bases of transmission paths, techniques and equipment for transmission of data.

CONTENTS: The bases of data communication. Transmission paths. Techniques for transmission of signals. Errors and detection. Standards. Data transmission equipment.

LECTURER: M^a Isabel Dieste Velasco

DEPARTMENT: Electromechanical Engineering

AREA: Electronic Technology

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written and oral exam, plus project work

1311 DATABASE ADMINISTRATION

4,5 ECTS / 6 ESP / 1st Semester / Optional

OBJECTIVES: Teach students the role and functions of database administration in the area of information systems in general and specifically in business. Analyse the importance of data as a business resource. The course will look at questions of property, the use of data and its strategic value, which influence the aspect of data administration. Explain the functions of database administration in each of the stages of the life cycle of a database. Study tools available to the administrator to carry out his work...

CONTENTS: Teaching Unit A: Introduction: Introduction to Database Administration. Presentation of Systems for Practical

Teaching Unit B: The Bases of Physical Implementation and Adjustment: Storage and the structure of Archives. Indexing and Association. Adjustment and planning of Consultations. Concurrence. Recuperation. Distributed Systems

Teaching Unit C: Confidentiality and Database Auditing: Confidentiality and Auditing

Teaching Unit D: Selection and Introduction of a Database Management System: Questions concerning, Introduction, Exploitation and Evolution of a Database. Selection of a Database Management System

LECTURER: Carlos Pardo Aguilar

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written and oral exam, plus project work

1313 AUDITING, LEGAL FRAMEWORK AND ETHICS OF COMPUTING.

4,5 ECTS / 6 ESP / 1st Semester / Optional

OBJECTIVES: Give students a vision of the usefulness and methodology used in the development of computer auditing. Analyse the ethics of computing, Study the laws governing computer materials in Spain.

CONTENTS: Introduction to Auditing. Computer resources. Internal Control systems. Internal and External Auditing. The Law of Data Protection. Protection of Copyright, Auditing and computer inspections.

LECTURER: Carlos Alonso de Armiño Pérez

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1314 AUTOMATED AND FORMAL LANGUAGES

7 ECTS / 9 ESP / 1st Semester / Optional

OBJECTIVES: Familiarise students with the theory of formal and automated languages, with special emphasis on the practical applications of this theory.

CONTENTS: Introduction to compilation, introduction to the theory of formal and automated languages, Turing machines, regular languages and lexical analysis (finite deterministic and non deterministic automated, regular expressions, theorems of analysis and synthesis, pumping and the use of flex), languages independent of the context and syntactic analysis (pile automated, context independent grammars, pumping, rise and fall analysis, use of the bison)

LECTURER: César Ignacio García Osorio

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1315 CALIMMETRY

4,5 ECTS / 6 ESP / 1st Semester / Optional

OBJECTIVES: Acquisition and understanding of the concepts indicated in the contents section

CONTENTS: Bases, normalisation, control of processes and finished product, reliability, optimisation, data analysis.

LECTURER: Ana Lorente Marín

DEPARTMENT: Mathematics and Calculation

AREA: Applied Mathematics

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1316 DESIGN OF SYSTEMS BASED ON THE MICROPROCESSOR

4,5 ECTS / 6 ESP / 2nd Semester / Optional

OBJECTIVES: Introduce students to knowledge of the structure and programming of systems based on the microprocessor.

CONTENTS: Microprocessors, microcontrollers and DSP. Structure of control systems and treatment of signals. Programming of systems. Applications.

LECTURER: Ángel González González

DEPARTMENT: Electromechanical Engineering

AREA: Electronic Technology

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1317 COMPUTER ASSISTED GRAPHIC DESIGN

4,5 ECTS / 6 ESP / 2nd Semester / Optional

OBJECTIVES: - Students will learn how to handle the main design programmes used by technical engineers for the preparation of different types of technical document.

- Students will attain the knowledge necessary to be able to begin graphic design using the normal language and conventions of technical drawing.

CONTENTS: Computer assisted 2D and 3D drawing, handling and development of basic 2D and 3D entities. solid modelling, configuration of a technical plan, elaboration and handling of rendered and photorealistic images, handling of the main peripherals (printing on paper).

LECTURER: Elías Martínez Muñiz

DEPARTMENT: Graphic Expression

AREA: Graphic Expression in Engineering

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Oral exam and project work

1318 COMMERCIAL MANAGEMENT

4,5 ECTS / 6 ESP / 2nd Semester / Optional

OBJECTIVES: Students will learn to understand the set of activities which direct the flow of goods and services from the manufacturer to the consumer, through identification of the needs, orientation of desires and stimulation of demand towards products and services manufactured by the producer.

CONTENTS: Information systems and market research. Studies of products, price, promotion and distribution.

LECTURER: Carlos Alonso de Armiño Pérez, Lourdes Sáiz Bárcena

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1319 HUMAN RESOURCE MANAGEMENT

4,5 ECTS / 6 ESP / 2nd Semester / Optional

OBJECTIVES: Give students a brief introduction to all the activities related with the HUMAN CAPITAL of a company. The course aims to give a global vision of the Function of Human Resources which will enable students to deal successfully in their professional lives with the computerised mechanisation of any of these resources.

CONTENTS: The function of Human Resources. Additive processes. Subtractive processes. Formation and Development. Retributions. Evaluation of Performance. The search for Well-being. Communication.

LECTURER: Santiago Arcos Arcos

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1320 INDUSTRIAL COMPUTING

4,5 ECTS / 6 ESP / 1st Semester / Optional

OBJECTIVES: The course aims to give students the knowledge they will need to implement applications of control and supervision of industrial processes using the PC, with the microprocessor as central element of the control processes. In addition the course will give students the necessary knowledge to be able to programme automats.

CONTENTS:

PART I. INTRODUCTION. 1 Basic description of the computer.

PART II. MICROPROCESSORS. 2. The Processor: Internal architecture. Programming in assembly language. 4. Interruptions and exceptions. 5. The mathematical coprocessor. 6. Connection diagrams and bus cycles. 7. Organisation of input/output. 8. Architecture of the PC.

PART III. PROGRAMMABLE AUTOMATS. 9. Introduction to automation. 10. Programming automats. PART IV. THE COMPUTER IN SUPERVISION AND CONTROL OF INDUSTRIAL PROCESSES. 11. Supervision and control of industrial processes.

