COMPUTER SCIENCE DEGREE

Computer Science Degree - Syllabus Structure

The syllabus is made up of 10 semesters. The number of Spanish credits for the whole syllabus is 375 (300 ECTS credits, 1 credit ECTS=1,25 Spanish credit), divided into two stages. The first takes 6 semesters and the second takes 4. The students must obtain 225 credits (180 ECTS credits) in the first stage and 150 (120 ECTS credits) in the second to obtain the degree. All the subjects are organised on a semester basis. Every semester has a duration of about 14 weeks. As yet, matriculation takes place only once every academic year (1 academic year = 2 semesters), in the month of September. The maximum load of credits per year is 75 credits (60 ECTS Credits).

There are three types of subjects: compulsory subjects, optional subjects and elective subjects. In order to obtain the degree, all the compulsory subjects for the degree must be taken, besides a certain number of credits corresponding to optional and elective subjects.

Elective credits allow students to build up their curriculum more flexibly and to gain credits for extracurricular activities. However the increased flexibility also involves a greater complexity in the management of elective credits. To simplify the management of these credits, it is convenient to classify elective credits into different categories. It is necessary to distinguish between elective subjects and elective activities. The former are subjects taught at the University and included in the timetables of the different Departments. The latter are not included in official timetables and may consist in placements or activities related to sports, to student representation etc.

At the moment the Faculty of Computer Science is changing the Degree's Study Plan. The transition takes 5 years, the Academic year 2003/2004 is the third year of this transition. This means that First, Second and Third year belong to the new Study Plan (2001) and that Forth and Fifth year belong to the Former Study Plan (1993) .

The distribution of credits is as follows:

STAGE	YEAR	COMPULSORY	OPTIONAL	ELECTIVE	TOTAL
	1	66	0	6	72
1st Stage	2	72	0	6	78
	3	33	30	12	75
2nd Stage	4	54	18	3	75
	5	15	48	12	75

To Convert to ECTS credits please multiply by 0.8

Compulsory Subjects

The compulsory subjects are majority in the two first years and in the fourth year of the degree The following tables include information about the compulsory subjects:

FIRST STAGE

First Year		Credits		
Semester A	**Semester B**	**Sem. A**	**Sem. B**	**Total**
Mathematical Analysis		6	6	12
Computer Fundamentals		6	6	12
Fundamentals of Physics for Computer Science		4.5	4.5	9
Programming		6	6	12
Mathematical Structures for Computer Science I		9	0	9
	Computer Technology	0	6	6
	Numerical Computation	0	6	6
Elective Subjects		0	6	6
	Total	31.5	40.5	72

Second Year		Credits		
Semester A	**Semester B**	**Sem. A**	**Sem. B**	**Total**
Statistics		6	6	12
Data Structures and Algorithms		6	6	12
Computer Structures		6	6	12
Management of Organizations and Information Systems		6	0	6
Logic Design		6	0	6
Operating Systems I		6	0	6
	Databases	0	6	6
	Methodology and Technology of Programming	0	6	6
	Operating Systems II	0	6	6
Elective Subjects		0	6	6
	Total	36	42	78

Third Year		Credits		
Semester A	**Semester B**	**Sem. A**	**Sem. B**	**Total**
Database Design		6	0	6
Evaluation of Computer Systems		4.5	0	4.5
Foundations of Computer Networks		6	0	6
Mathematical Structures for Computer Science II		4.5	0	4.5
	Operations Research I	0	6	6
	Algorithmics	0	4.5	4.5
	Graphical User Interfaces	0	6	6
	Programming Languages and Paradigms	0	6	6
Automata Theory and Formal Languages		4.5	4.5	9
Optional Subjects		6	6	12
Elective Subjects		6	4.5	10.5
	Total	37.5	37.5	75

Optional Subjects

Third Year Optional Subjects			
Title	**Credits**	**Title**	**Credits**
Cryptography	6	Numerical Algorithms	6
Economic Valuation of Computer Science Projects and Assets	6	Strategy and the new Information Technologies	6
Study of an Operating System	6	Simulation of Dynamic Systems	6
Symbolic Calculus	6		

SECOND STAGE

Fourth Year		Credits		
Semester A	**Semester B**	**Sem. A**	**Sem. B**	**Total**
Requirements Engineering		6	0	6
Artificial Intelligence		4.5	0	4.5
	Learning and Perception	0	4.5	4.5
	Systems Engineering and Automatic Engineering	0	6	6
Computer Arquitecture		4.5	4.5	9
Language Processors		4.5	4.5	9
Software Engineering		6	6	12
Computer Networks		4.5	4.5	9
Elective Subjects		6	9	15
	Total	36	39	75

Fifth Year

1.- Industrial Computing

1. Automation & Robotics Laboratory (4.8 ECTS)
2. Computer Assisted Design (4.8 ETCS)
3. Computer Assisted Manufacturing (3.6 ECTS)
4. Computer Graphics (4.8 ECTS)
5. Digital Image Processing (4.8 ECTS)
6. Digital Image Production (4.8 ECTS)
7. Industrial Control (4.8 ECTS)
8. Industrial Instrumentation (3.6 ECTS)
9. Industrial Local Networks (3.6 ECTS)
10. Real-Time Systems (4.8 ECTS)
11. Robotics (3.6 ECTS)
12. Vision Systems (4.8 ECTS)

2. - Computer Engineering

1. Advanced Architectures (3.6 ECTS)
2. Advanced peripheral units (3.6 ECTS)
3. Computer evaluation, modeling & simulation (3.6 ECTS)
4. Design of Microprocessors Systems (4.8 ECTS)
5. Fault Tolerant computer systems (3.6 ECTS)
6. Languages & Environments for parallel programming (4.8 ECTS)
7. Parallel Computation (4.8 ECTS)
8. VLSI Architectures Design (4.8 ECTS)

3. - Software Engineering

1. Advanced Databases (4.8 ECTS)
2. Advanced Software Technology (4.8 ECTS)
3. Advanced tools for software development (4.8 ECTS)
4. CASE tools & semi-formal methods in software engineering (4.8 ECTS)
5. Components Technology. Design patterns & code generation (4.8 ECTS)
6. Conceptual Modeling of Information Systems (4.8 ECTS)
7. Database Technologies (4.8 ECTS)
8. Distributed Systems (4.8 ECTS)
9. Formal Methods in Software Engineering (4.8 ECTS)

10. Management & Organization of Software Projects (4.8 ECTS)

4. - Languages & Artificial Intelligence

1. Advanced tools of software development (4.8 ECTS)
2. Artificial Intelligence Techniques(4.8 ECTS)
3. Declarative Programming (4.8 ECTS)
4. Information Encoding (4.8 ECTS)
5. Intelligent Systems (4.8 ETCS)
6. Language theories (4.8 ECTS)
7. Learning (4.8 ECTS)
8. Neuronal Networks (4.8 ECTS)
9. Pattern Recognition (4.8 ECTS)
10. Programs Automatic Optimization (4.8 ECTS)

5. - Computer Networks & Operating Systems

1. Distributed Systems (4.8 ECTS)
2. Distributed Systems Design & Applications (4.8 ECTS)
3. Local Area Networks & Internetworking (4.8 ECTS)
4. Multimedia Networks (4.8 ECTS)
5. Operating Systems Design (4.8 ECTS)
6. Operating Systems Management (4.8 ECTS)
7. Security in Computer Systems (4.8 ECTS)
8. Signals, systems & radio devices (4.8 ECTS)

6.- Information Systems

1. Advanced Databases (4.8 ECTS)
2. CASE tools & semi-formal methods in software engineering (4.8 ECTS)
3. Conceptual Modeling of Information Systems (4.8 ECTS)
4. Database Technologies (4.8 ECTS)
5. Informatics of the productive, logistic and commercial system (4.8 ECTS)
6. Informatics Tools for Enterprises (4.8 ECTS)
7. Information Systems Audit (4.8 ECTS)
8. Management & Organization of Software Projects (4.8 ECTS)
9. Management of Information Projects (4.8 ECTS)
10. Operating Research II (4.8 ECTS)
11. Quality Control (4.8 ECTS)

General courses
Medical Informatics
Bioinformatics
Foundations of multimedia systems
Multimedia integration
Introduction to audio synthesis, editing and postproduction
Databases and data mining
Development of applications for mobile devices
Mecatronics

PROGRAMMING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Francisco Abad
Type	Core
Total credits	Total 12 = Theory 6 + Practice 6
Code	5537 PRG
Course	1º A+B

Objectives

• Resolve simple problems efficiently
• Encode the solutions to the problems in C
• Computational complexity
• Recursion
• Data structures
• Sorting algorithms

Syllabus

1. Work environment. Operating system. Basic commands.
2. Editing. Security copies.
3. Compiling: concept. Execution of programs.
4. Programming elements: control structures.
5. Program debugging.
6. Experimental cost study.
7. Revision of tools.
8. Recursion.
9. Standard input and output. Files.
10. Data structures: lists, stacks, queues.
11. Sorting algorithm: analysis of temporary behaviour.

Practice

Evaluation standards

Bibliography

• Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman. Estructuras de datos y algoritmos. Addison-Wesley Iberoamericana, 1988.
• Brian W. Kernighan, Dennis M. Ritchie. El lenguaje de programación C. Prentice-Hall Hispanoamericana, 2a. ed., 1991.
• Mark Allen Weiss. Estructuras de datos y algoritmos. Addison-Wesley, 1995.
• Francesc J. Ferri, Francesc V. Albert, Gregorio Martín. Introducció a l´anàlisi i disseny d´algorismes. Universitat de València, 1998.
• Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran. Computer algorithms. Computer Science Press, 1998.

MATHEMATICAL ANALYSIS

Degree	Computer Science Degree
Department	DMA
Lecturer in charge	Esther Sanabria Codesal
Type	Core
Total credits	Total 12 = Theory 6 + Practice 6
Code	5538 AM
Course	1º A+B

Objectives

• The student will become familiar with calculation tools and techniques in one and several variables, and also those corresponding to the solving of ordinary differential equations. More advanced stopics will also be covered, such as the operation of complex functions and of series of
functions, actually studying Fourier series.

Syllabus

The methodology will be mainly practical with the aid of computer applications for calculating and representing.
1. Preliminaries. Functions of one real variable.
2. Complex numbers and functions of one complex variable.
3. Sequences of real numbers. Difference equations.
4. Series of real numbers.
5. Functions of several variables.
6. Sequences and series of functions. Fourier Series.
7.Ordinary differential equations

Practice

1. Basic knowledge of Mathematica. Basic commands
2. One real variable functions. Definition, graphs and limits.
3. Derivatives and Taylor Polynomials. Complex numbers.
4. Approximate resolution of equations.
5. Sequences and series of real numbers.
6. Integration. Numerical approximation.
7. Functions of several variables.
8. Relative extremes and integration of functions of several variables.
9. Fourier Series.
10. Ordinary differential equations.

Appendix: Real variable vector functions and curve representations

Evaluation standards

• 80% of the subject grade corresponds to the theory and the remaining 20% to the laboratory.

Bibliography

Además de las notas de la asignatura, se recomienda que los alumnos consulten:

•T.M. Apostol, Calculus, Ed. Reverté
•F. Ayres and E. Mendelson, Cálculo Diferencial e Integral. Ed. McGraw-Hill, Serie Schaum 3ªed.

•V. del Olmo, D. García-Sala, Ll. Gascón y A. Pastor, Análisis Matemático I (Ejercicios Resueltos). Ed. Tebar, 2000.
•W.R. Derrick, Variable Compleja con Aplicaciones. Grupo Editorial Iberoamericana.
•R. Fuster e I. Giménez, Variable compleja y ecuaciones diferenciales. Ed. Reverté.
•E. Kreyszig, Matemáticas avanzadas para ingeniería. Ed. Limusa.
•Salas, G.J. Hille-Etgen, Calculus. Ed. Reverté, 2002.
•G.B. Thomas y R.L. Finney, Cálculo de una variable. Ed. Addison Wesley Longman, 1999.
•G.B. Thomas y R.L. Finney, Cálculo de varias variables. Ed. Addison Wesley Longman, 1999.

COMPUTER BASICS

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Salvador Petit Martí
Type	Core
Total credits	Total 12 = Theory 6 + Practice 6
Code	5539 FCO
Course	1º A+B

Objectives

• To know the internal structure and basic operation of computers.
• To know and understand the elements which support the arithmetic and logical operations of computers.
• To know and understand the function of the basic structural elements of the processor for the execution of a set of minimal instructions.

Syllabus

- The program is divided into:
- Block I.- Study of the methods used by the computer to represent the information.
- Block II.- Introduction to basic digital circuits and memory elements.
- Block III.- Assembly language of the MIPS R2000 processor; instruction set and encoding.
- Block IV.- Study of the
elements which compose the Central Processing Unit, their interconnection and
the implementation of the necessary control logic.

Practice

• The practical work of the subject is divided into three blocks:
- Block I: Study, design and construction of combinational and sequential digital systems. The setting up of the circuits is done by means of the logic trainer.
- Block II: Assembly language. Instruction encoding, analysis and programming in assembly language. SPIM simulator.
- Block III: Datapath and control unit. Analysis and design. Simulation via Xillinx.

Evaluation standards

• Evaluation standards:
- The evaluation comprises theory as well as practice.
- Theory: Final exam in June/September. This represents 90% of the final grade.
- Practice: Attendance at teaching practice is obligatory. Failure to meet attendance requirements will make a practice exam necessary. Practical classes are evaluated and represent 10% of the final grade.

Bibliography

•Introducción a los Computadores. J. Sahuquillo y otros. Ed. SP-UPV, 1997 (ref. 97.491). Bloques I, II y III
•Organización y diseño de computadores: La interficie circuitería/programación. D.A. Patterson y J.L. Hennessey. Ed. Reverté, 2000. Bloques III y IV
•Digital Design: Principles and practices. J.F. Wakerly. Ed. Prentice-Hall Internacional, 2000
•V.C. Hamacher y otros. Computer Organization. Ed. McGraw-Hill, 1996
•Charles H Roth, Jr. Fundamentos de diseño lógico. Thomson, 5ª Ed. 2004

PHYSICS FOR COMPUTER SCIENCE

Degree	Computer Science Degree				
Department	DFA				
Lecturer in charge					
Type	Core				
Total credits	Total	9	= Theory	3	+ Practice 6
Code	5540				FFI
Course	1º				A+B

Objectives

• Understand conductor, semiconductor and insulator materials response to an electric field and potential via energy bands model.
• Apply the intensity, potential and electrical resistance concepts to the resolution of direct current circuits.
• Analyse in terms of power and energy the behaviour of direct current circuits.
• Solve flat linear electrical networks via Kirchhoff's laws, matrix methods and equivalent theorems.
• Analyse the generation and effects of magnetic fields.
• Interpret the ferromagnetic materials model, using magnetic fields and magnetic moment concepts.
• Distinguish electromagnetic induction phenomena and interpret the inductive behaviour of circuits and their basic applications.
• Analyse the effects of alternating currents on basic electric dipoles and circuits.
• Describe the polarized NP semiconductor junction behaviour applying the energy bands model.
• Understand basic semiconductor components behaviour: diodes and transistors.
• Describe the applications of electromagnetic waves in information systems, from the electromagnetic fields to optics.
• Work on electrical instrumentation on electric circuits: multimeters, oscilloscopes andfunction generators.
• Understand uncertainties and dispersion of the results of experimental measurements and appropriately present them.
• Produce reports of laboratory work including experimental results analysis.

Syllabus

1. Static electric fields
2. Circuits
3. Electric networks analysis
4. Electric properties of conductor and dielectric materials
5. Electric properties of semiconductor materials
6. Diodes
7. Transistors
8. Magnetism
9. Electromagnetic induction
10. Alternating current circuits
11. Electromagnetic waves
12. Optical applications

Practice

- Theoretical knowledge imparted:
1. Laboratory reports
2. Dealing with experimental data

3. Error or uncertainty theory
- Practice
1. Instrumentation. Circuit assembly. Evaluation of electric resistance measuring systems.
2. Oscilloscopes
3. Transient phenomena. Charging and discharging capacitors.
4. Semiconductor diodes. Characterisation and applications.
5. BJT. Characterisation and applications.
6. Resonance in AC circuits. Filtering.

Evaluation standards

The evaluation of the subject can be done in partial exams or a final exam. Together with laboratory practice, the final FFI qualification will be obtained according to the following scheme:
- Practice grade: 50% practical exam + 50% Attendance (obligatory) and laboratory reports (minimum of 2.5 points in each part)
- Theory grade (theory and problems): the theory grade is obtained either by partial exams (January and June) or by final exam (June). To pass via partial exams, the minimum grade of each one is 4 points.
- Partial exams and the final exam consist of one part questions and the other part problems. The minimum grade for each is 2.5 points.
- Total grade: 25% Practical grade + 75% theory grade. (To calculate the average a minimum of 4 in theory+problems and in practice is required).
• The exam dates are set by the Faculty of Information Systems, and the confirmed announcement with the classrooms and timetable will be made public before each exam.
• The first partial exam will evaluate the first six topics of the subject. The second will evaluate the last six topics.
• The grades of the partial and final exams will be made public on the website of the subject, as well as all the information related to the revision of the exams.
• If only the laboratory practice or total theory grade has been passed in June, the qualification will only be maintained for the September exam and the next two of the following year, not keeping the grade for subsequent courses.

Bibliography

•Fundamentos físicos de la informática, José Antonio Gómez Tejedor ... [et al.]. Valencia : Universidad Politécnica de Valencia, 2003. Ref.: 2003.904
•Cuestiones y problemas de electromagnetismo y semiconductores, José Antonio Gómez Tejedor, Juan José Olmos Sanchis; colaborador, Jose Mª Meseguer Dueñas. Valencia : Universidad Politécnica de Valencia, D.L. 1999, (SPUPV ; 99.4157) (Libro docente) ISBN 8477218277
•Qüestions i problemes d´electromagnetisme i semiconductors, José Antonio Gómez Tejedor, Juan José Olmos Sanchis; colaborador, Jose Mª Meseguer Dueñas. Valencia : Universidad Politécnica de Valencia, D.L. 1999, (SPUPV ; 99.3517) (Renaixença i futur : Monografies de la Universitat Politècnica de València sobre ciència, tecnologia i art), ISBN 8477218285
•Prácticas de fundamentos físicos de la informática : Facultad de Informática, José Antonio Gómez Tejedor ... [et al.]. Valencia : Editorial UPV, D.L. 2003 Ref.: 2003.526, ISBN 8497053109
•Pràctiques de fonaments físics de la informàtica, José Antonio Gómez Tejedor ... [et al.]. València : Editorial UPV, 2003 (Renaixença i futur : Monografies de la Universitat Politècnica de València sobre ciència, tecnologia i art) Ref.: 2003.3539, ISBN 8497053486
•Electricidad y magnetismo, luz, física moderna : mecánica cuántica, relatividad y estructura de la materia, Paul A. Tipler. - Barcelona : Reverté, 1999, Trad. de 4ª ed. en inglés, ISBN 8429143823 (Vol. 2), ISBN 842914384X (O.G.)
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• Física para ciencias e ingeniería, Raymond A. Serway, Robert Beichner, 5ª ed. - México : McGraw-Hill/Interamericana, 2000, ISBN 9701035828 (Vol. 2), ISBN 9701035801 (O.G.)
• Física clásica y moderna, W. Edward Gettys, Frederick J. Keller, Malcolm J. Skove Madrid : McGraw-Hill, D.L. 1991. ISBN 8476156359
• Fonaments de física, Vicente Martínez Sancho, Barcelona : Enciclopèdia Catalana, cop. 1991.
• Física universitaria, Francis W. Sears ... [et al.]. México [etc.] : Addison Wesley Longman de

México, cop. 1999.Trad. de 9ª ed. en inglés, ISBN 9684442785 (Vol. 2)

MATHEMATICAL STRUCTURES OF INFORMATION SYSTEMS

Degree	Computer Science Degree					
Department	DMA					
Lecturer in charge	María Teresa Gasso					
Type	Core					
Total credits	Total	9	= Theory	6	+	Practice 3
Code	5541					EMI1
Course	1º					A

Objectives

• We try to provide the student with a range of basic discrete mathematics knowledge, extremely useful in the Information Systems discipline, and the fundamental aspects of linear algebra and its applications from the matrix' point of view.

Syllabus

1. Introduction to logic: Principle logic.
2. Predicate logic. Induction method.
3. Binary relations.
4. Graphs.
5. Equation systems.
6. Matrices
7. Vectorial spaces
8. Diagonalisation of matrices
9. Euclid vectorial space

Practice

Practice 1: Introduction to Graph theory with "Mathematics"
Practice 2: "Mathematics" relations
Practice 3: Introduction to "Matlab". Staggered Matrices.
Practice 4: Matricial arithmetic and LU Decomposition.
Practice 5: Basic Operations and Determiners.
Practice 6: Euclid vectorial space.

Evaluation standards

• 80% written exam (theory and problems). To calculate the average of the practical exam, mínimum 3 points out of 8. Of those at least 1 point has to correspond to the algebra section and 1 point to the discrete mathematics section.
• 20% practical exam.
• The grades will be maintained (from 4 for the written exam and from 1 for the laboratory exam) for June.
• GRADES ARE NEVER MAINTAINED FOR THE FOLLOWING COURSE
• THEORY EXAM SECTIONS ARE NEVER MAINTAINED

Bibliography

•Hervas, A. R. Villanueva, M. J. Rodriguez Alvarez. Apuntes de Matemática Discreta para la ingeniería Informática, SPUPV-2002.419
•Solomon Garfunkel. Las matemáticas en la vida cotidiana. Addison Wesley
•Sahni, S. Concepts in Discrete Mathematics. The Camelot Pub. Co.
•Hervas, A. y Nuño J.J. Apuntes de Lógica, SPUPV
•C. Jordan Lluch, J. R. Torregrosa. Introducción a la Teoría de Grafos y sus algoritmos. Reverte-SPUPV-96-865

•Johnsonbaug, Matemáticas Discretas, Pearson-Prentice Hall, 1997.
•García Merayo, F. Matemática Discreta, Thomson-Paraninfo, 2001
•Ferrando, J.C., Gregori V., Matemática Discreta, Reverté, Barcelona 1995.
•M. ANZOLA, J. CARUNCHO, Problemas de álgebra. Tomo 3: Espacios vectoriales, Deimos, 1981.
•J. De BURGOS, Curso de álgebra lineal y geometría, Alhambra. 1977.
•J. GARCÍA GARCÍA, M. LÓPEZ PELLICER, Algebra lineal y geometría, Marfil. 1977.
•A. HERVÁS, L. JÓDAR, H. WESTON, A. LAW, A. REZAZADEH, Computational Procedures for the Drazin, Moore-Penrose and Other Generalized Inverses, IMSL User Group North America 4th Annual Conference.
•T.W. HUNGERFORD, Algebra, Springer-Verlag, New York 1974.
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•S. LANG, Introducción al álgebra lineal, Addison Wesley Iberoamericana. 1990.
•G.Nakos y D. Joyner, Algebral lineal con aplicaciones, Thomson,1998.
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•G. STRANG, Algebra lineal y sus aplicaciones, Addison-Wesley Iberoamericana. 1986.

COMPUTER TECHNOLOGY

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Daniel Gil Tomas
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	5542 TCO
Course	1º B

Objectives

• To know the basics of semiconductor devices used in Computer Technology.
• Apply basic concepts about devices in the analysis of electrical circuits.
• Characterise and compare the main integrated digital circuit technologies.
• Learn, by means of simulation, the behaviour of some basic circuits.
• Set up simple electrical circuits.

Syllabus

Topic 1: Diodes
Topic 2: BJT Transistors
Topic 3: FET Transistors
Topic 4: Introduction to Logic Families. TTl Family.
Topic 5: CMOS Family

Practice

1. Constant linear circuits
2. Introduction to PSpice. Circuits with diodes.
3. Bipolar Transistor.
4. Mosfet Transistor.
5. Logical families (I)
6. Logical families (II)

Evaluation standards

• Test on the first part of the subject (Topics 1-3)
• Final exam in June and September

Bibliography

• Teoria:
• A.R. Hambley: “Electrónica” (2ª Ed.)” ,2001
• M.H. Rashid:“Circuitos microelectrónicos. Análisis y diseño”, 2002
• N. R. Malik: “Circuitos electrónicos: análisis, simulación y diseño”, 1996
• R. Boylestad: “Electronic devices and circuit theory”, 2002
• J.F. Wakerly:”Digital Design. Principles and Practices”. Prentice-Hall. 1999.
• Pablo Alcalde S. Miguel: “Principios fundamentales de la Electrónica” Paraninfo, 2002

• Problemes:
• G. Benet, J. V. Benlloch, V. Busquets, D. Gil, P. Pérez: “Ejercicios resueltos de Ampliación de Tecnología de Computadores”, S.P.U.P. de Valencia. 2002
• J.V. Benlloch, G. Benet, P. Gil: “Problemas resueltos de electrónica. S.P.U.P. de Valencia. 1988

NUMERIC COMPUTING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Víctor M. García Mollá
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	5543 CNU
Course	1º B

Objectives

• Produce methods to efficiently find approximate solutions to problems expressed mathematically.
• Introduce the student to the use of numerical packages on the market for solving problems expressed mathematically.

Syllabus

1. Introduction to Numeric Computing. Errors
2. Resolution of non-linear equations
3. Resolution of Linear Equation Systems
4. Interpolation, Derivation and Integration

Practice

• Weekly practical classes in the MATLAB environment, about the different points of the topic. Attendance is obligatory and several reports about the exercises completed are required.
• If a student is unable to attend the practical classes they will be required to sit a special exam “at the computer” on the same date as the normal exam.

Evaluation standards

• The theory and practical parts are evaluated separately, each worth 50% of the grade.
• The theory exam is evaluated as a written exam. The practical part is evaluated as a written exam (35% of the total grade) and by the reports completed during the course (15% of the total grade).
• It is possible to improve the grade by means of voluntary work, proposed by the tutors.

Bibliography

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•Burden, R.L.; Faires, J.D.:"Análisis Numérico" (2ª edición). Ed. Grupo Editorial Iberoamericana (1996).
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•Penny J., Lindfield G. "Numerical methods using Matlab" Ed. Ellis Horwood. (1995)

STATISTICS

Degree	Computer Science Degree
Department	DEIOAC
Lecturer in charge	Alcover Arandiga, Rosa María
Type	Core
Total credits	Total 12 = Theory 6 + Practice 6
Code	5822 EST
Course	2º A+B

Objectives

• To present Descriptive Statistics concepts, the basics of Probability Calculation, and develop at operation level the basics of ANOVA, DOE and Regression Models. Present the student with diverse practical applications for these techniques in the field of engineering using relevant statistics software. To encourage the habit of producing conclusions from the analysis of the information contained in the observed data or experimentally generated.

Syllabus

• In the proposed program a coherent balance between theory and practice is maintained. The theoretical aspects which are not strictly necessary to understand the statistics methodologies and techniques taught, are discarded. Instead, the core of the subject is reinforced, putting special emphasis on the study of methods and models of most interest for application in the field of engineering.

1. Introduction
2. Unidimensional Descriptive Statistics
3. Bidimensional Descriptive Statistics
4. Basic concepts of the calculation of probabilities
5. Distribution of probability
6. Normal Distribution
7. Sampling Distribution
8. Basic concepts of Statistical Inference
9. Inference for normal populations
10. Single Factor Analysis of Variance
11. General concepts of Experimental Design
12. 2k Designs
13. More than 2 level factor balanced Design
14. Factorial fractions. Orthogonal Arrays of Taguchi
15. Regression models
16. Introduction to Statistics Processes
17. Wait-Queue systems

Practice

Description of the type of practical work carried out:
• Attendance at practical classes is obligatory
• Every weekly theory session taught (three hours long) is associated with a practical session. In those themed units which, due to their contents, permit the didactic use of statistics software, the practical session will include the use of said software and will be carried out in the computer laboratory. In the rest of the units the practical sessions will consist of the solving of different problems and questions.
• In practical sessions students will work in groups of three people.
Organisation of practical sessions:

• Every week practical sessions will be carried out, following on from the themed unit covered in the theory sessions. Students will work in groups of three people, keeping the same groups throughout the course.
Evaluation of practical sessions:
• Each practical session ends with an evaluation exercise. The qualifications obtained in these evaluations make up the practical grade.
• The practical grade ranges between -1 (if none of the practical sessions have been attended) and +1 (those who have attended the practical sessions and have all the correct evaluations).
• The practical grade is made up of the average grade of the two partial exams or of the final exam (at least 4.5) constituting the qualification of the subject.

Evaluation standards

• The subject will be taught in the context of a PIE project, as a consequence, the practical work is of essential importance. Every week the practical session ends with an evaluation exercise carried out in teams, and whose result forms a part of the student's final qualification.
• The subject consists of two partial exams (February and June). The subject grade is calculated as the average of those two partial exams (grade of at least 4.5) plus the practical grade.
• Those students who suspend the first exam (or do not sit it) will be graded on the final exam in June. The practical grade will be calculated into this exam (at least 4.5). This will be the final subject grade.
• No grade from the partial exams will be carried over to the final exam in September. The September exam corresponds to the subject total.

Bibliography

BIBLIOGRAFÍA BÁSICA: TEORÍA Y PRÁCTICA

• Romero, R., Zúnica, L. Métodos Estadísticos en Ingeniería. SPUPV 2005-637.
Este texto ha sido preparado específicamente para impartir la asignatura, constituyendo la referencia básica para la misma, y siguiéndose estrictamente a lo largo del curso.

PROBLEMAS, TABLAS Y FORMULARIO

En Reprografía se dispone de:
1.- Colección de examenes de la asignatura (Anterior y nuevo Plan)resueltos.
2.- Colección de problemas propuestos.
3.- Formulario y Tablas de las Distribuciones.

BIBILIOGRAFÍA COMPLEMENTARIA: TEORÍA Y PRÁCTICA

• Box, Hunter, Hunter, Estadistica para investigadores. Ed. Reverte,1989
• Jain, R. The Art of Computer Systems Performance Analisys. John Wiley and Sons, 1991.
• Montgomery, D. Diseño y Analisis de Experimentos. Grupo Editorial Iberoamericana,1991.
• Peña, D. Estadística: modelos y métodos Vol. 1 y 2. Fundamentos. Alianza Universidad, 1986.
• Trivedi, K. S. Probability and Statistics with reliability, queuing and Computer Science applications. Prentice-Hall Internacional, 1982

DATA STRUCTURES AND ALGORITHMS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Salvador España Boquera
Type	Core
Total credits	Total 12 = Theory 6 + Practice 6
Code	5824 EDA
Course	2º A+B

Objectives

• Study the most significant data structures and the main algorithm strategies.

Syllabus

1. Introducction to C++
2. Set representation
3. Divide and Conquer.
4. Graph representation.
5. Greedy algorithms
6. Algorithms on graphs.
7. Backtracking.

Practice

Practice 1. Introduction to C++.
Practice 2. Hash tables
Practice 3. Heaps
Practice 4. Ordering algorithms
Practice 5. Mf-sets
Practice 6. Kruskal algorithm. Practice 5. Mf-sets
Practice 6. Kruskal algorithm.

Evaluation standards

• Personal evaluation of practical sessions with a result of PASS/FAIL
• Theory exams are carried out without notes. It is permitted to take an A4 manuscript for the student's own use (not photocopies) which is handed in together with the exam but not evaluated (this is to check that it is not a photocopy and is written by the student). This sheet can be recovered at the exam revision. In the final exams one sheet is permitted for each partial exam.
• In January an exam is set corresponding to the first trimester. In June both semesters are evaluated. In September only ONE test is set corresponding to both semesters.
• The final grade is the average of both semesters, as long as a PASS is obtained in the practical sessions and P2 and P2 are 4 or more. Any other case is a suspension. P1 and P2 denote the grade corresponding to the first and second semesters respectively, whether in one exam or separate ones.

Bibliography

• Computer algorithms - C++ (Horowitz, Ellis)
• Fundamentos de algoritmia (Brassard, Gilles)
• Introduction to algorithms- (Cormen, Thomas H.)

DATABASES

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Laura Mota Herranz
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	5858 BDA
Course	2º B

Objectives

• Study of the basic principles of database technology.
• Study of the relational data model.
• Use of relational database management systems

Syllabus

Topic 1. Introduction to databases.
Topic 2. The relational data model.
Topic 3. Database management systems.

Practice

• SQL language and use or relational system (Oracle)

Evaluation standards

• Final exam

Bibliography

• Celma,M..Casamayor, JC Mota, L Bases de datos relacionales Pearson. Prentice Hall. ISBN: 84-205-3850-7, 2003.
• Elmasri & Navhate Fundamentos de los sistemas de bases de datos. 3ª edición, Addison Wesley, 2000.
• Date, C.J Introducción a los sistemas de bases de datos, Vo.l I. (7ª edición). Prentice Hall, 2001.

PROGRAMMING METHODOLOGY AND TECHNOLOGY

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Antonio Molina Marco
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	5864 MTP
Course	2º B

Objectives

• Familiarise the student with Program Engineering, presenting the lifecycle of the development of classic software.
• In-depth study of Information Systems Structured Design using Dataflow Diagrams, Structure Diagrams, Data Dictionary, etc.
• Learn basic program test mechanisms.
• Develop an information system in all stages of the lifecycle, making use of CASE (Computer Aided Software Engineering) tools.

Syllabus

1. Introduction to Program Engineering.
2. Introduction to structured analysis.
3. Structured design graphic tools: Structure Diagram
4. Method for specifying modules.
5. Coupling.
6. Cohesion.
7. Strategies for deriving Structure Diagram.
8. Additional design guides.
9. Software testing techniques.

Practice

1. Introduction to the Visual C++ programming environment.
2. Introduction to CASE tool system architect.
3. Introduction to Structured Analysis and Design with System Architect.
4. Analysis and design of an information system with System Architect.
5. Implementation of an information system in C.
6. Testing software.

Evaluation standards

• The subject grade is calculated depending on the theory exam grade, practical laboratory work and voluntary work presented to the student.
• The final grade will be 70% of the theory grade +30% of the practical grade + the work grade.
• The theory exam includes theoretical problems and questions. To evaluate the practical sessions several tests will be carried out throughout the course.

Bibliography

BIBLIOGRAFÍA BÁSICA

• Metodología y Tecnología de la Programación. Molina A.; Letelier P.; Sánchez P.; Sánchez J.; SPUPV-97.498.
• Ejercicios Solucionados de Metodología y Tecnología de la Programación. Sánchez P.; Molina A.; Letelier P.; Sánchez J.; Vivancos E.; SPUPV 97.960.

• Boletín de ejercicios (web de la asignatura).
• El lenguaje de Programación C. Kernighan, B.; Ritchie, D.; Ed. Prentice Hall, 1991.

BIBLIOGRAFÍA COMPLEMENTARIA

• The Practical Guide to Structured Systems Design. Pages Jones, M. Ed. Prentice Hall, 1988.
• Ingeniería del Software: Un enfoque práctico. Pressman, R. Ed. McGraw Hill, 1997.
• Ingeniería del Software. Sommervill, I. Addisson Wesley, 2001.

OPERATING SYSTEMS I

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Gabriela Andreu García
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	5888 SO1
Course	2º A

Objectives

· Study the basic concepts, fundamental techniques, and organisation of Operating Systems (OS)
· Learn about the services provided by OS
· Acquire skills in the handling of an OS

Syllabus

· Introduction
· Process management
· Memory management
· E/S management
· File Systems

Practice

· Practice 1: Command Interpreter (1 session)
· Practice 2: Development of a specific case (2 sessions)
· Practice 3: Memory Management (2 sessions)
· Practice 4: The MINIX file system (1 session)

Evaluation standards

· Course evaluation via a single written exam.
· Includes questions related to theory and practical work

Bibliography

• Libro base:
- A. Silberschatz, P.B. Galvin. "Operating systems concepts". Addison Wesley, 5a edicion 1998 (en castellano edición 1999)

• Libros de Unix, C
- B.W. Kernighan, R. Pike. "El entorno de programación Unix". Prentice Hall 1987 (castellano)
- Phil Cornes. "Linux A..Z". Prentice-Hall 97

THEORY OF AUTOMATONS AND FORMAL LANGUAGES

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Pedro García
Type	Core
Total credits	Total 9 = Theory 4 + Practice 5
Code	5895 TAL
Course	3º A+B

Objectives

• Demonstrate the basic concepts surrounding formal language, finite automaton and grammar theory. In-depth study of regular language types. Show different finite automaton models as well as their equivalents. Show regular expressions as a description method for regular languages. Show the basic concepts surrounding context-free language types. Present the Turing machine calculation model and study its relation to recursive and recursively innumerable language types. Present the basic concepts of Complexity Theory as well as recursive and indecidibility functions.