DEPARTMENT: Electromechanical Engineering

AREA: Systems and Automation Engineering

LECTURER: Juan Vicente Martín Fraile

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam

1321 ENGLISH II

4,5 ECTS / 6 ESP / 2nd Semester / Optional

OBJECTIVES: By the end of the course students should be able to: Write their own C.V., write professional letters, write up reports, communicate through writing and speaking in professional areas related with their future career as computer engineers.

CONTENTS: Companies, jobs, products and services. Small systems and software. Large systems and software. Historical developments in information services. Training and recruitment. Preliminary investigations. Preliminary design. System development. System production planning. System implementation. New technologies. Jobs and careers.

LECTURER: M^a Cruz Merino Peral

DEPARTMENT: Philology

AREA: English Philology

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1322 OPERATIVE RESEARCH

4,5 ECTS / 6 ESP / 2nd Semester / Optional

OBJECTIVES: The course teaches students to identify and solve problems of linear programming, networks and queue theories.

CONTENTS: Linear programming, Network analysis, Markov chains, Queue Theories, Game decision theories.

DEPARTMENT: Civil Engineering

AREA: Business Organisation

LECTURER: To be assigned

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam

1323 COMPUTER MAINTENANCE

4,5 ECTS / 6 ESP / 2nd Semester / Optional

OBJECTIVES: Acquire knowledge of the architecture of the PC and associated technologies in order to be able to:

-Participate in decisions concerning the purchase of computer equipment.

-Interpretation and analysis of manuals and technical specifications regarding computer equipment.

-Installation, configuration, maintenance and solution of hardware problems..

CONTENTS: INTRODUCTION TO PC ARCHITECTURE (physical architecture, Architecture of DOS programming). THE PROCESSOR (Generations, maintenance parameters). MEMORY (RAM, BIOS, caché Memory, Technologies, Modules, Maintenance). CIRCUIT BOARD (Bus of the system, expansion buses, Chipset, Design, Configuration, ATX). TECHNOLOGIES (Plug & Play, DMI). STORAGE SUBSYSTEM (Introduction, Disks, Recording format, Controllers and disk interfaces).

LECTURER: Ignacio Moreno Velasco

DEPARTMENT: Electromechanical Engineering

AREA: Electronic Technology

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1324 ELECTRICAL DISTURBANCES IN THE NETWORK

2,5 ECTS / 3 ESP / 2nd Semester / Optional

OBJECTIVES: The course teaches students the knowledge necessary to be able to identify and solve problems caused by electromagnetic disturbances, which require basic essential concepts such as what electrical installations are like, the elements which make them up, how they work, and the problems which may arise such as untimely electrical cuts.

CONTENTS: 1.- Electrical disturbances, electromagnetic compatability. 2.- Conduced disturbances. 3.- Radiated disturbances. 4. Norms and regulations, problems and solutions.

DEPARTMENT: Electromechanical Engineering

AREA: Electric Engineering

LECTURER: Jesús Sagredo González

TEACHING METHOD: Theory and seminars

ASSESSMENT METHOD: Project work

1325 ADVANCED PROGRAMMING

4,5 ECTS / 6 ESP / 1st Semester / Optional

OBJECTIVES: Learn to solve problems by the paradigm of orientation to objects and its

implementation with a specific language, JAVA. The subject introduces concepts of advanced programming: concurrent programming, design standards and methodological concepts of development of applications oriented towards objects.

CONTENTS: Concepts of orientation to the object in JAVA: Classes, inheritance, polymorphism, genericity. Handling exceptions. Concurrence. Designs standards. Cases of Use.

LECTURER: Carlos López Nozal

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1326 PROGRAMMING ROBOTS

4,5 ECTS / 6 ESP / 2nd Semester / Optional

OBJECTIVES: Provide students with the knowledge necessary to be able to programme any of the industrial robots currently on the market.

CONTENTS: Basic functioning of the Robot. General Characteristics of the system. System Start-up. Programme Start-up. Stopping the Programme. Stopping the System. Programming Language. Structure of the Language. Movement. Instructions for positioning. Movement data. Activation of outlets or interruptions in specific positions, Input and output signals. Communication. Interruptions. Applications: Soldering by points, Soldering of the arch and Manipulation.

LECTURER: Juan Vicente Martín Fraile

DEPARTMENT: Electromechanical Engineering

AREA: Systems and Automata Engineering

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1327 ACQUISITION AND CONTROL SYSTEMS

4,5 ECTS / 6 ESP / 1st Semester / Optional

OBJECTIVES: Focus students on the concept of acquisition of information, data and physical variables for the control of simple and complex processes in the world of management and industrial computing

CONTENTS: Sensors and transducers. Captation, adaptation and improvement of signals. Activators. Control of instrumentation. Industrial buses.

LECTURER: Pedro Luis Sánchez Ortega

DEPARTMENT: Electromechanical Engineering

AREA: Electronic Technology

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1328 EXPERT SYSTEMS AND ARTIFICIAL INTELLIGENCE

7 ECTS / 9 ESP / 1st Semester / Optional

OBJECTIVES: Familiarise students with the basic techniques of artificial intelligence:

formulation of problems, techniques for solution searching, forms and models for representation of knowledge, logics, ... The theoretical study of algorithms will be complemented with their implementation in a common language in the field of artificial intelligence: LISP. Likewise students will be introduced to the Prolog programming language

CONTENTS: What is AI? LISP, searching in states of space, non informed searches, informed searches, alfa-beta search, logics and the principle of resolution, prolog, representation of knowledge

LECTURER: César Ignacio García Osorio

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

1331 SOFTWARE FOR MATHEMATICS

2,5 ECTS / 3 ESP / 2nd Semester / Optional

OBJECTIVES: The course teaches students to handle the various computer packages designed for mathematics such as MAPLE, MATHEMATICS...

CONTENTS: Introduction to the programmes MAPLE and MATHEMATICS. Basic arithmetics. Applications in algebra. Applications in Calculus. Applications in statistics. Graphs. Programming.

DEPARTMENT: Mathematics and Calculation

AREA: Applied Mathematics

LECTURER: María José Zapatero

TEACHING METHOD: Practicals

ASSESSMENT METHOD: Project work

COMPUTER SCIENCE ENGINEERING (2ND CYCLE)

FOURTH YEAR

4443 THE ARCHITECTURE AND ENGINEERING OF COMPUTERS

7 ECTS / 9 ESP / 1st semester / Mandatory

OBJECTIVES: In this course students will study advanced architectures and systems for increasing the performance of computers.

CONTENTS: Classical computer architecture, increase in performance, monoprocessor architectures, multiprocessor architectures, interconnection systems. System programming

LECTURER: José María Cámara Nebreda

DEPARTMENT: Electromechanical Engineering

AREA: Electronic Technology

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4444 PROJECT PLANNING AND MANAGEMENT

4,5 ECTS / 6 ESP / 1st semester / Mandatory

OBJECTIVES: The course aims to familiarise the student with the problems arising from the supervision, organisation, planning and management of information technology related projects.

It studies aspects related to personnel management, hardware and software management, deadlines and costs, as well as aspects related to quality, standardisation and the prevailing legislation.

CONTENTS:

1. Generalities
2. Project management in general
3. Project life cycles
4. Prioritisation of phases
5. Metric functions
6. Estimates
7. Planning
8. Quality guarantees and assurances
9. Team organisation
10. Project follow-up
11. Learning from experience

DEPARTAMENT: Civil Engineering

AREA: Languages and Systems

LECTURER: Jacinto Canales de Caso

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory, practicals and seminars

ASSESSMENT METHOD: Written exam and project work

4448 LANGUAGE PROCESSORS

7 ECTS / 9 ESP / 1st semester / Mandatory

OBJECTIVES: The course reviews the basic concepts of the theory of formal languages and the corresponding models of calculus and links

with the techniques of language processes and design tools for efficient compilers interpreters

CONTENTS: A review of the theory of automats and formal languages. An overall view of the process of compilation. Syntactic analysis. Translation directed by syntax. Semantic analysis. Type testing. Handling of errors. Generation and optimisation of a code.

LECTURER: Armando Martínez Polo

DEPARTMENT: Civil Engineering

AREA: Área de Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4449 NETWORKS

7 ECTS / 9 ESP / 1st semester / Mandatory

OBJECTIVES: The course aims to provide students with in-depth knowledge of the architecture of the TCP/IP network at network level. Configuration of networks. Programmes of distributed applications with the client-server model. Knowledge of products for application to Internet.

CONTENTS: 1. A review of the Reference Model of Network Architecture TCP/IP. 2. The network Level. Protocols IP, ICMP, IGMP, ARP, RARP and BOOTP. 3. The Transport Level. Protocols TCP and UDP. 4. The Application Level. TELNET, SSH, FTP, NFS, SMTP, MIME, OPO, IMAP, HTTP, DNS, NIS, DHCP, SNMP. 5. Multimedia Networks. 6. Security in networks. Practicals: Programming Client-Server Applications with Interface Sockets.

LECTURER: Angel Peña Peña

DEPARTMENT: Electromechanical Engineering

AREA: Systems and Automation Engineering

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4445 SOFTWARE MAINTENANCE AND DESIGN I

4,5 ECTS / 6 ESP / 2nd semester / Mandatory

OBJECTIVES: The course offers a global vision of software development and maintenance set in a project management framework that is object-orientated. It seeks to improve the use of UML (Unified Modelling Language) industry-standard tools for analysis and design.

CONTENTS: Study Unit 1. Introduction

Study Unit 2. Software quality

Study Unit 3. Software quality in an object-orientated work environment

Study Unit 4. Object-orientated design and analysis

Study Unit 5. Object-orientated software development and maintenance processes

LECTURER: Juan Carlos Peciñas de Frutos

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals
ASSESSMENT METHOD: Written exam and project work

4451 DESIGN OF DATA BASES

4,5 ECTS / 6 ESP / 1st semester / Mandatory

OBJECTIVES: The course provides students with the adequate methodology to perform advanced Data Base designs, as well as an initiation to the development of Object Relational and Object Oriented Data Bases. Students will acquire the necessary practical experience in the design of Third Generation Data Bases.

CONTENTS: THEME 1: Review of the Design of Relational Data Bases. THEME 2: Advanced design in the Relational Model. Theory of Normalisation. THEME 3: Entity Model/Relation and Entity Model/Extended Relation. Transformation to the Relational Model. THEME 4: The future of Data Bases. The design of Object -Relational Data Bases. Modelling with UML. (Class Diagrams). SQL3. THEME 5: Distributed Data Bases.

LECTURER: Juan Perlos Pérez Córdoba

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4452 ADVANCED SYSTEMS PROGRAMMING

4,5 ECTS / 6 ESP / 2nd semester / Mandatory

OBJECTIVES: The course aims to give students the knowledge necessary to programme advanced systems, to know the different mechanisms existing for communication between processes and the use of shared resources. There will be an introduction to Distributed Systems.

CONTENTS: THEME 1: Introduction to Operative Sytems. THEME 2: Management of Archives and Directories. THEME 3: Processes. THEME 4: Communication and synchronisation of processes. THEME 5. Communications by network. THEME 6: Introduction to Distributed Systems.

LECTURER: Juan Perlos Pérez Córdoba

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4453 PROGRAMMING GRAPHIC INTERFACES

4,5 ECTS / 6 ESP / 2nd semester / Mandatory

OBJECTIVES: The course includes a description of the possibilities, principles and methodologies of analysis and design.

CONTENTS: TOPICS: Chapter 1. Introduction to and Definition of Interaction or Man-Machine Communication (IHM). Chapter 2. Man and the IHM. Chapter 3. Rules for the design of user interfaces. Chapter 4. Metaphore of the

Interface. Chapter 5. Different forms of Interaction. Chapter 6. User medium. Chapter 7. Guidelines for design. Chapter 8. Internalisaion of Interfaces. Chapter 9. Phases of the design. Chaper 10. Analysis of tasks. Chapter 11. From medium tools to implementation. Chapter 12. Evaluation.

LECTURER: Emilio S. Corchado Rodríguez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Oral and written examand project work

4454 NEW TECHNOLOGIES AND THE FIRM

4,5 ECTS / 6 ESP / 2nd semester / Mandatory

OBJECTIVES: The course aims to teach students about the emerging digital economy, providing them with the theory necessary to organise the firm, plan its leadership, link business strategies, and identify opportunities and risks to obtain competitive advantages. This general objective is specified in learning advanced economic business models, the important changes undergone by markets and products, the evolution experienced by business processes or the transformation of industrial sectors in which the firm operates.

CONTENTS: New technologies applied to Business Organisation. Management of Information, of knowledge and of commerce and innovation.

LECTURER: Lourdes Saiz Bárcena

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4455 DESIGN AND MANAGEMENT OF SYSTEMS AND NETWORKS

7 ECTS / 9 ESP / 2nd semester / Optional

OBJECTIVES: This course gives students thorough knowledge of the design and interconnection of networks, the configuration of enrouters, network management, and security in networks.