Syllabus

Topic 1. General knowledge about languages and grammars.
Topic 2. Finite automatons.
Topic 3. Nerode Theorum. Automaton minimisation.
Topic 4. Regular expressions.
Topic 5. Regular language properties.
Topic 6. Context-free grammars. Simplification and normalisation.
Topic 7. Properties of context-free languages.
Topic 8. The Turing machine.
Topic 9. Recursive functions.
Topic 10. Introduction to complexity theory.

Practice

Practice 1: Introduction to Mathematics. Implementation of formal languages.
Practice 2: Implementation of finite automatons.
Practice 3. Equivalences among deterministic and non-deterministic finite automatons.

Evaluation standards

• There will be a written exam for the subject (theory and practical) which will be graded out of 10.
• The exam will consist of 5 theory question points and 5 problem points, (theory problems as well as Mathematical problems).
• The algorithms studied in the laboratory sessions form a part of the syllabus of the subject.
• Students are permitted to come to the exam with all the written material related to the subject considered necessary. Consulting the aforementioned material during the exam is permitted.

Bibliography

• Introducción a la teoría de autómatas, lenguajes y computación. John Hopcroft, Jeffrey D. Ullman, Rajeev Motwani. Addison Wesley, 2002
• Introduction to automata theory, languages and computation. John Hopcroft, Rajeev Motwani, Jeffrey D. Ullman. Addison Wesley, 2001
• Problem solving in automata, languages and complexity. Ding-Zhu Du, Ker-I Ko. John Wiley and Sons. 2001

• Languages and machines : An introduction to the theory of computer science. Thomas A. Sudkamp. Addison-Wesley, 1997
• Apuntes sobre la teoría de autómatas y lenguajes formales. Pedro García, Tomás Pérez, José Ruiz, Encarna Segarra, José Sempere, Manuel Vázquez de Parga. Universidad Politécnica de Valencia (Libro Apunte Ref. 846), 1996
• Apunts sobre la teoria d´autómats i llenguatges formals. Pedro García, Tomás Pérez, José Ruiz, Encarna Segarra, José Sempere, Manuel Vázquez de Parga. Universidad Politécnica de Valencia (Renaixença i futur), 1998
• Lenguajes, gramáticas y autómatas : un enfoque práctico. Pedro Isasi, Daniel Borrajo, Paloma Martínez. Addison Wesley Iberoamericana España, 1997
• Teoría de autómatas y lenguajes formales. Dean Kelley. Prentice-Hall, 1995
• Automata and computability. Dexter Kozen. Springer, 1997

ARCHITECTURE AND COMPUTER ENGINEERING

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Pedro López Rodríguez
Type	Core
Total credits	Total 9 = Theory 6 + Practice 3
Code	5900 AIC
Course	4º A+B

Objectives

• Define the concept of architecture. Distinguish the parameters which influence architecture features. List the fundamental aspects of a set of computer instructions.
• Recall segmentation techniques and their application to arithmetic units and the instruction unit of a computer. Distinguish problems stemming from segmenting an instruction unit. Know and understand the techniques applied to solve these problems.
• Apply segmentation techniques to a computer instruction unit with multi-cycle operations. Differentiate static management techniques vs. instruction dynamics. Know and understand dynamic instruction management techniques. Know and understand the concept of superscalar processors.
• Know and understand techniques used to design high-performance memory subsystems.
• Distinguish the types of computer oriented towards vector processing. Know and understand segmented vector computers.
• Differentiate shared-memory multiprocessors and Multicomputers. Identify the aspects which have the most influence over the features and performance of shared-memory multiprocessors and Multicomputers.

Syllabus

UT 1. Definition of architecture.
T 1. Concept of architecture.
T 2. Analysis of architecture features.
T 3. Design of instruction sets.
UT 2. Segmented Computers
T 4. Segmented Instruction Unit.
T 5. Multi-cycle operations.
T 6. Static Management of Instructions
T 7. Dynamic Management of Instructions
T 8. Speculation techniques.
T 9. Multiple launch of instructions.
UT 3. Memory access acceleration.
T 10. Evaluation of memory subsystem features.
T 11. Improve cache memory peformance.
T 12. Improve main memory performance.
UT 4. Vector computers.
T 13. Segmented vector computers.
T 14. SIMD computers
UT 5. Multiprocessor computers.
T 15. Multiprocessor architecture.
T 16. Shared-memory multiprocessors.
T 17. Multicomputers.

Practice

P1. Hardware description language.
P2. Architecture analysis.
P3. Segmented units.
P4. Program development in segmented computers.
P5. Segmented instruction unit.
P6. Static management of instructions.
P7. Dynamic management of instructions.
P8. Instruction speculation hardware
P9. Vector computer programming.
P10. Programming with the message-passing model.

Evaluation standards

• Exams:
- Partial exams. January and June 2006. They will be eliminatory (material passed in the partial exam will not need to be covered in the final exam). Exams passed in this subject on previous courses are not valid.
- Final exam. June 2006. The student is examined on material which wasn't passed in the partial exams.
- Final exam. September 2006. The student is examined on all of the material.
- Via the evaluation of the exams, the theory grade (T) is obtained.
• Practical work
- In each practical session the work carried out by the student will be evaluated. The practical grade (P) will be obtained taking into account the average grade of the practical sessions. In cases where the student doesn't attend a practical session, the grade for that session will be 0 points.
- Practical sessions completed on previous courses may be valid, which would mean five points on the practical grade (P=5).
• The final grade of the student will be obtained applying the formula 0.9*T+0.1*P.

Bibliography

• J.L. Hennessy, D.A. Patterson, Computer Architecture: A Quantitative Approach, 3ª edición, Morgan Kaufmann Publishers, 2002.
• J.L. Hennessy, D.A. Patterson, Computer Architecture: A Quantitative Approach, 2ª edición, Morgan Kaufmann Publishers, 1996.
• D. Sima, T. Fountain, P. Kacsuk, Advanced Computer Architectures, Addison-Wesley, 1997.
• J.P. Shen, M. Lipasti, Modern Processor Design: Fundamentals of Superscalar Processors, McGraw-Hill, 2003
• D.A. Patterson, J.L. Hennessy, Computer Organization & Design: The Hardware/Software Interface, 3ª edición, Morgan Kaufmann Publishers, 2005.
• H. G. Cragon, Memory Systems and Pipelined Processors, Jones and Bartlett Publishers, 1996.
• B. Wilkinson, Computer Architecture: Design and Performance, Prentice Hall, 1996.
• M. R. Zargham, Computer Architecture: Single and Parallel Systems, Prentice-Hall International, 1996.

REQUIREMENTS ENGINEERING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	[no hay información relativa a este campo]
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	5901 IDR
Course	4º A

Objectives

• The objective of the subject is to inform the student of:
- the importance of suitable requirements specification in software quality.
- conceptual framework of requirements engineering (according to IFIP FRISCO)
- the use of requirement specification languages which permit its validation:

• First Order Logic which makes Conceptual Logic Modelling
and its validation via automatic Prototype in the framework of the ISO 82 model possible.
• Dynamic logic which supports Object-Oriented Conceptual Modelling and its validation for automatic Prototyping in the framework of OASIS

Syllabus

1. Introduction and motivation of Requirements Engineering.
2. Conceptual framework of Requirements Engineering: FRISCO-IFIP
3. Conceptual Logic Modelling
4. Object-Oriented Conceptual Modelling

Practice

1. Requirements specification SW IEEE-830
2. Prolog Seminar and Presentation of Visual Prolog (I)
3. Prolog Seminar and Presentation of Visual Prolog (II)
4. Prolog Seminar and Presentation of Visual Prolog (III)
5. Conceptual Logic Modelling (approx. operational and deductive). Stated upon realisation.

Evaluation standards

• The evaluation grade consists of two parts:
Theory grade: 60%
Practical grade: 40%
• The theory grade is obtained via:
1. Multiple-choice test: each incorrect answer subtracts 0.3 points and each correct answer adds 1 point. The final is normalised at 10.
2. Points obtained for answers to questions formulated in class. The value of the point depends on the difficulty of the question: 0.1,..0.5,…1,…
3. Class presentations by students on related topics: up to 2 points

• The practical grade assumes the submission and evaluation of work proposed by the lecturer.
• NOTE: it is necessary to obtain at least a 4 to be able to compensate a Theory or Practical grade.

Bibliography

a.1) Basica
• "Fundamentals of Algebraic Specification" vol. 1 H. Ehrig; B. Mahr.

• EATCS Monographs on Theoretical Computer Science. Springer-Verlag 1985, 1990
• Apuntes del seminario "Programación Lógica y lógica ecuacional", del prof. J. Meseguer (utilizados con autorización del prof. Meseguer), del SRI Computing Lab (Stanford), impartido en la FIM en Enero-Febrero de 1995.
• Apuntes de la asignatura Ingeniería del Software II, Facultad de Informática de Valencia, 1995
• "Software Engineering: A Practitioner's Approach" R.S. Pressman. McGraw Hill (1992)
• Introducing OBJ3", Goguen et al., Tech. Report SRI Computing Lab, Stanford, California, Draft of Jan. 1992 (se usará como manual de OBJ3, en prácticas)
• OASIS v. 2.1.1: A Class-Definition Language to model Information Systems using an Object-Oriented Approach", Oscar Pastor e Isidro Ramos. Servicio de Publicaciones de la Universidad Politécnica de Valencia. Ref. UPV-788

a.2) Complementaria

• "Formal Methods can Deliver Provable Software", Nina Hall. Scientific Computing World. March 1995.
• Requirements Engineering: A Framework for understanding", R.J. Wieringa, John Wiley&Sons LTD., 1996
• Software Requirements", A. Davis, Prentice Hall
• "Algebraic Specifications in Software Engineering" Ivo Van Horebeek; Johan Lewi. Springer-Verlag 1989
• "Diseño de programas: formalismo y abstracción", Ricardo Peña. Prentice Hall, 1993
• "OASIS: An Object-Oriented Specification Language" O. Pastor; Hayes, F.; S. Bear. in Proceedings of the CAISE-92 Conference, Springer-Verlag (1992)

PROGRAM ENGINEERING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Juan Sanchez
Type	Core
Total credits	Total 12 = Theory 6 + Practice 6
Code	5902 IDP
Course	4º A+B

Objectives

• Present software development methods based on the object-oriented paradigm:
- Object Modelling Technique (OMT)
- Unified Modelling Language (UML)
- Present object orientation from the point of view of programming languages (Java)

Syllabus

• Theory contents:
Chapter 1. Introduction to programming languages OO.
Chapter 2. Software Engineering.
Chapter 3. Use case model.
Chapter 4. Description of the static construction of the system.
Chapter 5. Behaviour models.
Chapter 6. Functional model.

Practice

• Practical contents:
Part 1. Programming Languages OO: Java.
Part 2. CASE Tools: Rational Rose.
Part 3. Development case research.

Evaluation standards

Bibliography

• Básica:

• T. Budd. “Introducción a la programación orientada a objetos”. Addison Wesley. (Cap 1)
• J. Rumbaugh Modelado y Diseño Orientado a Objetos. Prentice Hall 1996. (Cap. 2,3,4,5)
• I. Jacobson. Object Oriented Software Engineering: A Use Case Driven Approach. Addison Wesley, 1995. (Cap. 2,3)
• G. Booch. El lenguaje unificado de modelado. Addison Wesley 1999. (visión de la notación)
• M. Fowler. UML gota a gota. Addison Wesley 1999

• Complementaria (casos de uso, cap 3):

• G. Schneider “Applying use cases : a practical guide”. Addison Wesley
• D. Kulak “Use cases : requirements in context”. Addison Wesley.
• P. Putnam “Use cases combined with BOOCH/OMT/UML :process and products”. Prentice Hall
• A. Cockburn “Writing effective use cases”. Addison Wesley.

• Bibliografía con caso de estudio:

• C. Larman. “UML y patrones” Pearson Education, Prentice-Hall, 1999.

ARTIFICAL INTELLIGENCE

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Vicente J. Botti (vbotti@dsic.upv.es)
Type	Core
Total credits	Total 4,5 = Theory 3 + Practice 1,5
Code	5903 IA
Course	4º A

Objectives

This course Offers an introduction to basic artificial intelligence (AI) techniques, under a practical
orientation, oriented to solving problems in this area. The course covers topics such as search in a solution space, heuristic search and knowledge representation methods. Special emphasis is given to knowledge-based systems. The practical exercises focus on the application of AI techniques to problem solving.

Syllabus

1.- Introduction.
2.- Problem-solving in AI.
3.- Knowledge Representation (KR) in AI.
4.- Adversarial search (game playing).

Practice

P1: Evaluation of several search methods on a particular AI problem.
P2: Seminar on CLIPS, an environment for developing productions systems
Development of a production system (rule-based system using patterns) to solve an AI problem

Evaluation standards

• The subject grade will be determined by:
- 70% Examination
- 30% Laboratory Practice

Bibliography

N.J. Nilsson. “Artificial Intelligence: a new synthesis”. Ed. Morgan Kaufmann (1998)
• P.Lucas, L. Van Der Gaag. Principles of Expert Systems. Addison Wesley 1991
• E. Rich, K. Knight. "Inteligencia Artificial 2 Ed." Mc Graw Hill (1994)
• Stuart J Russell and Peter Norvig. "Artificial Intelligence A Modern Approach." Prentice-Hall Series in Artificial Intelligence (1995)
• P.H. Winston, ´Inteligencia Artificial´, Addison-Wesley Iberoamericana (1994)

LEARNING AND PERCEPTION

Degree	Computer Science Degree		
Department	DSIC		
Lecturer in charge	Alfons Juan		
Type	Core		
Total credits	Total 4,5 = Theory 2,5 + Practice 2		
Code	5919	APP	
Course	4º	B	

Objectives

• Show concepts, methods and applications of Shape Recognition.

Syllabus

1. Introduction
2. Preprocessing and feature extraction: images
3. Distance-based classification
4. Statistical decision theory
5. Unsupervised learning or clustering
6. Preprocessing and feature extraction: speech
7. Hidden Markov models

Practice

0. The working environment
1. The learning and perception oracle
2. Face recognition
3. Speech recognition

Evaluation standards

A written exam (70% of the global mark) and the results obtained
in lab exercises (30% of the global mark).

Bibliography

• R.O. Duda, P.E. Hart. Pattern Classification and Scene Analysis. Wiley, 1973.
• R.O. Duda, D.G. Stork, P.E. Hart. Pattern Classification. Wiley, 2001.

LANGUAGE PROCESSORS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	José Miguel Benedí Ruiz
Type	Core
Total credits	Total 9 = Theory 6 + Practice 3
Code	5988 PDL
Course	4º A+B

Objectives

• To learn the internal functions of compilers and interpreters.
• To learn the fundamental aspects of the translation process.
• Learn how to apply acquired knowledge about formal grammars and automatons to the design process of languages and their translation.
• Learn the basic techniques employed during the analysis and code generation process.
• Learn to construct compilers for simple, but not trivial, languages.

Syllabus

1. Introduction to complication process.
2. Lexical analysis.
3. Syntactic analysis:
- Introduction.
- Descendant syntactic analysis
- Ascendant syntactic analysis
4. Semantic analysis
- Attribute grammars
- Type checking
5. Memory Information Representation
6. Intermediate Code Generation
7. Code optimisation
8. Code generation

Practice

• The project consists of the development of a compiler for a simple programming language, making use of FLEX/BISON and carried out in small groups (maximum 4 people).
• Laboratory classes will consist of solving problems specific to the implementation of a compiler for a simple programming language. The following seminars will also be held during the course:
Seminar 1: Project Presentation
Seminar 2: Introduction to Flex
Seminar 3: Introduction to Bison
Seminar 4: Bison extension
Seminar 5: Attribute Grammars and TDS functions
Seminar 6: Intermediate Code Generation

Evaluation standards

• The evaluation of the subject takes two aspects into consideration:
• A first aspect is referred to as THEORY CONTENTS which are evaluated in the following way:
- First partial exam: test on theory and practical knowledge acquired in the first four-month-term of the course. The student who attains a grade ≥ 5 in this test and has attained a PASS in the first practice review, can sit the second partial exam in June. Otherwise the student

should sit the final exam in June and/or September.
- Second partial exam: test on theory and practical knowledge acquired in the second four-month-term of the course. The final theory grade will correspond to the second partial exam grade + the first partial exam grade / 2, as long as the conditions regarding the eliminatory character of the first partial exam indicated in the previous paragraph are met. It is carried out on the same day and at the same time as the final exam of the course. Sitting this exam excludes the possibility of sitting the final exam.
- Final exam: test on theory and practical knowledge acquired throughout the whole course. The grade attained in this exam will be the final theory grade. In the September re-sit exam there is only one final exam (grades from partial exams are not carried over).
• The second aspect to be evaluated is the PRACTICAL EXPERIENCE acquired via the development of a project carried out in small groups (maximum 4 people). This practical experience is graded by means of an individual test, as long as the student has previously attained a PASS grade in the development project.
• During the course there will be two project revisions. The approximate dates to hand in these revisions are: January and June.
• Furthermore, there will be a re-sit exam for the exam in September.
• The subject FINAL GRADE will be determined by:
- If the student attains a Pass in the project, then the final grade will be the following:
final grade = (0.7 theory grade) + (0.3 x individual test grade)
- If the student attains a Fail in the project, then the final grade will be the following:
final grade = min (0.7 x theory grade, 4)

Bibliography

• Básica:

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• Consulta:

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• C.N. Ficher, R.J. LeBlanc.Crafting a Compiler with C. Benjamin Cummings, 1991
• J.P. Tremblay, P.G. Sorenson. The Theory and Practice of Compiler Writing. McGraw-Hill, 1985.
• A. Aho, J.D. Ullman. The Theory of Parsing, Translation and Compiling. Vol 1 y 2. Prentice Hall 1972

COMPUTER NETWORKS

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Carlos Tavares Calafate
Type	Core
Total credits	Total 9 = Theory 6 + Practice 3
Code	6016 RDS
Course	4º A+B

Objectives

• The purpose of the course is to enable the student to understand the problems associated with the transport of information and the solutions to the underlying problems.
• Upon completion of the course, we will understand WHAT LIES BENEATH the SOCKETS interface, linking
this course with other course - Fundamentals of Networks – that students are expected to take prior to
Computer Networks.
• Using the ISO/OSI architecture as a reference, we study the main issues, problems and solutions related to the physical, link, network and transport layers.