CONTENTS: 1. Interconnection of Networks at Physical level and for Links. 2. Interconnection of Networks at Network Level. Statistical enrouting and NAT. Dynamic inrouting: RIP, OSPF and BGP. 4. Network Management. DHCP and SNMP Protocols. 5. Security in Networks. Firebreakers. Practical. Configuration and Administration of Systems. Linux as server of Network Systems. Configuration and Administration of Networks. Configuration of a Linux System as an Enrouter. Configuration of a Linux System as a Firebreaker.

LECTURER: Angel Peña Peña

DEPARTMENT: Electromechanical Engineering

AREA: Systems and Automation Engineering

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

FIFTH YEAR

4446 SOFTWARE MAINTENANCE AND DESIGN II

5 ECTS / 6 ESP / 1st semester / Mandatory

OBJECTIVES: During the course students will:

- Discuss features of good object-orientated software design
- Evaluate the quality of numerous software designs based on fundamental design-related principles and concepts
- Select and apply design patterns in the construction of a software application
- Describe the need for competition in the working environment
- Demonstrate the main problems of separate execution by multitasking; states of dependence and mutual exclusion.

CONTENTS:

Study Unit 1: Introduction to software design patterns

Study Unit 2: Creational patterns

Abstract Factory, Builder, Factory Method, Prototype, Singleton

Study Unit 3: Architectural patterns

Adapter, Bridge, Composite, Decorator, Facade, Flyweigh

Study Unit 4: Implementing Patterns

Chain of responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

Study Unit 5: Concurrency

Concurrent computation. Importance of concurrence. From processes to objects. Synchronization problems. Concurrency in java

Study Unit 6: Concurrent patterns

Single Thread Execution, Guarded Suspension, Producer-Consumer, Balking.

LECTURER: Carlos López Nozal

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4447 ARTIFICIAL INTELLIGENCE AND KNOWLEDGE ENGINEERING

8 ECTS / 9 ESP / 2nd semester / Mandatory

OBJECTIVES: The course provides an introduction to Artificial Intelligence (A.I.), search trees, types of neuronal networks, genetic algorithms, artificial vision, etc.

CONTENTS:

- Study Unit 1. Introduction
- Study Unit 2. Non-informed search
- Study Unit 3. Heuristic search
- Study Unit 4. Heuristic search in antagonistic situations
- Study Unit 5. Introduction to knowledge representation

- Study Unit 6. Logical representations
- Study Unit 7. Cognitive representation
- Study Unit 8. Probabilistic representation
- Study Unit 9. Introduction to neuronal networks
- Study Unit 10. Non-supervised learning networks
- Study Unit 11. Supervised learning networks
- Study Unit 12. Rules based systems (expert systems)

LECTURER: Emilio S. Corchado Rodríguez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and assessment of projects

4456 ALGORITHMS

5 ECTS / 6 ESP / 1st semester / Mandatory

OBJECTIVES:

The course will enable the student:

- To analyse the execution time of recursive as well as iterative algorithms.
- To resolve problems using well-established design techniques.
- To associate a problem with the most suitable algorithm for its resolution.
- To learn the main theoretical concepts of NP - complete problems.

CONTENTS: 1. Algorithm analysis

- Asymptotic notation
- Amortized analysis
- Recurrence resolution
- 2. Algorithmic design
- Algorithms with voracious characteristics
- Methods Divide and Conquer
- Dynamic programming
- Going back
- Algorithmic probabilities
- 3. Computational complexity
- Reductions
- NP-complete problems
- NP-difficult problems
- Non-deterministic algorithms
- Approximate algorithms

LECTURER: Juan José Rodríguez Díez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4457 INTERNET SECURITY

5 ECTS / 6 ESP / 2nd semester / Mandatory

OBJECTIVES: The course gives the student a basic training in security issues related to operating systems and internet telecommunications as well as deepening his or her knowledge of practical aspects.

CONTENTS:

Study Area 1. Introduction to the problems of Internet security

Study Area 2. Operating systems security

- 2.1. Introduction
- 2.2. Identification and authentication
- 2.3. Memory protection

- 2.4. Policies, models and security mechanisms
- 2.5. Types of policies
- 2.6. Security models
- 2.7. Access control mechanisms
- 2.8. Evaluation of secure operating systems

Study Area 3. Cryptography

- 3.1. Basic concepts
- 3.2. Cryptography and Internet Security
- 3.3. The classic encoding systems
- 3.4. Modern encoding systems
- 3.5. DES
- 3.6. RSA cryptosystem
- 3.7. Cryptographic protocols
- 3.8. Digital Signature

Study Area 4. Security in Personal Computers

- 4.1. Introduction
- 4.2. Vulnerable points
- 4.3. Security measures
- 4.4. File protection
- 4.5. Copy protection

Study Area 5. Virus and other programmed threats

- 5.1. Definition and classification
- 5.2. Preliminary virus-related concepts
- 5.3. Classification of information technology virus
- 5.4. Life-cycle of the virus
- 5.5. Virus detection
- 5.6. Techniques and tools
- 5.7. Advanced virus

Study Area 6. Networks and Internet Security

- 6.1. Introduction
- 6.2. TCP/IP Networks
- 6.3. Network Cryptography
- 6.4. Vulnerabilities, attacks and countermeasures
- 6.5. Firewalls
- 6.6. Application level encryption
- 6.7. Network level encryption

Study Area 7. Database Security

Study Area 8. Physical Security

- 8.1 - Safe areas
- 8.2. - Security of the equipment
- 8.3.- General controls

Study Area 9. Risk analysis and planning

- 9.1 - Administrative aspects related to continuity of negotiations

Study Area 10. Security techniques and products

- 10.1 - Description of some tools for controlling and following up Internet access
- 10.2. - Tools checking System integrity
- 10.3.- Windows NT tools

Study Area 11. Legal and ethical considerations in relation to Internet security

- 11.1 - Complying with legal requisites
- 11.2. - Revising security policies and technical compatibility
- 11.3.- System audit considerations
- 11.4. - Global communication interception systems

LECTURER: José Manuel Saiz Díez**DEPARTMENT:** Civil Engineering**AREA:** Computer Languages and Systems**TEACHING METHOD:** Theory and practicals**ASSESSMENT METHOD:** Daily work and assessment of projects**OPTIONAL COURSES FOR 4TH OR 5TH YEAR****4469 PERIPHERALS****5 ECTS / 6 ESP / 1st semester / Optional****OBJECTIVES:**

The course enables the student to:

- understand the technical literature and specifications on peripherals provided by the manufacturers of equipment and programmes.
- resolve peripheral and interface-related problems that may arise in I.T. systems, applications or networks.
- evaluate different alternatives, taking the most appropriate decisions in view of the objectives being pursued and the available resources.
- to design and implement software controllers and drivers to control peripherals.

In order to do so the student has to set out technical objectives in such a way that meeting these objectives will to a certain extent guarantee that the proposed objectives have been learnt. Among these technical objectives the following may be highlighted:

- Basic physical attributes of peripherals
- Structure and functioning of peripherals
- Conceptualization of buses
- Standardization of buses
- Current applications in the use of peripherals and interfaces
- Peripheral interconnections
- Design and implementation of peripheral drivers/controllers

CONTENTS:

- 1.- Introduction
 - 1.1.- General aspects
 - 1.2.- Terminology
 - 1.3.- General approach to E/S
- 2.- Tapes and magnetic disks
 - 2.1.- Basic attributes
 - 2.2.- Structure of the magnetic storage components
 - 2.3.- Structure of information
 - 2.4.- Electronic read/write controllers for magnetic devices: hard disk controller. Write head and functions
 - 2.5.- Basic attributes of the CD-ROM
 - 2.6.- Structure of a CD-ROM reader
- 3.- Standardised local buses
 - 3.1.- Concept of the standardised bus
 - 3.2.- AT, ISA, EISA buses
 - 3.3.- PCI, AGP buses
- 4.- Screens CRT and LCD)
 - 4.1.- Basic attributes
 - Structure and operation of a CRT monitor
 - Structure and operation of an LCD screen
 - Basics of colour
 - 4.2.- A study of the video signal
 - 4.3.- Video controller and memory
 - 4.4.- Classification of the different monitor systems : SVGA, CGA, etc.
- 5.- Keyboards

5.1.- Basic attributes
 5.2.- Structure and operation of a keyboard
 5.3.- Keyboard controller
 6.- Positioning devices (Mouse, trackball, laser pencil)
 6.1.- Basic attributes and classification
 6.2.- Structure and operation of the mouse
 7.- Printers
 7.1.- Techniques and basic attributes of printers
 7.2.- Description of parallel protocol
 8.- Audio reproduction
 8.1.- The basic features of audio reproduction
 8.2.- Structure of a basic audio card
 8.3.- Introduction to the MIDI interface
LECTURER: Pedro Luis Sánchez Ortega, Ángel González González
DEPARTMENT: Electromechanical Engineering
AREA: Electronic Technology
TEACHING METHOD: Theory and practicals
ASSESSMENT METHOD: Written exam and project work

4473 DESIGN OF MULTIMEDIA APPLICATIONS

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: The course will familiarise the student with some of the most commonly used tools for the creation of multimedia applications, such as interactive catalogues, marketing and final product presentations, as well as presentations with a specific content for teaching purposes, projects etc.

To achieve this the student will use various video and audio editing programmes which will be integrated into another with which the completed media product will be made.

By using these the student will learn to:

-Edit convencional (linear) video, from the creation of the video through its editing and special effects editing, to the manipulation of the different audiovisual media. The student will learn about the architecture of digital video, by learning to put into digital format, audio, video, headlines, images etc. applying filters, masks and other editing tools.

-Create and edit interactive video, learning to create and edit 3D images from conventional images, creating interactivity between images to move from one sequence to another in real time, creating a sensation of movement through space.

-At the same time, the student will learn to synchronise sound with the videorecorder and will learn the different techniques to create 3D panoramic images, 3D objects and 3D scenery.

-Integrate video, audio, images, animations, texts, etc. with a tool that allows us to create interactive products that may be compiled later on for distribution, in such a way that the addressee can execute the application without any need to have the programmes with which the application was created.

In short, the student will learn to create Multimedia Applications.

CONTENTS:

Module 1 "Conventional Video Editing"
 Study Unit 1. Introduction.

1.1. Working material
 1.2. Obtaining and creating video files
 1.3. Types of effects to apply in video editing
 1.4. File organisation and structure.
 1.5. Exporting or creating the final file
 1.6. Video quality
 Study Unit 2.1 Creating a project
 2.1. Video configurations
 2.2. Audio configuracions
 2.3. Integration of project components
 2.4. Creating the project
 Study Unit 3. Importing images
 3.1. Distribution of images
 3.2. Adding transitions
 3.3. Inserting text
 3.4. Creation of the final video
 Study Unit 4. Importing animations or videos
 4.1. Cutting sections of animations or videos
 4.2. Distributing or reordering previous sections
 4.3. Inserting text, simple images, transitions, etc.
 4.4. Creation of the final video
 Study Unit 5. Importing and synchronising audio
 5.1. Cutting and reordering audio sections
 5.2. Synchronising images, text, etc. with video
 5.3. Creation of the final video
 Study Unit 6. Superimposing video compression
 6.1. Transparencies.
 6.2. Superimposition or montage of 2 or more videos.
 6.3. Adding backgrounds
 6.4. Masking
 6.5. Screen division
 Study Unit 7. Creation of the definitive video
 7.1. Available formats and their attributes
 7.2. Output to files or video tape
 7.3. Video creation for Internet
 7.4. Video creation for CD-ROM.
 7.5. Exporting fixed images
 7.6. Exporting to filmstrip for photographic retouching
 Module 2 "Editing interactive video"
 Study Unit 8. Introduction
 8.1. Photography: conventional and digital
 8.2. Obtaining digital photographs from scanners
 8.3. Interactive video applications
 8.4. Marketing.
 8.5. 3D panoramic landscapes
 8.6. Interactive digital scenes in houses
 8.7. Culture, training, etc.
 Study Unit 9. Photographic techniques
 9.1. For 3D objects
 9.2. For 360° panoramic images
 9.3. For 3D scenarios
 Study Unit 10. Creating projects
 10.1. Importing photos
 10.2. Adjusting and aligning photographs
 Retouching photographs: brilliance, colour, contrast, illumination, etc.
 Study Unit 11. Adding the finishing touches
 11.1. Previewing before release of the final video