Syllabus

1. Introduction
2. Signal theory
3. Physical level
4. Synchronous / asynchronous Transmission
5. Local Area Networks
6. Link level
7. Link-level protocols
8. Internetworking
9. Internet addressing. ARP protocol.
10. Internet Protocol (IP)
11. Internet Control Message Protocol (ICMP)
12. IP routing: upgrading routers
13. Multi-destination IP routing
14. User Datagram Protocol (UDP)
15. Transmission Control Protocol (TCP)

Practice

• In the practical sessions different scenarios related to computer networks are set up and simulated using the OPNET IT Guru program. This and other network simulators allow the Systems Engineer to create real case scenarios and study the best solution before carrying out expensive implementations, thus helping the students in their future professional lives. Different practical sessions will also be carried out with protocol analysers, with which the actual traffic of a network will be monitored. The basic operating systems' instructions related to networks will also be studied.

Evaluation standards

• A partial exam in February. Initial course units will be removed from June's exam if a grade of 5 or higher is
attained.
• Exam in June (in this partial exam, contrarily to the exam in February, an average grade from

both is
obtained if the June's grade is equal to or greater than 4).
• The practical sessions will be evaluated in the exam as questions and/or problems, which represent one third of the exam maximum.
• The grade is not added up to other exams: for September's exam only one exam is taken for the all the subjects in the course, including practical sessions.

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• Internetworking with TCP/IP, vol I. D.E. Comer, 4ª ed., Prentice Hall, 2000.

• Bibliografía extendida:

• Computer Networks: a systems approach, L. Peterson and B. Davie, 3rd ed., Morgan Kauffman, 2003
• Redes de Computadores, A.S. Tanennaum, 4ª ed., Prentice Hall, 2003.
• Data Communications, Computer Networks and Open Systems, F. Halsall, 4ª ed., Addison-Wesley, 1996.
• TCP/IP protocolos y servicios: Referencia técnica. T. Lee y J. Davies (Microsoft). Mc Graw Hill, 2000
• RFCs, Internet Request For Comments (rfcs).

ORGANISATIONAL AND INFORMATION SYSTEMS ADMINISTRATION

Degree	Computer Science Degree
Department	DOEEFC
Lecturer in charge	Leonor Ruiz Font
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	6018 ADO
Course	2º A

Objectives

• Basic knowledge of organisation behaviour and the main functions of Management.
• Knowledge of functional areas and the management processes most susceptible to computer support.
• Establish the relation and integration of information systems to the rest of the organisation.

Syllabus

I. Introduction to Organisation Management
I.1 Planning and control.
I.2 The function of the organisation.
I.3 Management.
I.4 Communication Management.

II. Functional Areas.
II.1. The financial subsystem
II.2. The production subsystem
II.3. The commercial subsystem

III: Information Systems for Management
III.1. Information in organisations: Critical strategic resource
III.2. Information systems in the company:
III.2.1. Introduction to Help Systems in decision making
III.2.2. Introduction to Information Systems for executives
III.2.3. Introduction to Inter-company Systems
III.3. Information-Collaboration Services:
III.3.1. Information Systems Auditing
III.3.2. Introduction to IS Consulting

Practice

The contents of the 6 practical sessions, all 2 hours in duration, is ordered chronologically below.
Practice 0: Theoretical introduction to “Case Method”, with the creation of groups and revision of rules for the development of the practical sessions.
Carrying out an exercise to check in situ, with first-hand experience, some of the advantages and inconveniences of working in a team.
Practice 1: Banco del Duero Case. This case analyses the changes produced in a medium-sized company and its alignment to the strategic necessities of the Organisation. Also, the necessity of the organisation chart to take into account DSI in the correct position so that it adequately supports the necessities of the company, is reviewed.
Practice 2: Case: José Olmeda. Teamwork management and analysis of the leadership of a large computer project developed by a company.
Practice 3: Film: In Search of Excellence (extract) by Peter and Waterman. Through the film, in

which some aspects of companies such as Disney, 3M, Apple, IBM and McDonalds are highlighted, they identify different Management concepts in the first part of the programme.
Practice 4: Financial Management. Amortisation of loans.
Making use of the financial functions of the Excel spreadsheet, preparing the boxes for a financial amortisation of a loan according to American, constant Amortisations and French methods.
Likewise, prepare the mortgage loan amortisation box, presenting corresponding fees for different amortisation periods and types of interest.
Practice 5: Commercial Management. Handling of a standard package.
The following objectives are set out:
• Familiarise yourself with a Commercial Management package
• Simulate the reality of a typical user, taking on products, clients, suppliers, order management, invoices and charges or payments, as required.
• Make a review, as a computer expert, of the advantages and failings of the Commercial Management package used.

Evaluation standards

• The classroom theory and practical sessions make up 80% of the final grade of the subject, and are evaluated via an exam consisting of two parts: one which is like a test that covers the contents of the theory syllabus, and another part which consists of numerical problems or exercises. This exam must be passed to be able to calculate the average of the practical work.
• The laboratory practical sessions make up 20% of the final subject grade. Attendance, the handing in of reports when studying cases and participation in the discussion of the same, and the handing in of reports when the practical session is based on computer application, are considered.

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CORNELLA, A. (1994) Los recursos de información. Ventaja competitiva de las empresas. McGraw-Hill.

CUERVO, A. et al. (1996) Introducción a la Administración de Empresas. Cívitas.

DONNELLY, J.H., GIBSON, J.L. y IVANCEVICH, J.M. (1997) Fundamentos de Dirección y Administración de Empresas. Irwin. 8ª edición.

GIL, I. (1997) Sistemas y Tecnologias de la Información para la Gestión. McGraw-Hill.

GIL, I., RUIZ, L. y RUIZ, J. (1997) La nueva Dirección de Personas en la empresa. McGraw-Hill.

MONFORTE, M. (1995) Sistemas de Información para la Dirección. Pirámide.

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COMPUTER STRUCTURES

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	José Flich Cardo
Type	Core
Total credits	Total 12 = Theory 6 + Practice 6
Code	6019 EC
Course	2º A+B

Objectives

• Acquire a complete view of the function of all the working parts of a computer, completing the training in computer structures acquired upon the completion of the Basics of Computers course, centred around the study of the processor.
• In-depth study of teh Aritmetic-Logic unit, Memory Unit and Input/Output Unit.
• In-depth study of advanced design aspects of processors such as segmentation

Syllabus

1. Memory Unit
2. Memory Hierarchy
3. Input and Output Unit
4. Computer Buses and Peripherals
5. Advanced design of the Arithmetic Logic Unit
6. Circuit segmentation fundamentals
7. Processor segmentation

Practice

P1: Memory chips
P2: Memory modules and maps
P3: Cache memories (I)
P4: Cache memories (II)
P5: I/O synchronization mechanisms
P6: Integer Arithmetic on MIPS
P7: Adder circuit
P8: Multiplier circuits
P9: Basic pipelining
P10: Processor segmentation on MIPS
P11: Segmented processor II

Evaluation standards

• Theory evaluation standard:
- First partial exam in January + final exam (or second partial) en June
- Special exam (or first partial or second partial or final) in September
• Practical evaluation standard:
- 20% final grade and evaluated (individually) in the laboratory
• Work evaluation standard:
• Optional and add a maximum of 1 point (if the subject is passed)

Bibliography

• Hamacher V.C., Organización de computadores, 5a edición, McGraw Hill 2002
• Patterson, D.A., Hennessy, J.L, Organización de computadores, interficie circuiteria/programación, Reverté 2002

• Stallings, W., Organización y Arquitectura de Computadores, 5a edición, Hall, 2000

LOGIC DESIGN

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	[no hay información relativa a este campo]
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	6020 DLO
Course	2º A

Objectives

• In-depth study of acquired knowledge relating to combinational circuits
• Hardware Description Language (VHDL)
• Synthesis methods of sequential systems based on finite state automatons
• To learn the design of digital circuits based on high-scale integration functional blocks (memory, PLD)
• Computer-aided digital design
• Practical training

Syllabus

1. Introduction. Combinational and flip-flop systems.
2. Hardware Description Language (VHDL)
3. Synchronised sequential systems
4. Sequential functional blocks: counters and registers
5. Semiconductor memory
6. Programmable logic circuits

Practice

1. Combinational circuit design with decoders and multiplexors.
2. Detection and elimination of aleatoric phenomena in combinational circuits
3. Implementation of combinational circuits in VHDL
4. Design and simulation of synchronised sequential systems via VHDL (2 sessions)
5. Design and implementation of counters
6. Design of counters by means of VHDL and implementation in FPGA (OPTIONAL, if the academic calendar permits)

Evaluation standards

• Previous courses are not considered
• Completion obligatory
• Practical sessions:
- Each session is evaluated (0 – 10)
- Grade (pract) = (Grade(P1) + … + Grade(Pn)) / n
(n = real number of practical sessions completed)
- They make up 20% of the subject final grade
Grade = Grade(theory) * 0.8 + Grade (pract) + 0.2
- Non-participation in ALL of the practical sessions results in a fail
 Practical exam
• Minimum theory and practical grades to calculate the average: 5

Bibliography

• P. Gil, J. Albaladejo. Diseño lógico. SPUPV-95.828. 1995.
• M.E. Gómez, J.C. Campelo, J. Albaladejo, J.C. Baraza, P. Gil. Problemas resueltos de diseño

lógico. SPUPV-2000.4009. 2000.
• J. Wakerly. Digital principles and practices. Ed Prentice Hall.
• R. Katz. Contemporary Logic Design. Ed. Benjamin-Cummings.
• E. Muñoz Merino. Circuitos Electrónicos Digitales. Vol. 4. ETSI de Telecom. (Madrid).
• F. Pardo, J.A. Boluda. VHDL, lenguaje para síntesis y modelado de circuitos, 1999. Ed. Ra-ma

OPERATING SYSTEMS II

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	[no hay información relativa a este campo]
Type	Core
Total credits	Total 6 = Theory 3 + Practice 3
Code	6021 SO2
Course	2º B

Objectives

• Show an example of system call interface, so that the student can learn about the combined services offered by the operating system.
• Provide the knowledge necessary to implement multithread programs, acquiring skills in the use of synchronization threads and tools which must be employed to adequately protect and direct the execution of resulting programs.
• Show the problem of interblocking and study the main solutions.

Syllabus

Topic block 1: System calls POSIX
U.T.1: Process management
U.T.2: Files and pipes
U.T.3: Signals
U.T.4: Directories and protection
U.T.5: Other calls
Topic block 2: Concurrence
U.T.6: Execution threads
U.T.7: Synchronisation. Problems. Basic solutions.
U.T.8: Traffic lights. Concept and POSIX calls
U.T.9: Monitor Concept. Implementation in POSIX
U.T.10: Interblocks

Practice

Block 1: Microshell: 6 sessions
Pr.1 Introduction to practical sessions
Pr.2 Making of the main loop
Pr.3 Implementation of the redirection of pipes
Pr.4 Command execution module
Pr.5 Complete signal execution and treatment module
Pr.6 Extensions
Pr.7 Work revision
Block 2: Concurrence: 6 sessions
Pr.8 Creation of POSIX threads
Pr.9 Running conditions
Pr.10 Problem of the 5 philosophers. Mutual exclusion.
Pr.11 Problem of the 5 philosophers. Simple solutions.
Pr.12 Problem of the 5 philosophers. Dining room.

Evaluation standards

• At the end of the four-month period an exam on the subject's theory and practical contents is sat.
• Practical grade (A=10, B=7.5, C=5, D=3, E=0)

• Attendance and progress register.
• Final works.
• The final grade is obtained by calculating the average of the exam of 70% against 30% of the practical sessions. This average is only calculated if the exam grade is higher than 4.
• In the September exam EVERYTHING will be calculated via the exam.

Bibliography

• UNIX Programación Práctica. Kay A. Robbins, Steven Robbins., Prentice Hall. ISBN 968-880-959-4
• Lenguaje de Programacion C, Brian W. Kernighan, Dennis M., Ritchie. ISBN: 9688802050
• Linux A-Z, Philip Cornes. Prentice Hall.
• Sistemas Operativos, 5ªEd. A. Silberschatz. ISBN: 9684443102

• Contenidos en la web:
- Página de SO1 en la web de la universidad:
1) Ir a http://www.upv.es/indexc.html
2) Seleccionar Estudios // Est. de primer y segundo ciclo // Búsqueda de asignaturas por nombre o código.
3) Dar (5850 ó 6021) como código de asignatura.
- Tambien... http://sop.upv.es/so2

ALGORITHMS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	María José Castro Bleda
Type	Mandatory
Total credits	Total 4,5 = Theory 3 + Practice 1,5
Code	6022 ALG
Course	3º B

Objectives

- Study the strategies of Dynamic Programming and Branch and Bound.
- Learn the formalism for the classification of decidable problems.

Syllabus

1. Introduction
2. Dynamic Programming
3. Branch and Bound
4. Problem complexity

Practice

Development of a project with report and public presentation.

Evaluation standards

• The subject final grade will be reached via a written exam and the completed project (a minimum grade of 5 in each part is required to calculate the average and to pass the subject):
- Exam: 80% of the grade
- Project: 20% of the grade

• Bringing any type of documentation to the exam is prohibited.

Bibliography

• Fundamentos de algoritmia- (Brassard, Gilles)
• Introduction to algorithms (Cormen, Thomas H.)
• Computers and intractability : A guide to the theory of NP-completeness (Garey, Michael R.)
• Computer algorithms (Horowitz, Ellis)
• Problems on algorithms (Parberry, Ian)

DATABASE DESIGN

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Ferran Pla
Type	Mandatory
Total credits	Total 6 = Theory 3 + Practice 3
Code	6023 DBD
Course	3º A

Objectives

• Objectives: Demonstrate a relational database design methodology based on the Entity-Relationship model.

Syllabus

1. Introduction to database design
2. Conceptual Design of Information systems with the Entity-Relationship model
3. Logical Design
4. Physical Design

Practice

1. Presentation of data model concepts by means of a simple example
2. Presentation of conceptual design methodology
3. Conceptual design exercises
4. Case study: conceptual, logical and physical design

Evaluation standards

• Written exam combined with the theory and practical part.

Bibliography

• Elmasri, R.; Navathe, S., Fundamentos de sistemas de bases de datos. Addison Wesley. 3ª edición. 2002

GRAPHS AND COMBINATORICS

Degree	Computer Science Degree				
Department	DMA				
Lecturer in charge	Cristina Jordán				
Type	Mandatory				
Total credits	Total 4,5	= Theory	3	+ Practice	1,5
Code	6024			EMI2	
Course	3º			A	

Objectives

• Familiarise the student with the contents of Graph Theory, its handling and multiple applications. Solve this subject matter's typical problems, related to or useful to Information Systems from the algorithmic point of view.
• Initiate the student into basic recount techniques which make it possible to establish the number of elements in a given set, without counting them. Combined techniques are very important in Computing given the frequency with which combinatorial problems appear, in relation to the complexity of algorithms, when it comes to determining discrete probabilities, etc.

Syllabus

Theory Programme
1.- GRAPHS
1.1- Basic concepts
1.2- Matching
1.3- Eulerian graphs
1.4- Hamiltonian graphs
1.5- Networks flows
1.6- Coloring graphs. Planar graphs
2.- COMBINATORIAL ANALYSIS
2.1- Basic principals of enumeration: Cardinal numbers. Functions
2.2- Variations, permutations and combinations

Practice

• Two consecutive hours of practical sessions will be completed.
• The first part of each practical session will be dedicated to solving with Mathematica a collection of questions and problems which will have been made available to the student to review
at home in advance.
• Towards the middle of the session some questionnaires related to the previously studied topic will be handed out and then completed and handed in to the lecturer, in the same practical session.
• The grade from these exercises will influence, as described in "evaluation standard", the evaluation process and the final grade.

Evaluation standards

• The evaluation of the subject will be done via an exam, taking into account the grade attained in the questionnaires completed in the laboratory and the voluntary problems handed in.
• The exam will consist of two parts:
1) The first, theory, will be done in the lecture room and the maximum grade will be 8. To enable to be added to the practical part, the grade should be higher or equal to 3.2 out of 8.
2) The second part will be done in the laboratory. After evaluating it, if the average of the exercises presented in the practical sessions, considering the maximum possible from the

questionnaires handed in, is:
-Greater or equal to 4 out of 10, so that the practical exam grade can be added to the theory, it should be greater than or equal to 0.5 out of 2
-Less than 4 out of 10, so that the practical exam grade can be added to the theory, it should be greater than or equal to 0.8 out of 2

In the laboratory exam students are permitted to consult all of the material related to the subject considered necessary.
In cases where the grade attained in the questionnaires is greater than 4 out of 10, and if the minimums mentioned have been passed, if the exam grade is greater or equal to 4.4 out of 10, the questionnaire grade will be added, marked out of 10 and multiplied by 0.7.
The grade attained in this way will increase according to the quantity and quality of the voluntary problems handed in.
- In cases where the minimum grade is not attained in some of the parts, the subject will not be considered passed.
- Grades are only carried over for the special exam in July.
- NOTE Attendance at theory as well as laboratory classes is insistently recommended

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1.*** N.L. Biggs, Matemática discreta, Vicens Vives, 1994.
2.*** G. Chartrand, O.R, Oellermann, Applied and algorithmic graph theory, McGrawHill, 1993.
3.* F. García Merayo, Matemática discreta Paraninfo, 2001.
4.**** F. García Merayo, G. Hernández, A.Nebot, Problemas resueltos de Matemática discreta,Thomson, 2003
5.**** C. García,J.M. López, D. Puigjaner, Matemática discreta. Problemas y ejercicios resueltos, Prentice Hall, 2002.
6.* R. P. Grimaldi, Matemáticas discretas y combinatoria, Addison-Wesley iberoamericana, 1998.
7.** J. Gross, J. Yellen, Graph theory and its applications, CRC, 1999.
8.** R. Johnsonbaugh, Matemáticas discretas, Prentice Hall, 1999.
9.* C. Jordán, J.R. Torregrosa, Introducción a la teoría de grafos y sus algoritmos, Reverté-SPUPV, 1996.
10.** B. Kolman, R.C. Busby, S. Ross, Estructuras de matemáticas discretas para la computación, Pearson Education, 1996.
11.**** S. Lipschutz, Teoría de conjuntos y temas afines, McGraw Hill, 1992.
12.*** C. L. Liu, Elementos de matemáticas discretas, McGrawHill, 1995.
13.**** V. Meavilla, 201 Problemas de matemática discreta, Prensas universitarias de Zaragoza, 2000.
14. * K. H. Rosen, Matemática Discreta y sus aplicaciones, McGraw-Hill. 5ª edición, 2004.
15.** K.A.Ross, Ch.R.B. Wright, Matemáticas discretas, Prentice-Hall, 1988.
16.**** J. Trias, Matemática discreta.Problemes resolts, UPC, 2001.