11.2. Exporting to a VR file (.mov).
11.3. Previewing the final video and adding the finishing touches
Study Unit 12. Key photographic frames
12.1. Selection of the key frames
12.2. Creating links
12.3. Creating the final video
12.4. Analysing the final video and the final changes
Module 3 "Presentation Design"
Study Unit 13. Introduction
Study Unit 14. Animated text
14.1. Design of text
14.2. Applying transparencies and colours
14.3. Animation and inversion
Study Unit 15. Transitions, sound, and conventional video
15.1. Transitions, types and applications
15.2. Sound and synchronisation
15.3. Video
Study Unit 16. Interactivity
16.1. Familiarisation with the 'lingo'
16.2. Navigation and destination markers
16.3. Writing navigation scripts
Study Unit 17. Animation techniques
17.1. Key frames
17.2. Creation of trajectories
17.3. Animation through real-time recording.
Study Unit 18. Sprite placing
18.1. Generating animations by using key frames
18.2. Placing sprites.
18.3. Exchange of members
Study Unit 19. Film loops and buttons
19.1. Creating loops
19.2. Creating buttons
19.3. Behaviour
Study Unit 20. Cursors and personalised controls
20.1. Working with limited areas
20.2. Changing sprites.
20.3. Personalising controls
20.4. Animated cursors
Study Unit 21. Channels and Alfa masking
21.1. Masking
21.2. Alfa masking
21.3. Sprite properties and palettes
21.4. Fixing sprite positions
21.5. Behaviour of navigation elements
21.6. Changing sprite properties
Study Unit 22. Markers and navigation
22.1. Insert markers
22.2. Destination screens
22.3. Changing members of a cast
22.4. Sources and menus.
22.5. Animating sprites.
22.6. Animating sprites with mixing
22.7. Personalised menus
Study Unit 23. Shockwave Flash for the director
23.1. Creating and reproducing films
23.2. Creating films for shockwave formats
Study Unit 24. Synchronisation of digital video
24.1. Formats: -.AVI, .COM
Study Unit 25. Use of lists and multiple casts
25.1. Strategies
25.2. Moving elements between casts.

25.3. Using databases and listings
Study Unit 26. Hypertexts
26.1. Hyperlinks
Module 4 "Creation of a CD-ROM for distribution"
Study Unit 27. Practical work

LECTURER:**DEPARTMENT:** Graphical Expression**AREA:** Graphical Expression in Engineering**TEACHING METHOD:** Theory and practicals**ASSESSMENT METHOD:****4460 DATABASE APPLICATIONS****5 ECTS / 6 ESP / 1st semester/ Optional****OBJECTIVES:** The course will present the different Client/Server programming techniques in existence; contrast the rapid application design techniques for applications as against the more standard models; enable the student to carry out database applications, by means of ODBC or JDBC and using PL/SQL: stored procedures, (static as well as dynamic) and triggers; become aware of new tendencies in Web interfaces for database applications.**CONTENTS:** 1.- Client/Server programming techniques

2.- RAD (Rapid Application Design)

3.- SQL Embedded / static / dynamic

4.- 4GL - 4th Generation languages PL/SQL.

5.- API/ODBC/JDBC

6.- Integration of database applications into office management systems

7.- Development of Web interfaces for Database applications / XML

LECTURER: Francisco José Hurtado Ramírez**DEPARTMENT:** Civil Engineering**AREA:** Computer Languages and Systems**TEACHING METHOD:** Theory and practicals**ASSESSMENT METHOD:****4462 DATA MINING****5 ECTS / 6 ESP / 1st semester/ Optional****OBJECTIVES:** The courses acquaints the student with:

- knowledge discovery processes in database systems

- the main methods of data mining

and enables the student to:

- to implement simple data mining methods

- use tools for data mining to analyse real-life data.

CONTENTS: 1. Introduction

2. Classification using Trees and Rules

-Basic construction of tree structures: ID3

-Pruning mechanisms

-From trees to rules

-Covering methods to arrive at rules

3. Other methods of classification

-Bayesian classification

-Example-based learning

-Combination of classifiers

4. Non-supervised learning

-Rules for associations

-Clustering

5. Data mining of relational data

LECTURER: Juan José Rodríguez Díez

DEPARTMENT: Civil Engineering
AREA: Computer Languages and Systems
TEACHING METHOD: Theory and practicals

4459 MULTIMEDIA AND VIRTUAL REALITY

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: 1. The course aims to give students an overall view of multimedia and its possibilities. 2. Students will be introduced to the various media, their editing tools, the different types of format and the hardware necessary. 3. Students will be taught about the functions of author tools, and learn in detail about one of these. 4. The peculiarities of a multimedia development process. 5. Introduce students to the possibilities and media relative to virtual reality.

CONTENTS: Introduction to Multimedia, Multimedia Hardware and Software. Text, Sound, Images, Animations and Video, Web and Multimedia, Multimedia Production, Introduction to Virtual Reality: Macromedia Flash 5.

LECTURER: Jesús Maudes

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Oral and written exam and project work

4468 INDUSTRIAL ROBOTICS

5 ECTS / 6 ESP / 1st semester / Optional

OBJECTIVES: The course will present fundamental design and operational aspects of industrial robots. Various types of robots will be studied. A dynamic kinematic study of an articulated manipulator will be carried out. The different systems used to control robots and the different programming languages in use will also be presented.

CONTENTS:

Theory

1. Introduction to robotics
2. Kinematic model of a robotic arm.
 - 2.1. Direct kinematics. The Denavit-Hartenberg representation
 - 2.2. Inverse kinematics
3. Dynamic Model of a Robotic Arm
 - 3.1. The Lagrange-Euler mathematical formulation
 - 3.2. The Newton-Euler mathematical formulation
4. Trajectory mapping. Sensors and actuating devices
6. Robot controllers.
7. Robotic programming languages
8. Industrial robotics

Practical studies

1. Simulation of an articulated robot using Matlab and the Robotic Toolbox.
 - 1.1. Direct kinematics. The Denavit-Hartenberg representation
 - 1.2. Inverse kinematics
 - 1.3. Trajectory calculation

1.4. Inverse dynamics: calculation of the motor par by means of the recursive Newton-Euler formulation

1.5. Direct dynamics: simulation of the dynamics of a robot

LECTURER: José Manuel Luis Gutiérrez

DEPARTMENT: Electromecánica

AREA: Systems and Automation Engineering

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4459 MULTIMEDIA AND VIRTUAL REALITY

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: The course allows the student to:

1. Gain a panoramic view of what multimedia is and its potential
2. Gain an introduction to the diverse media, their editing tools, file formats and necessary hardware.
3. Become acquainted with the essential physical, physiological, psychological, and artistic attributes related to multimedia information.
4. Gain practical experience of operating graphic editing programmes
5. Gain practical experience of authoring tool functions, to become fully familiarised with an authoring tool.
6. Become familiar with the peculiarities of multimedia development processes.
7. Be introduced to the possibilities and resources related to virtual reality.

CONTENTS:

1. Introduction to multimedia
2. Authoring tools (Practical sessions with Macromedia Flash 5)
3. Images (Practical sessions with GIMP 1.2.3)
4. Audio
5. Text
6. Animations and video
7. Virtual reality and three-dimensional environments
8. Multimedia life-cycle and production

LECTURER: Jesús Maudes Raedo

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4461 ADVANCED DATA BASES

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: The course allows the student to:

- Study the characteristics and underlying principles of object-orientated and distributed database systems.
Become acquainted with the latest tendencies in Database Management Systems.
Acquire in-depth conceptual knowledge of the essentials of DataWarehousing, as well as of its architecture and design.

Analyse the differences between DataWarehousing and a DataMart.

Be able to design a star model, defining fact and dimension tables.

Analyse the differences between ROLAP, MOLAP and HOLAP.

CONTENTS:

1. Distributed Databases
2. Object-Orientated Databases
3. Future tendencies in Database Management Systems
4. DataWarehouse and DataMarts. The Star Model. Fact and dimension tables and hierarchies
5. MOLAP (Multidimensional Online Analytical Processing),
ROLAP (Relational Online Analytical Processing)
HOLAP (Hybrid Online Analytical Processing)

LECTURER: Francisco J. Hurtado Ramírez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Examen teórico-practico y presentación de trabajos

4463 DISTRIBUTED SYSTEMS

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: The course will introduce the student to those concepts inherent in distributed systems from the point of view of their synchronisation and planning, as well as the development of distributed applications, and will also cover the scope of distributed operating systems.

CONTENTS:

- Study Unit 1. Introduction to distributed systems
Study Unit 2. System models
Study Unit 3. Networks and network connections
Study Unit 4. Communication between processes
Study Unit 5. Distributed objects and remote recall
Study Unit 6. Operating system support
Study Unit 7. Name services
Study Unit 8. Global time zones and states
Study Unit 9. Coordination and agreement
Study Unit 10. Transactions and concurrency control mechanisms. Distributed transactions.

LECTURER:

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and practical exercise

4464 NEURONAL AND EVOLUTIVE COMPUTATIONS

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: The course provides an introduction to connective techniques, learning types, types of neuronal networks, genetic algorithms, etc.

CONTENTS:

- Study Unit 1. Introduction

- Study Unit 2. Neuronal networks with non-supervised learning

- Study Unit 3. Hebb's rule

- Study Unit 4. Anti-Hebbian learning

- Study Unit 5. Self-organising maps

- Study Unit 6. Supervised learning Example: The MultiLayer Perceptron (MLP)

LECTURER: Emilio S. Corchado Rodríguez

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and assessment of projects

4466 NEW SYSTEMS APPLIED TO COMMERCE

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: The course allows the student to:

- 1.- Learn about changes linked to the development of the New Economy and the implications of the 'Information Age' for business activity.
- 2.- Reflect on the role that the new technologies will play in the economics of the firm.
- 3.- Learn about the history and development of Internet.
- 4.- Reflect on the opportunities that Internet offers for the processes which companies use to negotiate.
- 5.- Gain in-depth knowledge about e-business and e-commerce within companies.
- 6.- Analyse the advantages and disadvantages of the theoretical and practical models of e-commerce.
- 7.- Become familiar with payment methods and invoice processing (billing) needed to carry out electronic commerce
- 8.- Learn to define a strategy to respond to the implementation of e-commerce in a company.
- 9.- Learn about techniques for digital marketing.
- 10.- Learn about the scope and integration of supply chain management.
- 11.- Learn about the current legal environment and legal aspects related to e-commerce.
- 12.- Review technologies that support the development of e-commerce and future tendencies.

New Systems Applied to Commerce is a study unit that tries to fit together all aspects related to the new methods of carrying out commerce, making the most of the advantages offered by technology, and especially the Internet.

This requires that sales processes adapt to the new environment and calls for new ways of promoting products and of managing client-related information, as a whole.

The profile of market segments, and signs of their behaviour in a digital environment determine the strategies to be defined with the aim of obtaining electronic sales.

The integration of digital business and physical business is fundamental to the company's service and image.

Managing this image through the design of web pages that apply user friendly concepts based on the perceptions of an objective member of the public is another key element of this study unit.

CONTENTS:

Study Unit 0: Introduction to the New Economy

1. Origins of the New Economy .
2. Symptoms of a transformation towards the New Economy
3. Danger signals in the transformation process.

Study Unit 1 : Internet and the Firm

1. Introduction to Internet
2. Internet and the firm in Spain
3. Internet opportunities in the firm
4. European Union Directives

Study Unit 2 : E-business and e-commerce

1. Introduction to e-business.
2. e-business applications
3. Introduction to e-commerce.
4. E-commerce scenarios
5. Integration of e-commerce into e-business.

Study Unit 4 : e-Business Models

1. Theoretical divisions
2. Practical divisions
3. Special models
4. Towards the multichannel gateway
5. Review of technologies

Study Unit 4: The extended firm

1. Introduction to the extended firm
2. E-strategy: Digital strategy
3. E-marketing: Digital Marketing
4. E-procurement: Digital Purchase
5. SCM: Supply Chain Management
6. E-logistics: The logistics of electronic-commerce

Study Unit 5: Legal aspects of electronic-commerce

1. LSSICE: Spanish Statute-Law 34/2002, of 11th of July relating to services to the digital community and electronic commerce
2. Data Protection Law, Organic Law 15/99 of 13th of December relating to the protection of personal and private information
3. Development of the legal framework relating to electronic commerce.

Study Unit 6: Security and ethics in electronic commerce

1. Defining a policy for Internet Security
2. Introduction to Digital Certification
3. Internet and Ethics
4. Fraud on the Internet

LECTURER: José Ignacio Bonel Cerdán

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and practical exercise

4467 INDUSTRIAL AUTOMATIZATION

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: The course will:

-Provide the student with the knowledge necessary to understand automatization of the multiple manufacturing processes in existence.

-Give a practical focus, using real examples of automatization and with the latest market tendencies in the field, to serve as a guide to the student in future automatization projects.

-Learn about the most widely-established automatization systems in modern industry: robots, programmed automatons, fieldbus, mobile identification systems, artificial vision

CONTENTS:

Study Unit 01. Introduction to industrial automatization

- 1.1 Manufacturing systems
- 1.2 Execution of technological control
- 1.3 Automated systems
- 1.4 Basic functions of a programmable automaton

Study Unit 02. Programmable Industrial Automaton (PIA)

- 2.1 Modular architecture of PIAs
- 2.2 Types of programming languages for PIAs.