Leyenda

Los asteriscos que preceden a los textos significan:
* bibliografía básica
** bibliografía útil para afianzar con conocimientos o aclarar dudas con ejercicios resueltos y propuestos.
*** bibliografía complementaria para ampliar conocimientos. También aportan ejercicios.
**** bibliografía de problemas.

COMPUTER SYSTEMS EVALUATION

Degree	Computer Science Degree			
Department	DISCA			
Lecturer in charge	ALICIA RUBIO MORENO			
Type	Mandatory			
Total credits	Total 4,5	= Theory 3	+	Practice 1,5
Code	6025			ESI
Course	3º			A

Objectives

• Learn to evaluate the performance or features of a computer
• Learn how to use basic tools and techniques used in the evaluation of the performance of a computer system:
- Modelling (analytical techniques)
- Monitoring
- Comparing systems
• Study the problems related to the comparing of systems
• Evaluate the impact of different upgrade and tuning therapies on performance

Syllabus

• Introduction to performance evaluation
• Analytical techniques I: Operational Analysis
• Analytical techniques II: Resolution Algorithms and bottleneck analysis
• Computer Systems Monitoring

Practice

Practice 1.- Introduction to modelling with QNAP. Closed and open network modelling.
Practice 2.- Modification analysis
Practice 3.- Computer System comparisons. Benchmarking.
Practice 4.- Basic monitoring tools in Unix

Evaluation standards

• The subject exam will consist of:
- Theory questions
- Problems
- Questions and problems relating to the practical sessions
• Final grade
- Final exam (10 points)
- Individual optional work related to the subject (up to 1.5 points)

Bibliography

• “Evaluación y Explotación de Sistemas Informáticos”, R. Puigjaner, J.J. Serrano y Alicia Rubio Editorial Síntesis. Colección Informática y Comunicaciones. (1995).
• “The Art of Computer System Performance Analysis. Techniques for Experimental Design, Measurement, Simulation and Modelling”. Jain, R. Ed. John Wiley & Sons (1991).
• "Quantitative System Performance. Computer System Analysis using Queueing Network Models."E. D. Lazowska, J. Zahorjan y otros. Editorial Prentice-Hall (1984)
• "Measuring computer performance. A practitioner’s guide" D.J. Lilja. Editorial Cambridge University Press (2000)

USER GRAPHIC INTERFACE

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	[no hay información relativa a este campo]
Type	Mandatory
Total credits	Total 6 = Theory 3 + Practice 3
Code	6026 IGU
Course	3º B

Objectives

• This subject provides the student the basics of communication between the person and the computer. It also teaches information presentation concepts which are not considered in any other core or obligatory subject on the syllabus. In the practical sessions libraries which allow the creation of user graphic interfaces, as well as how to graphically present information, will be used. (OpenGL) More information at http://www.sig.es/asignaturas/igu/

Syllabus

Unit 1: Introduction to IG
Unit 2: Interaction Modes
Unit 3: Introduction to IG3
Unit 4: Introduction to IG2
Unit 5: User interface

Practice

Practice 0: Introduction to the work environment
Practice 1: Profile editing and Modelling 3d
Practice 2: Visibility, illumination and shading

Evaluation standards

Exam
• Theory part (5 points, 2 points are needed to calculate the average)
• Practical part (2 points, 0.8 points are needed to calculate the average)
• The handing in of the practical sessions is obligatory to sit the exam
• Sitting the exam carries the grade in the exam
Practice
• Practice 1 (2 points) + Practice 2 (1 point) (1.2 points are need to calculate the average)
Partial grades which are averaged are only kept from the June and September exams, never from one course to the next.
Voluntary practical work are added to the final grade, as long as everything averages.

Bibliography

Human-Computer Interaction / Alan J. Dix, Janet E. Finlay, Gregory D. Abowd, Russell Beale. - 2nd ed. - Prentice-Hall International, 1998. ISBN 0132398648

Gráficos por computadora con OpenGL / Donald D. Hearn, M. Pauline Baker. – 3a ed. - Englewwod Cliffs : Prentice-Hall International, cop. 2006 ISBN:84-205-3980-5

Introducción a la graficación por computador / James D. Foley...[et al.] Addison-Wesley Iberoamericana, 1996. ISBN 0201625997

Computer graphics : Principles and practice / James D. Foley...[et al.]. - 2a. ed. - Addison-

Wesley, 1996. ISBN 0201121107

Interactive computer graphics : a top-down approach with OpenGL / Edward Angel. - 3rd. ed. - Boston : Addison-Wesley, 2003. - 719 p. : il. ; 24 cm. ISBN 0201773430

Computer Graphics using opengl, second edition/ F.S. Hill, JR, 2ed, Prentice Hall, 2001 ISBN 0-13-320326-3

OpenGL en fichas. Editores: José Ribelles y Javier Lluch. Publicaciones de la UJI, ISBN 84-8021-428-7

OPERATIONS RESEARCH I

Degree	Computer Science Degree
Department	DEIOAC
Lecturer in charge	Pilar Tormos y Antonio Lova
Type	Mandatory
Total credits	Total 6 = Theory 3 + Practice 3
Code	6027 IO1
Course	3º B

Objectives

The course provides an overview of the foundations of programming languages and paradigms. A wide variety of logics (such as Horn clause logic and equational logic) and formalisms (such as operational semantics, denotational semantics, fixpoint theory, and abstract data types) have been been used to help understand various aspects of modern programming languages.

In this course, the instructor presents a series of lectures to introduce such logics and formalisms with the aim of using them to study and analyze programming languages in a wide range of programming paradigms, including functional, logic, visual, and object features.

Students are expected to undertake programming small programs which will involve understanding and implementing applications in different programming styles.

Syllabus

1. Introduction. History of Programming Languages, Formal Description of PLs, Syntax and Semantics, Program equivalence

2. Functional Programming. Program syntax, algebraic datatypes, type inference, evaluation strategies, higher order. Operational Semantics, Denotational Semantics. Lambda Calculus and Term Rewriting
The Programming Language Haskell

3. Logic Programming. Horn Clause Logic: Syntax and Semantics. Logic Programming: Operational Semantics, Declarative Semantics, Fixpoint Semantics. The Programming Language Prolog. Efficient Programming in Prolog

Practice

P1: Modelization
P2: Modelization and Graphical Resolution
P3: Graphic Resolution and Sensitivity Analysis
P4: Formulation, resolution and results analysis of a production problem
P5: The Simplex method in table form
P6: The Revised Simplex Method
P7: Usage and interpretation of artificial variables
P8: Application of the upper bound technique
P9: Figures, Sensitivity analysis; Duality
P10: Modelization, sensitivity analisys and duality
P11: Modelization of integer programming models. A set covering problem

P12: Introduction to other Operations Research Tecniques

Evaluation standards

• The global subject grade will be based on a final exam.
• Additionally and voluntarily, students can carry out work (individually or in a group of 2 students) which increases the global grade, to a maximum of 2 points

Bibliography

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BIBLIOGRAFÍA COMPLEMENTARIA:

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• Hillier, F.S. y Lieberman, G.J. (2005): Introduction to Operations Research. Eigth Edition. McGraw-Hill.
• Meredith, J.R. y S.J. Mantel (1989): Project Management. A managerial approach. Wiley.
• Mordecai, A., y Golany, B. (eds.) (1996): Mathematical programming for Industrial Engineers. Marcel Dekker.
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• Winston, W.L. (2005): Investigación de operaciones. Aplicaciones y algoritmos. 4ª edición. ThomsonGrupo Editorial Iberoamericana.

PROGRAMMING LANGUAGES AND PARADIGMS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	María Alpuente Frasnedo
Type	Mandatory
Total credits	Total 6 = Theory 3 + Practice 3
Code	6028 LPP
Course	3º B

Objectives

• The objective of the course is to show the basics and applications of the key paradigms in which current programming languages are set: functional, logical, imperative, objects and others.
• The purpose of this general objective is to enable the students to understand programming languages from different points of view.

Syllabus

1. Introduction
2. Syntax and semantic of programming languages
3. Functional paradigm
4. Logic paradigm
5. Imperative and concurrent paradigm

Practice

Development of guided sessions in the laboratory using LPA-Win Prolog and Helium.

Evaluation standards

• The subject grade is determined by the theory-practical exam (questions), with a PASS also being necessary in the laboratory

Bibliography

• Apt, K.R. From Logic Programming to Prolog, Prentice Hall, 1996.
• Bird, R. Introducción a la Programación Funcional, Prentice Hall, 2000.
• Pratt, T.W.; Zelkowitz, M.V. Lenguajes de programación: diseño e implementación, Prentice-Hall, 1998
• Scott, M.L. Programming Language Pragmatics, Morgan Kaufmann Publishers, 2000
• Julián, P.; Alpuente, M. Programación Lógica, Teoría y Práctica.
Pearson, 2007.

FUNDAMENTALS OF COMPUTER NETWORKS

Degree	Computer Science Degree				
Department	DSIC				
Lecturer in charge	Mª Angeles Pinar Sepulveda				
Type	Mandatory				
Total credits	Total	6	= Theory	4,5 +	Practice 1,5
Code	6029				FRC
Course	3º				A

Objectives

• Basic study of communication between information systems.
• Presentation of TCP/IP communication architecture.
• Understanding of Client/Server communication diagram.
• Study of the main applications which currently work on the internet, as well as their interface with the rest of the protocol stacks.

Syllabus

Topic 1: INTRODUCTION.
Topic 2: DYNAMIC HOST CONFIGURATION PROTOCOL (DHCP) AND DOMAIN NAME SYSTEM (DNS).
Topic 3: WORLD WIDE WEB APPLICATION.
Topic 4: ELECTRONIC MAIL.
Topic 5: OTHER NETWROK APPLICATIONS.
Topic 6: PROGRAMMING INTERFACES.
Topic 7: NETWROK SECURITY

Practice

Description of the type of practical sessions carried out:
• Practice 1: Connection to other machines.
• Practice 2: Apache web server.
• Practice 3: Study of different protocols via a network analyser: Ethereal.
• Practice 4: Basic socket programming in C.
• Practice 5: Socket programming in Java.
Organisation of practice sessions:
• Practical classes are done fortnightly in 2-hour sessions in the DISCA Network Laboratory

Evaluation standards

• Practical session evaluation: The evaluation of the practice sessions will be done in the final subject exam.

Bibliography

• Redes de Computadores. Un enfoque descendente basado en Internet, James F. Kurose & Keith W. Ross. 2ª Edición. 2003 Addison Wesley.
• Internetworking with TCP/IP. Principles, Protocols and Architectures, Douglas E. Comer. 4ª Edición. 2000 Prentice Hall.
• Computer Networks. A Systems Approach, Larry L. Peterson & Bruce S. Davie. 3ª Edición. 2003 Morgan Kaufmann.

SYSTEMS AND AUTOMATION ENGINEERING1

Degree	Computer Science Degree					
Department	DISCA					
Lecturer in charge	Enrique J. Bernabeu Soler					
Type	Core					
Total credits	Total	6	= Theory	4,5	+ Practice	1,5
Code	6030				ISA	
Course	4º				B	

Objectives

• Systems and Automation Engineering is an important subject which should form a part of every engineering degree. In fact, related subjects such as Systems Theory are being taught with great success in economics and basic science degrees.
• This course has been designed with the aim of giving the student a basic vision of the techniques and concepts associated with systems dynamics, control and signal processing. On this theme, special attention is paid to what the systems and signal model would be, to then go to the processing aspect, and finally to control.
• The analysis takes place in two domains, temporal and frequential, with the aim of being able to deal with process simulation as well as the behaviour of filters related to signal processing.
• Since this subject is taught in a computer faculty, special emphasis is placed on the use of the computer as a signal processing system, and also of control.

Syllabus

I. Introduction to Systems and Automation Engineering (3H)
II. Continuous signals and systems (3H)
III. Discrete signals and systems (3H)
IV. Automation via PLC (6H)
V. Frequency analysis (6H)
VI. Filter design (3H)
VII. Temporal analysis of discrete systems (3H)
VIII. Control algorithm design (9H)

Practice

• The laboratory practical sessions are orientated to modelling, analysis, design and implementation. Firstly simulation software packages are used with the aim of gaining a rapid understanding of the basic concepts. Then practical sessions are organised with actual physical equipment which the student uses to verify the acquired theory knowledge.
• In practical sessions real signal processing and process control are emulated. In particular, the effects of the filtering of signals are analysed by means of two information transmission situations: sound and images.
• The following is a list of the practical sessions programmed for the subject:
Practice 1. EXPOSITION OF THE AREA VIA VIDEOS.
Practice 2. SYSTEMS AND SIGNALS MODELLING: simulation of continuous systems and signals.
Practice 3. PARAMETRIC IDENTIFICATION: identification of a continual current motor by square minimums.
Practice 4. AUTOMATION: Automation of a CIM cell.
Practice 5. FILTERING: Analysis and design of filters.
Practice 6. PROCESS CONTROL: PID control of actual physical process.

Evaluation standards

• The evaluation is done via a final exam which takes into account the practical sessions, worth 20% of the overall subject grade.

Bibliography

• “Automática Industrial y Control”, A. Cuenca, J. Salt. SPUPV 2005-349 ISBN por asignar.
• “Teoria de Sistemes: Aplicació als Sistemes Automàtics”, P. Albertos, P. Moya. SPUPV-99.3516.
• “Sistemas Digitales de Control”, J. Tornero, J. Salt. SPUPV-90.529
• “Sistemas de Control en Tiempo Discreto”, Ogata, K. Ed. Prentice Hall.
• “Sistemas de Control Digital. Análisis y Diseño”, Phillips & Nagle. Ed. Colección Ciencia Electrónica.
• “Signals and Systems”. Oppenheim, A. V., Willsky A. S. Ed. Prentice Hall. ISBN 0-13-809731-3

NUMERICAL ALGORITHMS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	José E. Román
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6031 ALN
Course	3º A

Objectives

• To learn which type of applications Numerical Algorithms are used in: meteorology, structure analysis, astrophysics, fluid dynamics, electromagnetism, etc.
• To know how to get from the physical model of the problem (partial differential equation) to an algebraic problem (equation system).
• Efficiently handle of large sparse matrices, via appropriate data structures.
• To know how to apply the most appropriate resolution method in each case to efficiently obtain the solution to the associated algebraic problem.

Syllabus

1. Partial differential equation discretization.
2. sparse matrices.
3. Stationary methods for linear systems.
4. Projection methods for linear systems.

Practice

The practice sessions are structured as a project. At the beginning of the semester each group of students is assigned a project. The projects consist of implementing a program to resolve a real problem, developing it progressively at each stage: discretization, numeric resolution and visualization of results. The project is implemented in Matlab, although it may be possible to use other programming languages, such as Python, Java o C/C++.

Evaluation standards

Two options are available (the first is recommended):
• Option 1: Project. For students who regularly attend class and progressively develop the project. The project makes up 65% of final grade and the other 35% is evaluated via a written exam, although this proportion can be negotiated with the tutor individually at the start of the semester.
• Option 2: Exam. For students who can not attend during the semester. Evaluation consists of a written exam, relating the theory as well as the practical sessions.

Bibliography

• Y. Saad, “Iterative Methods for Sparse Linear Systems”, 2nd ed., SIAM 2003.
• R. Barret et al., “Templates for the Solution of Linear Systems”, SIAM, 1994.
• B. N. Datta, “Numerical Linear Algebra and Applications”, Brooks/Cole Publishing Company, 1995.
• J. W. Demmel, “Applied Numerical Linear Algebra”, SIAM, 1997.

SIMBOLIC CALCULUS

Degree	Computer Science Degree
Department	DMA
Lecturer in charge	María José Rodríguez Alvarez
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6032 CSI
Course	3º A

Objectives

• Demonstrate Symbolic Calculus and its algorithms to the student.
• Initiate the student in the design of the most useful mathematical algorithms, with one of the available Symbolic Calculus packages, mainly in Mathematica
.
• We will focus on known problems in a different way, using tools such as Mathematica and our ever-more efficient computers.

Syllabus

Topic 1: Introduction
Topic 2: Normal forms and algebraic representations.
Topic 3: Polinomal and integer arithmetic
Topic 4: Linear equation systems
Topic 5: Integration of Rational Functions

Practice

• We will carry out 3 practical sessions with Mathematica and 6 with computer-assisted teaching.
• Practical sessions can be done individually or in pairs (trios are not permitted). The pair cannot change throughout the length of the course (if they can be done alone).
PRACTICAL SESSIONS WITH MATHEMATICA:
• The material for the Mathematics practical sessions is already on the microweb.
• These practical sessions are carried out in the laboratory at the appointed times.
• The deadline for handing in the three practical sessions will be the last day of class of the subject in the month of December.
PRACTICAL SESSIONS WITH COMPUTER-ASSISTED TEACHING:
• To carry out the practical sessions with computer-assisted teaching you have to connect to: www.upvabierta.net and enter your DNI as user and key.
• If in pairs, to do the practical session you will always use the same user (in other words, to do the evaluation you will always use the same DNI and not change between one another). You will both chose it but you can't change it.
• The evaluation of a practical session can only be done once.
• To revise the concepts you can use any of the two users.
• You have do carry out these practical sessions as programmed activities throughout the course.
• You will have to do 6 practical sessions of which it is advisable to do at least 1 a fortnight.
• The deadline to do them is the last class day of the subject in the month of January.
Evaluation Standard
• This subject is eminently practical, an therefore we evaluate it as such.
• Students will be able to chose between two evaluation systems:
1.- List of problems + practical sessions + written exam (option 1)
2.- Written exam + practice sessions (option 2)

Evaluation standards

• The completion of practical sessions is obligatory for all students, which ever method of evaluation they opt for.
• Students will be able to opt for one of the two previous evaluation systems.
• For the final subject grade, the following will be taken into account:
1. Handing in of problems (class attendance is necessary to be able to complete the continuous evaluation). These problems can be handed in in pairs or individually. The pairs will always be from the same seminar group. It is possible to change seminar groups if enough advance warning is given and if there is room. TRIOS ARE NOT PERMITTED.
2. Exam (if the problems are not of sufficient quality or class attendance is too irregular).
3. The practical sessions with Mathematics and EAO practical sessions can vary in number if it becomes apparent that the number of practical classes is affected or for other reasons. If there is a variation, it will be made known.

• List of problems + exam (option 1):
- There is an opportunity to complete a list of problems, which will make up 30% of the final subject grade, as long as they are of a high enough standard.
- To complete these problems the following instructions and considerations must be taken into account:
Their completion and presentation is optional.
The problems can be done individually or in pairs.
TRIOS ARE NOT PERMITTED.
Their presentation does NOT mean that the exam will be evaluated as 40% of the grade. If the work is not of a high enough standard it will not be considered.
The standard will be set by the tutor.
The submission will be done as follows:
- The problems or parts of problems in which there is the implementation of one or several algorithms, or the carrying out of tests with them, should be presented on a diskette prepared for its execution along with the result of the execution, and a printout of the exercise (if it is very long, a summary).
- The rest, by hand.
The handing in of the list of problems will be done on the given dates, which will be made known sufficiently in advance.
If the tutor requires a clarification regarding one of the presented pieces of work, an appointment will be made with the author(s), and as such, the author(s) of the work should indicate a rapid form of contact (telephone, email).
If similar points are detected on different pieces of work or on parts of them, the consequences will be precedented.
• Written exam (option 2)
The exam is a written exercise which will be done on the day and time set by the Faculty (consult the faculty calendar). As an example of what the exam could be like, you can check the pages of this site corresponding to previously completed exams, where there are headings and solutions for all the exams up until the date of the subject.
• Grading of the exam. To obtain the final grade of the exam we will use the following method:
- Theory part 70%
- Practical part 30%

Bibliography

BIBLIOGRAFÍA (Teoría y problemas)

• R.J. Villanueva, A. Hervás, J.J. Lorente, Apuntes de Cálculo Simbólico, SPUPV 96.855
• A. Hervás, M.J. Rodríguez, R.J. Villanueva, Curso interactivo de Cáculo Simbólico, Universidad Politécnica de Valencia.
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• J.D. Lipson, Elements of Algebra and Algebraic Computing, Addison-Wesley, 1981.
• I.N. Herstein, Grupos, anillos, cuerpos y teoría de Galois, Trillas, 1980.
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• J. Dorronso y E. Hernández, Números, grupos y anillos. Addison-Wesley / Universidad Autónoma de Madrid (1999)

BIBLIOGRAFÍA (Prácticas de laboratorio)

• W.C. Bauldry, J.R. Fiedler, Calculus Laboratories with Maple, Brooks/Coole Pubs. Co., 1991.
• G.L. Bradley, K.J. Smith, Calculus Explorations with Mathematica, Prentice-Hall, 1995.
• E. Castillo, A. Iglesias, J.M. Gutiérrez, E. Álvarez, A. Cobo, Mathematica (Serie ´Domine al 99%´), Paraninfo, 1994.
• B.W. Char, K.O. Geddes, G.H. Bonnet, B.L. Leong, M.B. Monagan, S.M. Watt, Maple V Language Reference Manual, Springer-Verlag (1991).
• S. Wolfram, Mathematica: A System for Doing Mathematics by Computer, Addison-Wesley.
• C. Pérez, Cálculo simbólico y número con Mahtematica, ra-ma (1995)

CRYPTOGRAPHY

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Pedro García
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6033 CRP
Course	3º B

Objectives

• Analyse basic algorithms and protocols which permit secure communication in information systems. Show the most illustrative applications of these as well as the theories that support them.

Syllabus

Topic 1: Introduction
Topic 2: Classic Cryptography
Topic 3: The DES system. AES standard. The RIJNDAEL algorithm
Topic 4: Basic concepts of the theory of information and the theory of complexity
Topic 5: Public-Key Cryptography
Topic 6: Basic concepts of the theory of numbers. The RSA system
Topic 7: Other Public-Key systems.
Topic 8: Digital Signing. Summary functions
Topic 9: Secure electronic mail
Topic 10: Digital certification
Topic 11: Secure internet protocols
Topic 12: Electronic commerce: Secure payment methods

Practice

Practice 1: Crypto analysis of classically-coded systems
Practice 2: Crypto analysis of the Vigenere system
Practice 3: Crypto analysis of the Hill system

Evaluation standards

• Final subject grade in the June exam is obtained as follows:
- 60% laboratory practical sessions
- 40% exam
• It is not obligatory to sit the exam to pass the subject.
• The grade of the September exam is obtained via an exam (graded out of 10).
• The handing in of practical work is not permitted at this exam.

Bibliography

• Public-key cryptography, Arto Salomaa. Springer, 1996
• Cryptography: Theory and Practice, Douglas R. Stinson. CRC Press, 1995
• Applied cryptography : protocols, algorithms and source code in C, Bruce Schneier. John Wiley, 1996.
• Introducción a la criptografía, Pino Caballero Gil. Ra-Ma, 1996.
• Digital certificates : applied Internet security, J. Feghhi, P. Williams, J. Feghhi. Addison-Wesley, 1999.
• Internet Cryptography, Richard E. Smith. Addison-Wesley, 1997.
• Security Fundamentals for E-Commerce, Vesna Hassler. Artech House, 2001.

INFORMATION SYSTEM STRATEGIES AND NEW TECHNOLOGIES

Degree	Computer Science Degree
Department	DOEEFC
Lecturer in charge	[no hay información relativa a este campo]
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6034 ENT
Course	3º B

Objectives

The concept of strategy originated in the military field. The first text on this theme is probably The Art of War by Sun Tsu (500 a.C., 1963). We know full well that the word 'strategy' comes from 'strategos', which means 'general' in Greek. In this field it is defined as "the art and science of military command applied to the planning and conducting of large-scale combat operations". In war the objectives are usually quite clear, but the means and the result are subject to considerable uncertainty. The same is true of companies in a market economy. Strategy refers to the combination of resources used to reach the objectives, in the presence of uncertainty. The term 'strategy', with the application of Information Technologies presents different nuances and specialisations as we will see in the subject.

Syllabus

• Introduction, Day 1, Subject Presentation
• Strategy 1, Day 2, Basic Strategy Concepts
Internal analysis
External analysis
• Strategy 2, Day 3, Strategic Tree and Balanced Scorecard
Diversification strategy
Competitive strategy
• Strategy 3, Day 4, Functional Strategies
Planning
Cases (practical cases)
• ITSGA's, Day 5, Introduction to ITSGA's
(Information Technology Strategic Generic Actions).
• ITSGA's Projects, Day 6, Development of a technology project via ITSGA's method
• Strategic Technology, Day 7, Project Management
Technologies integrated in Business Strategy
Day 8-17, Idem. and development of practical cases.

Practice

• Practice sessions will be set by the respective subject tutors, at the times set by them as well as the contents, working methods and evaluation.
• Although the practice classes will be done within the theory or practice timetable, attendance at these, or attendance at the laboratories for the development of these isn't considered obligatory, which is why it won't be considered in the obtaining of the 80% attendance necessary for the continual evaluation.

Evaluation standards

• This subject can be passed via a double route: on the one hand, starting from the continual evaluation, whose final grade is confirmed via a validation test, and on the other hand, starting from the sitting of a final exam (witnessed). The accreditation formula of the subject is as follows: EC + PV or EXFp.

• For the continual evaluation option, the student must have attended at least 80% of the theory classes and completed 100% of the practical sessions demanded. By this process the final grade will be attained will be from practical sessions via a validation test which will serve to confirm the participation in the development of the practical sessions of the subject.
• The final exam option doesn't require the 80% attendance at theory classes but it DOES require 100% attendance at practical sessions. In this case the student sits a final exam on 100% of the subject contents.
• A student who opts for continual evaluation can also take the final exam option, only to improve on the attained grade.

Bibliography

• Ansoff, H.Igor Corporate Strategy: An Analytical Approach to Business Policy for Growth and Expansion. New York: McGraw Hill 1965
• Implanting Strategic Management. Englewoods Cliffs, New Jersey: Prentice Hall. 1984
• Hamel, Gary y C.K.Prahalad, Competing for the future, Mass.: Harvard Business School Press,1994.
• Hax A. y Majluf, N. The Strategy Concept and Process: A Pragmatic Approach. Englewoods Cliffs,
New Jersey: Prentice Hall 1997
• Porter, Michael Competitive strategy for Analyzing Industries and Competitors. New York: The Free Press 1980
• Jarillo, Jose Carlos. Dirección Estratégica, Mc.Graw Hill.
• Andreu Rafael, Et.Al.; Estrategia y Sistemas de Información; McGraw-Hill; 1996

STUDY OF AN OPERATING SYSTEM

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Estefanía Argente Villaplana
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6035 ESO
Course	3º B

Objectives

* To identify all "system services" provided by Windows Application Programing Interface (win32 API).
* To distinguish and relate which system services are needed in Windows applications.
* To apply Win32 API for an effective management of resources using those system services.

The Win32 API interface to be described in this subject will be compared with POSIX systems, already seen in Operating Systems II.

Subject Prerequisites: Operating Systems I and Operating Systems II.

Syllabus

1. Win32 systems
2. Process management
3. File management
4. Pipes and I/O Redirection
5. Threads and planning
6. Synchronisation
7. IPC: Mailslots
8. Signals

Practice

Students will have to develop a "cron" server responsible for launching periodic tasks, which are specified in a configuration file. The cron server reads from this file, creates tasks periodically and generates an output file in which termination time and termination value of each process are indicated.
This server functionality is divided in three blocks:
* Basic functions (compulsory)
* Extension 1: pipes and redirection extensions.
* Extension 2: status enquiry

Evaluation standards

The subject grade is divided into 50% theory and 50% practical work.
 The average will only be calculated if at least a 4 has been attained in the practical work and a 5 in the theory (The normal exam and re-sit exam)
 The theory grade will be obtained in one final exam.
 The practical grade will be obtained from the work developed in the laboratory, according to the following:
Basic part: Up to 4 points.

1st extension: Up to 2 points.
2nd extension: Up to 2 points.
Performance in the laboratory sessions and documentation: Up to 2 points.

The grades for the theory and practical parts will be carried over to the re-sit exam (not for the next course). Extensions and submissions from the practical part will not be accepted after having completed the first four-month period.
 In the re-sit exam there will be questions for theory and practice.
 Those students with suspensions in both parts should complete the whole exam.
 If only one of these has been passed, then all of the questions for the suspended part should be answered plus 25% of the questions for the part that has been passed, chosen by the student.

Bibliography

 Johnson M. Hart: "Win32 System Programming" (2ª ed.), Addison-Wesley, 507 págs, ISBN 0-201-70310-6

* MSDN of Visual Studio .NET 2003

DYNAMIC SYSTEM SIMULATION

Degree	Computer Science Degree
Department	DISA
Lecturer in charge	Marina Vallés
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6036 SSD
Course	3º B

Objectives

• To learn about discrete and continuous system modelling tools.
• To learn about continuous system simulation methods.
• To learn about the basics of discrete system simulation.
• To know how to model input data for its simulation.
• To be able to create simulation experiments.
• To know how to analyse simulation results in discrete systems.

Syllabus

Practice

Practice 1: Continuous system simulation (I)

Practice 2: Continuous system simulation (II)

Practice 3: Introduction to Arena

Practice 4: Discrete Systems Modelling

Practice 5: Random number and variable generation

Practice 6: Experiment design

Practice 7: Results analysis

Evaluation standards

• 3 parts:
Theory exam: 40%
Practice: 20%
Work: 40%
• Practical work essential to obtain a subject grade

Bibliography

• SIMULATION MODELING & ANALYSIS. A. M. LAW, W.D. KELTON. McGRAW HILL, 1991
• DISCRETE-EVENT SYSTEM SIMULATION. J. BANKS ET AL. PRENTICE-HALL INTERNATIONAL, 2000.
• SIMULACIÓN DE SISTEMAS DISCRETOS. J. BARCELÓ. ISDEFE. 1996.
• SYSTEMS MODELING AND COMPUTER SIMULATION. VARIOS AUTORES, EDITOR NAIM A. KHEIR. MARCEL DEKKER, 1996.
• MODELING AND SIMULATION OF DYNAMIC SYSTEMS. R. L. WOODS, K. L. LAWRENCE.

PRENTICE HALL, 1997

ECONOMIC ASSESSMENT OF INFORMATION SYSTEM PROJECTS AND ASSETS

Degree	Computer Science Degree					
Department	DECS					
Lecturer in charge	Ana Blasco Ruiz					
Type	Optional					
Total credits	Total	6	= Theory	3	+	Practice 3
Code	6037					VPA
Course	3º					A

Objectives

• Study of a company in its double dimension of the supply and allocation of capital. The student is instructed in the art of making decisions about investments, as well as the selection of possible financial sources.

Syllabus

1. Investment and financing.
2. Self-finance: reserves and amortisation techniques.
3. External financing of the company.
4. Company investments.
5. Financial evaluation of investments.
6. Casuistry of investments.
7. The influence of taxes and inflation on investments.
8. Risk investments.
9. Sequential investments.

Practice

• Exercises using the Excel spreadsheet will be carried out at the appointed times. These exercises will be like those done in class only more realistic due to the elimination of the problem of the complexity of the calculations.

Evaluation standards

• 80% of the grade will be obtained in the written exam of the subject.
• The remaining 20% will be evaluated in the practical sessions. In this way, up to 2 points can be obtained in the laboratory practical sessions, for which all of the practical sessions on the established timetable should have been completed. In the opposite case, the grade will be obtained proportionally to the number of practical sessions completed.

Bibliography

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• FERNANDEZ ALVAREZ, A. I. (1994): Introducción a las finanzas. Madrid: Civitas.
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• SUAREZ SUAREZ, A. (1998): Decisiones óptimas de inversión y financiación en la empresa. Ed. Pirámide. 18ª edición.
• VERA SANTANA, F.L. (2000): Guía para el mercado de valores en España. Editorial Civitas.
WILSON, P. (1994): Gestión financiera en la pequeña y mediana empresa. Ed. Pirámide.

ROBOTICS AND AUTOMATION LABORATORY

Degree	Computer Science Degree
Department	6038
Lecturer in charge	Martin Mellado
Type	Optional
Total credits	Total 6 = Theory 0 + Practice 6
Code	6038 AUT
Course	5º B

Objectives

• The overall purpose of the Robotics and Automation Laboratory subject is to develop computer projects in the field of the material studied in the robotics subject and the integration of concepts acquired in other subjects studied, covering the intensification of industrial computing.

Syllabus

• Development of practical computer projects in the field of robotics and automation.

Practice

• All of the credits in this subject are dedicated to the practical development of projects.

Evaluation standards

• Development and evaluation of projects as course work.

Bibliography

• A suministrar según la asignación de proyecto específico.

INDUSTRIAL CONTROL

Degree	Computer Science Degree					
Department	DISA					
Lecturer in charge	Julián J. Salt Llobregat					
Type	Optional					
Total credits	Total	6	= Theory	3	+	Practice 3
Code	6039					CIN
Course	5º					A

Objectives

• The objectives focus on industrial automatism knowledge from an eminently practical aspect with the intention of enabling the student to integrate into a team responsible for the analysis, development and implementation of automation applications in an industrial environment. The theory-practical classes will be carried out practically in the Laboratory from the third session.

Syllabus

T1. INTRODUCTION TO AUTOMATISMS.
T2. MODELLING, ANALYSIS AND SYNTHESIS OF AUTOMATISMS
T3. PROGRAMMABLE LOGIC CONTOLLERS (PLCs)
T4. IMPLEMENTATION AND TESTING OF AUTOMATION PROJECTS.
T5. USE OF SPECIAL FUNCTIONS IN AUTOMATION PROJECTS
T6. MODELLING WITH RdP (PETRI NETWORKS)
T7. MODELLING WITH GRAFCET
T8. USE OF SUBPROCESSES/ ROUTINES

Practice

• Setting up, modelling and implementation of automation problems from the second session. The first will be dedicated to the complete description of industrial automaton to be used in the practical sessions.

Evaluation standards

• Presentation of all the course work plus an individual or team project to be completed in the practical sessions of the subject.

Bibliography

• “Automatización de Procesos Industriales”. Emilio García Moreno. Servicio de Publicaciones de la UPV. SPUPV-99.4116.
• “Ingeniería de la Automatización Industrial”. Ramón Piedrafita Moreno.
Editorial Ra-Ma. 1999.

COMPUTER-ASSISTED DESIGN

Degree	Computer Science Degree					
Department	DISA					
Lecturer in charge	Eduardo Vendrell					
Type	Optional					
Total credits	Total	6	= Theory	3	+	Practice 3
Code	6040					DAC
Course	5º					B

Objectives

• Teach and train the student in the basic concepts of Computer-Assisted Design.
• To know and understand the use of a CAD modeller.
• Present the basic concepts of 2D, 2½D and 3D.
• Train the student in the concepts and characteristics of solid modellers.

Syllabus

1. Basic concepts of CAD
2. CAD systems
3. Geometric modelling
4. Solid modelling
5. CAD applications

Practice

1. CAD 2D modelling.
2. CAD 2½D and 3D modelling.
3. Solid object modelling.
4. Completion of a task defined by the tutor.

Evaluation standards

• First exam:
- Attendance and completion of practical sessions (10%)
- Completion of a task defined by the tutor (40%)
- Exam (50%)

• Second exam:

• Attendance and completion of practical sessions (10%)
• Exam (90%)

• Remaining exams:

- Exam (90%)

Bibliography

• La bibliografía, al no existir un libro único para todos los contenidos de la asignatura, se suministra con cada tema.

• La bibliografia, al no existir un llibre únic per a tots els continguts de l´assignatura, se subministra amb cada tema.

COMPUTER GRAPHICS

Degree	Computer Science Degree					
Department	DSIC					
Lecturer in charge	Roberto Vivó Hernando					
Type	Optional					
Total credits	Total	6	= Theory	3	+	Practice 3
Code	6041					GPC
Course	5º					A

Objectives

• Obtain knowledge on the different ways of modelling 3D synthetic objects, their organisation in a scene and graphic representation on a screen.