2.3 Programming in AWL, FUP and KOP languages

Study Unit 03. Wiring systems in industrial installations

- 3.1 Introduction.
- 3.2 Wiring possibilities
- 3.3 Classic wiring systems
- 3.4 Pre-wiring basics
- 3.5 Input / output distributed

Study Unit 04. Modelling and programming of discrete events systems

- 4.1 Modelling using states graph
- 4.2 Methodology for carrying out automaton programmes
- 4.3 Modelling using Petri networks

Study Unit 05. The 'step', 'action', and 'transition' graph: GRAFCET

- 5.1 Basic elements of Grafcet
- 5.2 Actions
- 5.3 Rules for Grafcet evolution
- 5.4 Grafcet structures
- 5.5 Grafcet programming in automatons: Simatic-S7.

Study Unit 06. Stop and go modes: the GEMMA guide

- 6.1 Stop and go procedures
- 6.2 Operating procedures
- 6.3 Default procedures
- 6.4 Basic implementation of Gemma

Study Unit 07. Industrial communications

- 7.1 Fieldbuses
- 7.2 The AS-I bus
- 7.3 Profibus(Siemens)
- 7.4 Interbus(Phoenix Contact).

Study Unit 08. Supervision and Control processes

- 8.1 Communication between man and machine
- 8.2 Production control
- 8.3 Mobile identification systems
- 8.4 Artificial vision

Study Unit 09. Programming of industrial robots

- 9.1 Robot security
- 9.2 Basic operation
- 9.3 The 'Go' command
- 9.4 Calibration of the robot
- 9.5 System parameters
- 9.6 Programming language in RAPID(ABB).
- 9.7 Applications
- 9.10. Functioning on production

LECTURER: Juan Vicente Martín Fraile

DEPARTMENT: Electromechanical Engineering

AREA: Systems and Automation Engineering

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and assessment of projects

4470 DIGITAL SYSTEM DESIGN

5 ECTS / 6 ESP / 2nd semester / Optional

OBJECTIVES: The course will teach the techniques to design digital systems.

CONTENTS:

1. Combinational logical elements
 - The switch level
 - The gate level
 - Combinational logic
2. Combinational design
 - Design of minimal functions by computer (Quine-McCluskey)
 - Data transfer logic and addition-subtraction (ALU / Arithmetic-Logic Unit)
 - Integration into programmable devices
3. Elements of sequential logic
 - Bistable asynchronous
 - Bistable synchronous
 - Temporization and behaviour of states.
 - Propagation delay
 - Basic principles of bistable design
4. Sequential design
 - Analysis of sequential circuits
 - Synthesis of sequential circuits
 - Design and tests
 - Design at registry level
 - Integration of programmable devices
5. Application methods of logical design
 - VHDL hardware description language
 - Capture schemes
 - Description by time (time diagrams)

LECTURER: José M^a Cámara Nebreda, Miguel Ángel Lozano Pérez

DEPARTMENT: Electromechanical Engineering

AREA: Electronic Technology

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and practical exercise

4465 KNOWLEDGE MANAGEMENT

5 ECTS / 6 ESP / 1st semester / Optional

OBJECTIVES: The course argues that the purpose of any firm is its long term survival, and to achieve this it needs to arrive at and maintain sustainable, long term, competitive advantages. Each firm may certainly define the scope of those terms with a degree of precision, but, in

practice there are very few, separate elements at its disposal to set up stable advantages for its clients. In this sense it cannot base its ability to differentiate on its assets, since, it is increasingly the case that the complexity of the latter means that practically all companies in a sector buy those assets from a few suppliers.

CONTENTS:

First part: an approach to knowledge management in business organisations

1. Knowledge in a business context
2. Types and properties of knowledge
3. Knowledge inventories
4. Generating knowledge

Second Part: Knowledge and value creation in the company

1. The knowledge company
2. Knowledge and professional skills needed to generate competitive advantage
3. Underlying foundations of knowledge management
4. Principal knowledge management models

Third part: Human resources in knowledge management

1. A framework of references for shared knowledge
2. Key elements of the knowledge company; characteristics and working methods.
3. Policies related to selection, training, motivation and compensation of skilled workers
4. Management of teams of experts

Fourth part: Practical application of knowledge management systems

1. Methodology for the development and implantation of knowledge management systems
2. Processes related to acquiring, formalization, and updating knowledge
3. Technologies related to knowledge management
4. Practical experience of the implementation of a knowledge management system project
5. Design and development of a knowledge management system

Fifth part: Implications of current legislation regulating the Internet for knowledge management

Practical work:

Complete case studies :

Cisco Systems Iberia

Unión FENOSA

Siemens

Group work on simulated as well as real-life initiatives and knowledge management projects. If possible, agreements will be arrived at with various organizations and companies to analyse their knowledge management systems.

Possibilities:

Theoretical:

1. In-depth examination of the importance of knowledge management in firms, developing knowledge types and attributes and examining their repercussions on the generation of competitive advantages.

2. Proposals to establish, within the firm, what its knowledge base is and who is in possession of it.
3. Proposals to share the knowledge possessed by individual company employees.
4. Proposals to define policies related to employee selection, training, and remuneration grounded in the knowledge-base.

Practical:

5. Description of the constituents of a model for managing a firm's knowledge base.
6. Study of a knowledge management system (or some of its parts) that has been implemented by a firm.
7. Taking down an opinion relating to knowledge management from a senior manager or employee of a firm with experience in this area (questions to be drawn up beforehand).

LECTURER: Lourdes Saiz Bárcena

DEPARTMENT: Civil Engineering

AREA: Business Organisation

TEACHING METHOD: Theory and practicals

ASSESSMENT METHOD: Written exam and project work

4444 PLANNING AND MANAGEMENT OF PROJECTS

4,5 ECTS / 6 ESP / 1st semester / Mandatory

OBJECTIVES: The course aims to familiarise students with the problems derived from the administration, organisation, planning and management of projects related with Computer Engineering. Students will study aspects relative to the control of human resources, hardware and software resources, deadlines and costs, as well as aspects related with quality, normalisation and existing legislation.

CONTENTS: 1. Generalities. 2. Project Management in general. 3. Project and Life Cycle. 4. Ordering of stages- 5. Metrics. 6. Estimation. Planning. 8. Quality guarantee and assurance. 9. Organisation of the team. 10. Project follow up. 11. The lessons of experience.

LECTURER: Jacinto Canales de Caso

DEPARTMENT: Civil Engineering

AREA: Computer Languages and Systems

TEACHING METHOD: Theory, practicals and seminars

ASSESSMENT METHOD: Written exam and project work