Syllabus

Unit 1. The visualisation process (Pipeline)
Unit 2. Scene-graph
Unit 3. Geometric modelling
Unit 4. Visual modelling
Unit 5. Colour in image synthesis
Unit 6. Local illumination
Unit 7. Raytracing
Unit 8. Shadows in local illumination
Unit 9. Textures

Practice

P1. Animation of an object (glut)
P2. Interactive movement of the observer (osg, producer)
P3. Bezier curve and surface visualisation (OpenGL)
P4. Videogame Construction (osg, glut)
P5. Programming using raytracing

Evaluation standards

Bibliography

[no hay información relativa a este campo]

DIGITAL IMAGE PRODUCTION

Degree	Computer Science Degree					
Department	DSIC					
Lecturer in charge	Javier Lluch Crespo					
Type	Optional					
Total credits	Total	6	= Theory	0	+	Practice 6
Code	6043					PID
Course	5º					B

Objectives

• To know and learn about high-end tools for generating 3D and 2D graphics
• To know and learn the working method of script languages for the definition of 3D scenes
• Utilisation of an application for the creation of graphic presentations
• To know and understand the creation process of videos via computer-assisted systems
More information: http://sig.upv.es/asignaturas/pid/

Syllabus

Unit 1. Creation of virtual worlds VRML/X3D
Unit 2. Creation of digital video (Premiere)
Unit 3. Graphic presentations (Swift 3D)
Practice
Unit 1. Creation of virtual worlds VRML/X3D
Unit 2. Graphic presentations + Digital Video (Swift 3D + Premiere)

Practice

Evaluation standards

• 2 tasks will be presented based on each of the units:
• VRML (5 points) + Swift 3d + Premiere (5 points)

Bibliography

• Curso VRML SIGGRAPH
• Ames, Nadeau, Moreland “VRML 2.0: Source Book” Wiley, 1997.
• Adobe premiere User Guide
• Foley, Van Dam, Feinier y Huges. “Computer Graphics. Principles and Practice”, Addison Wesley, 1990.
• Foley, Van Dam, Feinier y Huges. “Introduction to computer graphics”, Addison Wesley, 1994.
• Hearn, Baker. “Computer graphics. Second edition”. Prentice Hall, 1994

REAL TIME SYSTEMS

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Alfons Crespo Lorente
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6045 STR
Course	5º A

Objectives

• Understand the temporal demands of industrial processes and translate them in requisite terms.
• Know and understand how to use real time programming languages and the implications of the operating system.
• Know how to analyse a real time system and be able to determine if it completes the imposed temporal restrictions.
• Know how to develop applications on conventional computers as well as integrated systems.
• Know how to choose the correct tools for its development.
• Know how to carry out control applications in the industrial field.

Syllabus

1. Introduction to real time systems
2. Introduction to Ada language
3. Concurrent programming
4. T.r systems programming
5. Analysis of s.t.r. planability
6. Real time operating systems

Practice

• Practice sessions are done on two types of processes:
- Control of a water tank
- Guided vehicle (Khepera)

Evaluation standards

Bibliography

• Apuntes de la asignatura (Transparencias + notas del curso)
• Real-Time Systems and Programming Languages A. Burns and A. Wellings Addison-Wesley, 1997
• Real time systems: Implementation of industrial computarised process automation Wofgang A. Halang World Scientific. 1992
• Concurrent programming with Ada A. Burns. Elsevier 1999
• John Barnes. Programming in Ada 95, 2nd. ed. Addison-Wesley, 1998. ISBN 0-201-34293-6

DIGITAL IMAGE TREATMENT

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Carlos Monserrat Aranda
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6046 TID
Course	5º B

Objectives

To know, understand and master the application of synthetic and real image digital processing algorithms.

Syllabus

Unit 1. – Synthetic image Rasterisation
1.1 Introduction
1.2 Rasterisation
1.2.1 Rasterisation of straight lines
1.2.2 Rasterisation of circles
1.2.3 Rasterisation of ellipses
1.2.4 Rasterisation of polygons
1.2.5 Refilling of areas
1.2.6 Rasterisation of characters
1.3 Antialiasing.
Unit 2 Rasterisation of real image
2.1 Introduction
2.1.1 Image processing
2.1.2 Image capturing and digitalisation
2.2 Digital image characterisation
2.2.1 Spatial, brightness and colour resolution
2.2.2 Colour spaces
2.2.3 Histogram of brightness
2.2.4 Contrast
2.2.5 Image control
2.3 Restoration and improvement of digital images
2.3.1 Introduction
2.3.2 Simple point processing
2.3.3 Multiple point processing
2.3.4 Processing in frequency control
2.3.5 Geometric transformations (Warping and Morphing)
2.4 Digital image compression

Practice

Practice 1. Implementation of a 2D drawing program
Practice 2. Implementation of a digital image editor
Evaluation Standard
• In normal conditions the subject grade is obtained directly from the grade attained in the final exam plus the grade achieved in the obligatory practical sessions.
• If the student doesn't sit the final exam or doesn't present the obligatory practical work they will receive a 'not present' grade.
• Theory and/or practical grade are only carried over if at least 40% of said subject has been

passed.
• Regarding the presentation of voluntary tasks, the grade obtained will be added to the final exam grade if the latter is equal or greater than 4 (out of 10).

Evaluation standards

• In normal conditions the subject grade is obtained directly from the grade attained in the final exam plus the grade achieved in the obligatory practical sessions.
• If the student doesn't sit the final exam or doesn't present the obligatory practical work they will receive a 'not present' grade.
• Theory and/or practical grade are only carried over if at least 40% of said subject has been passed.
• Regarding the presentation of voluntary tasks, the grade obtained will be added to the final exam grade if the latter is equal or greater than 4 (out of 10).

Bibliography

• "Computer Graphics", Hearn & Baker. Prentice Hall 1994.
• "Computer Graphics: Principles and practice", Foley et al.. Adison Wesley 1990.
• "Introducción a la graficación por ordenador", Foley et al.. Adison Wesley 1994.
• "Introduction to computer graphics", Foley et al.. Adison Wesley 1994.
• "Introducción a la informática gráfica 2D", Roberto Vivó y Xavier Lluch. Ref.: 96-062, U.P.V..
• "Digital Image Processing", Gregory A. Baxes. Wiley 1994.
• "Digital Image Warping", George Wollberg. IEEE Computer Society Press Monograph.
• "Modern Image Processing: Warping, Morphing and Classical Techniques", Christopher Watkins, et al.. APE Professional.
• "Graphics file formats", C. Wayne Brown & Barry J. Shepherd Prentice Hall.
• "Procesamiento digital de imagen", M. Alcañiz Raya, et al. Ref: 99-150, SUPV

VISION SYSTEMS

Degree	Computer Science Degree
Department	DISCA/DISA
Lecturer in charge	Alberto J. Pérez Jiménez
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6047 SDV
Course	5º A

Objectives

• Show the general problems of computer vision.
• Study the characteristics most relevant to the elements of a vision system: cameras, optics and digitaliser
• Describe and use basic image and vision computer processing techniques.
• Study the application of said techniques in industrial contexts for automatic visual inspection tasks and robotics.

Syllabus

Topic 1: Computer vision basics
Topic 2: image acquisition
Topic 3: Image digitalisation
Topic 4: Basic image pre-processing techniques
Topic 5: Image segmentation techniques
Topic 6: Binary image analysis
Topic 7: Description and interpretation
Topic 8: 3D vision

Practice

P1: Project – Presentation
P2: Image acquisition
P3: Project – Acquisition/Umbralization
P4: Segmentation
P5: Project – labelling
P6: Project - Characteristic extraction
P7: Classification

Evaluation standards

• The final grade will be obtained:
- 50% Written exam
- 50% Final practical task

Bibliography

• R.C. González, R.E. Woods, "Digital Image Processing", Addison Wesley, 1993.
• A.K. Jain."Fundamentals of Digital Image Processing", Prentice-Hall, 1989
• E.R. Davies. "Machine Vision: Theory, Algorithm & Practicalities", Academic Press, 1990.
• M.W. Burke, "Handbook of Machine Vision Engineering. Vol. I: Image Acquisition", Chapman & Hall, 1996
• T.Y. Young & K.S. Fu, "Handbook of Pattern Recognition & Image Processing", Academic Press, 1986.
• H. Freeman. "Machine Vision for Inspection & Measurement", Academic Press, 1989.

ADVANCED ARCHITECTURE

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Julio Sahuquillo Borrás
Type	Optional
Total credits	Total 4,5 = Theory 3 + Practice 1,5
Code	6048 AAV
Course	5º B

Objectives

• To know and understand how the latest commercial processors work.
• Analyse the advantages and disadvantages of processors with different nuclei: multithread and multiprocessors.
• Understand how massively parallel system applications function and the different interconnection network commutation, arbitration and flow control mechanisms.
• To know the different interconnection network routing topologies and algorithms.

Syllabus

Topic 1: Renaming of registers
Topic 2: Advanced memory access techniques
Topic 3: Jump prediction and advanced search mechanisms
Topic 4: Multiprocessor systems
Topic 5: Multithread architecture
Topic 6: Interconnection networks. Introduction
Topic 7: Topologies
Topic 8: Routing, arbitration and commutation
Topic 9: Practical aspects of commercial networks
Topic 10: Examples of interconnection networks

Practice

1. Introduction to simplescalar simulator
2. Modelling a bank of registries and an instruction queue in simplescalar
3. Modelling of loads and stores in simplescalar
4. Introduction to interconnection network simulators
5. Influence of the commutation mechanism on the performance of interconnection networks
6. Influence of commuter architecture on the performance of interconnection networks

Evaluation standards

The final grade will be made up as follows:
• Attendance and participation in class 25%
• Coursework 50%
• Practical work 25%

Bibliography

J.P. Shen, and M.H. Lipasti,
Modern Processor Design: Fundamentals of Superscalar Processors,
McGraw Hill, 2005

J. Hennessy and D. Patterson,
Computer Architecture: a quantitative approach,
Morgan Kauffman, 2003

J. Duato, S. Yalamanchili, L. Ni,
Interconnection Networks, An Engineering Approach,
Morgan Kaufmann

W. Dally, B. Towles,
Principles and Practices of Interconnection Networks,
Morgan Kaufmann

PARALLEL COMPUTING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Antonio Vidal Macià
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6049 CP
Course	5º A

Objectives

• Parallel computing models
• Evaluation of parallel algorithms
• Design of parallel algorithms

Syllabus

• Parallel computing models
• Evaluation of parallel algorithms
• Design of parallel algorithms

Practice

Evaluation standards

Bibliography

[no hay información relativa a este campo]

MICROPROCESSOR-BASED SYSTEM DESIGN

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Juan José Serrano Martín
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6050 DSM
Course	5º A

Objectives

• Acquire practical theoretical knowledge of microprocessor-based system design, micro-controllers orientated to the development of general applications, and integrated industrial systems. The student will learn about the mechanisms most used in the design of systems with micro-controllers, and the techniques used in the design, practical use and debugging of these systems. 8, 16 and 32 bit system design will be analysed, with special emphasis on the design of the most used systems in the industry.

Syllabus

1. Introduction, Microprocessors, micro-controllers and Systems-on-Chip (SoC): Types and applications.
2. Internal structure of a micro-controller. Memory subsystems.
3. Micro-controller and integrated systems programming in C.
4. Design and debugging tools for systems with micro-controllers.
5. Generation of clock, reset and working mode signals.
6. Interruptions and internal error detection.
7. Input/Output mechanisms, for general and industrial use.
8. Timers, Counters, PCAs. Measurement and generation of times. PWM signal generators.
9. Peripheral series interconnection systems within PCB's, Serial Buses, I2C, SPI, etc.
10. Communication Controllers in micro-controllers, CAN Networks, Ethernet, USB, etc.
11. The influence of EMI/EMC on the design of a micro-controller systems and Printed Circuit Boards (PCBs)
12. Examples of the design of micro-controller systems, robotics, automation, industrial systems, home automation, etc.

Practice

• Practical sessions are completed using equipment prepared by the tutor based on the Silabs micro-controller 8051F310 (www.silabs.com) (Antes Cygnal).
• At first boards developed on simple applications will be used to learn to handle the tools and systems.
• Later, using small mobile robots and/or similar devices with legs, such as hexapods and quadropods, more advanced practical work will be done using different internal E/E units for micro-controllers and sensors and actuators like continuous current motors, servos, distance measurers, contact sensors, electronic compasses, etc.
• The practical sessions finish in a task where all of the previously attained knowledge is used, carrying out medium/high level complex applications.
• On the subject CD all of the necessary information can be found for the development of all of the practical work and equipment to be used.

Evaluation standards

Bibliography

• Microcontrolador Intel MCS-51 : arquitectura y programación- (Campelo Rivadulla, José Carlos), Servicio de Publicaciones UPV.
• Periféricos e interfaces industriales- (Campelo Rivadulla, José Carlos). Servicio de Publicaciones UPV.
• Al comienzo del curso de reparte un CD, con la información del microcontrolador a utilizar, manuales, notas de aplicación, notas de ejemplos de aplicación, etc. Y los manuales de dispositivos, compiladores, y equipos usados en las prácticas.
• Transparencias usadas en clase.

ARCHTECTURE DESIGN IN VLSI

Degree	Computer Science Degree				
Department	DISCA				
Lecturer in charge	Daniel Gil Tomás				
Type	Optional				
Total credits	Total	6	= Theory	3	+ Practice 3
Code	6051				DAV
Course	5º				B

Objectives

• To know the problems when designing and implementing integrated circuits of a Very Large Scale Integration (VLSI)
• To know the main characteristics of CMOS logic
• To know the main processes in the manufacture of VLSI integrated circuits
• To know the main methodologies and CAD tools for the design of VLSI integrated circuits.
• Study VHDL language as a circuit architecture design tool.
• Carry out the synthesis of circuits-on-chip via FPGA

Syllabus

Topic 1: Introduction to VLSI systems
Topic 2: CMOS technology
Topic 3: Integrated circuit manufacturing process
Topic 4: Design methodologies and tools
Topic 5: Hardware description languages. VHDL language
Topic 6: Programmable logic design
Topic 7: Architecture synthesis
Topic 8: Validation and testing of integrated circuits

Practice

Practice 1: CMOS logic. Sim,ulation with PSPICE
Practice 2: Full-Custom design of standard cells
Practice 3: Semi-Custom design based on programmable logic (I)
Practice 4: Semi-Custom design based on programmable logic (II)
Practice 5: Synthesis in FPGA

Evaluation standards

• Submission of practical session reports
• Submission of exercises proposed in class

Bibliography

• Jan M. Rabaey, A. Chandrakasan, B. Nikolic. “Circuitos Integrados Digitales”. Prentice-Hall. 2003.
• Douglas A. Pucknell, Kamram Eshraghian. “Basic VLSI Design”. Prentice Hall.1994
• N. Weste, K. Eshraghian. “Principles of CMOS VLSI Dsign”. Addison-Wesley. 1993.
• G. De Micheli. “Synthesis and Optimization of Digital Circuits”. McGraw-Hill. 1994.
• W. Wolf. “Modern VLSI Design”. Prentice-Hall. 1998.
• T. E. Price. “Introduction to VLSI Tchnology”. Prentice Hall.1994
• Douglas L. Perry. “VHDL”. McGraw-Hill. 1994
• K.C. Chang. “Digital Systems Design with VHDL and Synthesis: An Integrated Approach”. Wiley-IEEE Computer Society Pr. 1999.
• Sunggu Lee, “Advanced Digital Logic Design Using VHDL, State Machines, and Synthesis for

FPGA´s". Thomson-Engineering. 2005)

EVALUATION, MODELLING AND SIMULATION OF COMPUTERS

Degree	Computer Science Degree				
Department	DISCA				
Lecturer in charge	Vicente Santonja Gisbert				
Type	Optional				
Total credits	Total 4,5	= Theory	3	+ Practice	1,5
Code	6052			EMS	
Course	5º			A	

Objectives

• To know the techniques used in the modelling and evaluation of information system performance: analytical techniques based on queue models and simulation techniques.
• Make use of computer tools based on the techniques above.
• Apply the techniques and tools studied to evaluate the performance of different information systems.

Syllabus

Topic 1: Introduction
Topic 2: Queue models
Topic 3: Simulation models
Topic 4: Evaluation of information systems

Practice

1. Simple queue models
2. Queue networks
3. Design of a simulator (I)
4. Design of a simulator (II)
5. Evaluation of an information system (I)
6. Evaluation of an information system (II)
7. Evaluation of an information system (III)

Evaluation standards

• Exam 50%
• Practical 50% (attendance and the submission of reports are evaluated)

Bibliography

• Boudewijn R. Haverkort, Performance of Computer Communication Systems. A Model-Based Approach. John Wiley & Sons, 1998.
• Raj Jain, The Art of Computer Systems Performance Analysis. Techniques for Experimental Design, Measurement, Simulation and Modeling. John Wiley & Sons, 1991.
• José Juan Pazos Arias, Andrés Suárez González y Rebeca P. Díaz Redondo, Teoría de colas y simulación de eventos discretos. Pearson Educación, 2003.
• Averill M. Law y W. David Kelton. Simulation Modeling and Analysis. Tercera edición. McGraw-Hill, 2000.

PARALLEL PROGRAMMING LANGUAGES AND ENVIRONMENTS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Antonio M. Vidal
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6053 LEP
Course	5º B

Objectives

• General objectives:
- Acquire skills in the advanced handling of a parallel programming language
- Acquire skills in the advanced handling of different parallel programming environments
- To be capable of using the above tools in the design of parallel applications
• Specific objectives:
- O1. To know the most typical parallel programming environments and manage them at a basic level.
- O2. Implement simple subroutines using a parallel programming language in these environments.
- O3. Acquire skills in the advanced handling of a parallel programming environment.
- O4. Be able to implement typical algorithmic schemes using the appropriate parallel language and the chosen environment.
- O5. Compare the advantages and disadvantages of two parallel programming environments.
- O6. Be able to implement robust, portable, legible and re-usable parallel algorithms.

Syllabus

• The basic idea of the subject is based on a series of Case Studies which the student must solve, individually, as if they were small projects.
• These Case Studies are deliberately chosen, in a way in which their development obliges the student to reach the set objectives; on the other hand, the difficulty level gradually increases con el fin de que el aprendizaje sea.
• Examples of Case Studies:
CS1. Programming environments: basic operations and communications.
CS2. Data distribution in parallel programming environments.
CS3. Parallel algorithms for calculating minimal distances in a directed graph.
CS4. The MPI programming environment: matrix-matrix product
CS5. Parallel algorithms for solving Triangular Systems
CS6. Divide and Conquer parallel algorithms.

Practice

• The whole subject will be taught in the Laboratory. There is no distinction between theory and practice.

Evaluation standards

• The evaluation of each student will be done by means of monitoring their work in each Case Study. To do this, the student must provide a report for each Case Study which demonstrates its development, as well as the software implemented, with the end of guaranteeing its good operation. The student should be able to justify, upon request by the subject tutor, the good operation of the software, as well as any information that appears in the report.
• The submission date for each Case Study report will be approximately between 2 to 3 weeks

after the finalisation of the implementation stage, depending on the difficulty of the Case Study and the circumstances in which it has been developed.

Bibliography

• [Foster97] I.Foster. "Designing and Building Parallel Programs", (Online), Addison-Wesley. http://www-unix.mcs.anl.gov/dbpp/
• [Kumar94] V.Kumar, A.Grama et al., "Introduction to Parallel Computing. Design and Analysis of Algorithms". 2ª Edición. Addison-Wesley (2003)
• [Snir96] M.Snir, S.Otto et al., "MPI. The complete reference.", J. Kowalik, Eds., Scientific and Engineering Computation. The MIT Press, Cambridge (1996)
• [Pérez00] J.L. Pérez y A.M. Vidal. “Introducción a la Programación en MPI”. Libro de apuntes editado por el servicio de publicaciones de la UPV. Ref. 902.
• [Wilkinson99] B.Wilkinson y M.Allen. "Parallel Programming. Techniques and Applications Using Networked Workstations and Parallel Computers." Ed. Prentice-Hall. (1999)

ADVANCED PERIPHERALS

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	José Miguel Valiente González
Type	Optional
Total credits	Total 4,5 = Theory 3 + Practice 1,5
Code	6054 PAV
Course	5º B

Objectives

• To learn the basic aspects of the programming of I/O in computers.
• To learn how to do the lowest level programming of peripherals, in other words that which directly accesses the interface's integrated drivers. To learn how to create a basic peripheral driver program.
• To understand the structure of device drivers used in operating systems for Input/Output and learn how to program a basic controller.
• To learn about the technological characteristics and operational parameters of magnetic disks, as well as the latest technology surrounding them.
• To learn about the latest interfaces for the connection of discs and storage subsystems.
• To learn about the characteristics and operation of network storage.
• To learn about the characteristics and parameters of the operation of some advanced peripherals such as cameras, peripherals of accessibility for the disabled or biometric peripherals, among others.

Syllabus

BLOCK I: Architecture of I/O
Topic 1: Basic aspects of the programming of I/O
Topic 2: Architecture of I/O in Windows/Linux
Topic 3: Development of drivers
BLOCK II: Storage systems
Topic 4: Magnetic disks. Latest technology
Topic 5: Advanced interfaces for disks: SCSI-3, Fibre Channel
Topic 6: Redundant systems (RAIDS)
Topic 7: Network Storage
BLOCK III: Advanced peripherals
Topic 8: Video cameras and interfaces
Topic 9: Peripherals of accessibility to physical media
Topic 10: Biometric peripherals
Topic 11: Other peripherals and interfaces

Practice

Practice 1: Basic programming of I/O
Practice 2: Programming of a peripheral: Digital I/O card PCI7248
Practice 3: Programming of a DLL for the operation of a peripheral
Practice 4: Programming of a driver
Practice 5: Setting up and fine tuning of a RAID

Evaluation standards

• The evaluation method will be agreed on with the students.
• Initial proposal:
- Final exam in test form on the theory and laboratory practical sessions (40%)

- Laboratory practical sessions (obligatory 40%)
- Subject work (optional 20%)

Bibliography

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• Paul Massiglia, The RAID Book: A Storage System Technology Handbook. Peer-To-Peer Communications, 1997.
• Scott Mueller. Upgraiding and Repairing PCs (15th ed.) . QUE,2004
• Win L Ros „ The Hardware Bible“ (6nd Ed.) QUE 2003
• Charles Petzold & Paul Yao Programación en Windows. McGraw Hill, 1996.
• Walter Oney. Programming the Microsoft Driver Model. Microsoft Press, 1999.
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• Microsoft Windows 2000 Driver Development Kit (DDK 2000)
• Marc Farley, Building Storage Networks, Osborne/McGraw-Hill; 2nd edition, 2001

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ADVANCED DATABASES

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6055 BDA
Course	5º B

Objectives

• Study advanced topics in database technology.
- To learn about the evolution of data management technology
- To learn about the new trends in the development of database management systems
- To use database management systems which incorporate new capacities

Syllabus

1. Database technology evolution
2. Relational system extensions
2.1 Active databases
2.2 Deductive databases
2.3 Object-relational databases
3. Object oriented databases
4. New types of database systems

Practice

1. Introduction to SGBD ORACLE8.
2. Active database management systems.
3. Deductive database management systems.
4. Object oriented database management systems.
5. Data storage.

Evaluation standards

• Final exam

Bibliography

• Sistemas de bases de datos : conceptos fundamentales.Elmasri, Ramez. Addison Wesley Iberoamericana 1997
• The Object database standard, ODMG 2.0. Morgan Kaufmann, cop. 1997
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“CASE” TOOLS AND SEMI-FORMAL METHODS IN SOFTWARE ENGINEERING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Patricio Letelier
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6056 HMI
Course	5º A

Objectives

• Upon completing HMI the student should be able to:
- Describe a software development project which considers the following aspects: Methodology and notation used, tools and development and implementation environment.
- Apply UML (United Modelling Language) in the context of a software development project.
- Use a software development process (RUO – Rational Unified Process)
- Describe the essential operation which some support tools provide to software engineering.
- Define the different roles necessary in a software development team, knowing their responsibilities after having performed one of them during the course.
- Establish comparisons between an agile and traditional methodology.

Syllabus

• Introduction to Development Methodologies: Extreme Programming (XP) and Rational Unified Process (RUP)
• Completion of a software development project using RUP or XP
• Work in teams of 6 to 8 students
• Project Monitoring presentations
• Product Architecture Technical Presentations
• Modelling and software testing activities

Practice

• Except for the first presentation sessions of the methodologies used, the rest of the work carried out in the subject is practical.

Evaluation standards

• There is a continuous evaluation which includes an exam on XP and RUP knowledge, one grade for each of the presentation monitoring presentations, one grade for each technical presentation, and each additional activity is also awarded a grade. The final grade is the average of these grades.

Bibliography

• Ver el portal de la asignatura en https://pid.dsic.upv.es/ en apartados “Material” y “Enlaces”

ADVANCED TOOLS FOR SOFTWARE DEVELOPMENT

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Alicia Villanueva
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6057 HAD
Course	5º B

Objectives

• The need to offer elevated performance levels means that modern software systems are of such complexity that their development and maintenance require the use of automatic assistance tools and techniques during the different stages of their lives.

• The objective of this subject is to offer an open view, free from any particular language or programming style, of the advanced tool families which can be used in the development and maintenance of software.

• The concept of properties of programs are a common place for many of the techniques involved (analysis, debugging, optimisation, validation, etc.), thus we will study different generic frameworks which allow both, the specification of properties of programs as well as methodologies which can be employed for static (from the program text) and dynamic (from the execution of the program) checking.

• As a natural continuation of properties analysis techniques, their application for debugging, improvement and validation of software systems as well as the construction of modern software development environments, will be studied.

Syllabus

• Frameworks for expressing properties of programs. Construction of approximate properties domains.
• Static/dynamic debugging; algorithmic debugging.
• Static analysis of programs. Case studies: unattainable code detection, useless variable detection, inconsistency detection, etc.
• Program validation/certification.
• Program transformation/optimisation.

Practice

• Implementation and practical utilisation of the different types of analysis and techniques covered in the theory classes.

Evaluation standards

• Theory exam and evaluation of practical work or, if appropriate, development and/or presentation of a task related to the material given.

Bibliography

• N. Jones, F. Nielson. Abstract interpretation: a semantics-based tool for program analysis. En S. Abramsky, D.M. Gabbay, and T.S.E. Maibaum, editores, Handbook of Logic in Computer

Science, volume 4, Semantic Modelling, páginas 527-636, Oxford University Press, 1995.
• F. Nielson, H.R. Nielson, C. Hankin. Principles of Program Analysis. Springer-Verlag, Berlin, 1999.

FORMAL METHOD IN SOFTWARE ENGINEERING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	María Alpuente
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6058 MFI
Course	5º A

Objectives

The course focuses on formal methods tools and techniques for automated software design that contribute to the development and management of correct
and reliable software, e.g., deductive synthesis, inductive synthesis, and transformational approaches. It provides an overview of the foundations of the field
as well as an appreciation of both the powerfulness of its underlying ideas and the
difficulty of their practical application. In contrast with more traditional (and little
practical) formal methods, which promote full formalization in overmuch expressive
languages and require excessive mathematical background from the final users, we a
dvocate a lightweigt approach which emphasizes selectiveness and is able to bring
greater benefits at reduced costs. In the course, advanced software processing techniques
are studied in a range of programming paradigms, including the analysis, specification,
debugging, verification, certification, synthesis, learning, transformation and optimization
of (multiparadigm) programs. In the laboratory, some landmark techniques and tools for
automatically processing software components are studied in depth.

Syllabus

Analysis, specification, debugging, verification, model-checking, certification, synthesis,
transformation and optimization of programs.

Practice

1. Algorithmic program verification with SMV.
2. The Maude project

Evaluation standards

The subject can be passed in two different ways, to be chosen by the student:
- One possibility is to do a theoretical exam which consists of a test of approximately 20 non-technical multiple-choice questions based on the overall comprehension of the concepts studied, with a weight of 70% and an evaluation of the practical work with a weight of 30%.

- Another possibility is to do a specific task (bibliographical, for example) related to one of the topics.
- A third possibility is to complete a practical task related to one of the practical blocks.
- Other possibilities, proposed by the student, will be considered.

Bibliography

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COMPONENT, DESIGN PATTERN AND CODE GENERATION TECHNOLOGY

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Vicente Pelechano Ferragud
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6059 TCP
Course	5º B

Objectives

• To provide knowledge and skills necessary for the development of automatic code generators from UML models. The latest Software Engineering trends (Model Driven Architecture proposed by the Object Management Group and Software Factories proposed by Microsoft) advocate the transformation of models to increase the productivity and quality of software development. Beyond the limited generation possibilities of the most popular CASE tools, in the near future professionals able to develop code generation tools which satisfy the particular requirements of companies will be necessary. This subject gives the student an insight into the world of design patterns, allowing them to apply tested design techniques and architectonic solutions in the development of code generators. Providing the knowledge necessary for the development of advanced tools used by the techniques demonstrated to automatically build management application in visual environments from UML conceptual models.

Syllabus

1. Introduction
- History and evolution
- Model Driven Architecture (MDA)
- Software Factories
- Frameworks and Pattern Software
- UML vs. Specific Domain Languages
2. Design Patterns (GoF) and their Extensions
- Creational Patterns
- Structural Patterns
- Behavioural Patterns
3. Implementation of UML Models via Design Patterns
- Implementation of Aggregation and Association Relationships
- Implementation of Specialisation/Generalisation Relationships
- Performance Implementation
- Implementation of State Transition Diagrams
- Implementation of Sequential Diagrams
4. Design of Implementation Architectures and Frameworks
- Development of User Interface
- Development of Business Components
- Design of Data Model
5. Construction of Code Generators
- Design and implementation of a code generator
- Definition of the correspondence
- Implementation of transformations

Practice

- Implementation of patterns
- Development of Frameworks
- Development of a Code Generator from Models
- Application to real problems
- The practical sessions can be done in any visual and Object Oriented development environment.

Evaluation standards

• Development of a project

Bibliography

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• Jack Greenfield, Keith Short, Steve Cook, and Stuart Kent. Software Factories. Wiley Publising Inc., 2004.
• Object Management Group. Model Driven Architecture Guide, 2003.

ADVANCED SOFTWARE TECHNOLOGY

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Isidros Ramos
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6060 TSA
Course	5º A

Objectives

• The objective of this subject is the study of object-oriented software technology as an advanced software production paradigm. Object-oriented programming development and environment methodologies are analysed, with special emphasis on visual environments in inter and intranet environments.

Syllabus

1. Object-orientation concepts. A reference model of the object-oriented paradigm.
2. Object-oriented programming languages.
3. Object-oriented programming languages.
4. Object-oriented applications. OO-Method: OASIS. Troll: OMTROLL.

Practice

Evaluation standards

• The evaluation grade consists of two parts:
Theory grade: a weight of 60%
Practical grade: a weight of 40%

• The theory grade is obtained via:
1. Multiple-choice test: each incorrect answer costs 0.3 points and each correct answer is worth 1 point. The final is graded out of 10.
2. Points obtained for answers to problems formulated in class. The value of the point depends on the difficulty of the question: 0.1,..0.5,…1…
3. Class presentations by the students on related themes: up to 2 points
• The final practical grade supposes the submission and evaluation of the two tasks proposed by the tutor.
• NOTE: it is necessary to attain at least a 4 to be able to balance a Theory or Practical grade
• Practical rules:
- They are obligatory
- They are done in groups of 2 people
- Location: To be determined (Old EUI)
- Register practical groups
- AUTOMATIC RESERVATION
- Location: Shortly the reservation times will be released
- Commencing of practical sessions; +20 October (when the laboratories end)

Bibliography

• Bibliografía general:
Standard ODMG-93. O. Pastor, I. Ramos: OASIS version2 (2.2): A Class-Definition Language to Model Information Systems Using an Object-Oriented Approach. SPUPV-95.788. CORBA. Manifiestos
• En cada tema se dará la bibliografía particular que se haya utilizado.

LEARNING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Pedro García Gómez
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6061 APR
Course	5º A

Objectives

• Familiarise the student with computational and algorithmic learning. Define information protocols valid for the efficient learning of language types. Study efficient learning algorithms for some regular and context-free language types. Study decision tree learning.

Syllabus

1. Introduction to algorithmic learning
2. Decision tree learning
3. The inductive inference paradigm
4. Regular language learning
5. Context-free language learning
6. Learning with additional information: oracles
7. Reinforcement learning

Practice

Practice 1: Synthetic generator design
Practice 2: Learning algorithm implementation
Practice 3: Decision tree learning

Evaluation standards

• February exam:
- 40% practical laboratory sessions
- 30% a task proposed in class
- 30% class exercises
(the latter can be substituted for and exam out of 10 points)
• June exam: exam out of 10 points

Bibliography

• Systems That Learn. An introduction to learning theory for cognitive and computer scientists Daniel N. Osherson, Michael Stob, Scott Weinstein. Bradford, 1990
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• Machine learning : a theoretical approach. Balas K. Natarajan. Morgan Kaufmann, 1991
• C 4.5 : programs for machine learning. J. Ross Quinlan. Morgan Kaufmann, 1993

AUTOMATIC PROGRAM OPTIMISATION

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Germán Vidal
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6064 OAP
Course	5º A

Objectives

• The objectives of this subject are based around the study of different automatic techniques for the optimisation of programs. Firstly, static analysis techniques are looked at, which allow information to be extracted from a program without the need to run it. This information could be useful for the compiler or for different optimisation tools. Later, program transformation techniques are studied, which permit efficient program specifications to be converted or specialise generic components. Finally, the subject ends with a revision of the main implementation techniques for non-algorithmic languages.
• To simplify their study, the different automatic program techniques will be looked at within the framework of a very simple functional language (similar to Haskell).
• The subject web page can be found at http://www.dsic.upv.es/~gvidal/oap.html

Syllabus

1. Introduction
2. Program Static Analysis techniques
3. Program generation from specifications
4. Program specialisation techniques
5. Non-algorithmic language implementation

Practice

• Practical sessions will consist of the implementation of a software tool associated with the techniques studied in the theory class. More specifically, students must implement a program analyser or a code specialisation tool.
• Practice sessions can be done individually or in groups.

Evaluation standards

• The evaluation will consist of a written exam (with notes) on the material covered in the theory classes (20-40% of the final grade) along with the evaluation of practical sessions (60-80% of the final grade).

Bibliography

• Terrence W. Pratt. Lenguajes de Programación. Diseño e Implementacion. Prentice-Hall.
• N. Jones, K. Gomard, and P. Sestoft. Partial Evaluation and Semantics-Based Program Generation. Prentice-Hall, 1993.

DECLARATIVE PROGRAMMING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Salvador Lucas
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6065 PD
Course	5º A

Objectives

• Declarative programming is a programming paradigm based on logic, in which many advanced aspects of modern programming languages are studied. The overall objective of the subject is to study in-depth the formal and applied aspects of declarative programming and, in particular, the paradigms most representative of the declarative programming style: functional programming and logic programming, following a uniform outline based on exploiting the most appropriate logic for each style: an equation logic for the functional style and clausal logic for the logic style.

Syllabus

1. Introduction to Declarative Programming
2. Programming in functional languages
3. Functional program reasoning
4. Logic language programming
5. Declarative language applications

Practice

• In the laboratory students work in an environment with facilities for developing GUI applications: efficient programming techniques are learnt in the most representative languages of each paradigm (Haskell, Maude and Prolog) and techniques and advanced applications such as XML document processing, the rapid development of interpreters and compilers, etc. are studied.

Evaluation standards

• An exam on the entire theory contents of the subject and assessment of the practical sessions completed. Personal work.

Bibliography

• [Bir00] Richard Bird. Introducción a la Programación Funcional con Haskell. Prentice-Hall, 2000.
• [HR04] Seif Haridi and Peter van Roy. Concepts, Techniques, and Models of Computer Programming. The MIT Press, 2004.
• [Hud00] Paul Hudak. The Haskell School of Expression. Learning functional programming through multimedia. Cambridge University Press, 2000.
• [NM00] Ulf Nilsson and Jan Maluszynski Logic, Programming and Prolog (2ed) John Wiley & Sons Ltd, 2000.
• [PE93] Rinus Plasmeijer and Marko van Eekelen. Functional Programming and Parallel Graph Rewriting. Addison-Wesley, 1993.

PATTERN RECOGNITION

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Joan Andreu Sánchez
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6066 RF
Course	5º A

Objectives

To provide a broad, introductory view of Pattern Recognition and its applications.

Syllabus

- Introduction
- Feature extraction
- Probability distributions
- Linear models
- Distance-based methods
- Unsupervised learning
- Error correcting methods
- Bayesian networks
- Hidden Markov models
- Maximum entropy

Practice

Lab exercises proposed in lectures.

Evaluation standards

A written exam (70% of the global mark) and the results obtained in lab exercises (30% of the global mark).

Bibliography

* R.O. Duda, D.G. Stork and P.E. Hart. Pattern Classification. Wiley, 2001.
* C.M. Bishop. Pattern recognition and machine learning. Springer, 2006. • R.O. Duda, P.E. Hart. Pattern Classification and Scene Analysis. Wiley, 1973.
• R.O. Duda, D.G. Stork, P.E. Hart. Pattern Classification. Wiley, 2001.
• R.C.Gonzalez and M.G. Thomason: Syntactic Pattern Recognition: an Introduction. Addison Wesley, 1982.
• H.Bunke and A. Sanfeliu: Syntactic and Structural Pattern Recognition: Theory and Applications. Worl Scientific, 1990.

NEURONAL NETWORKS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Francisco Casacuberta Nolla
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6067 RN
Course	5º A

Objectives

The first objective of the subject is to familiarise the student with the exciting world of Artificial Neuronal Networks, highlighting their possibilities and limitations. The second objective is to train the student in the design of Connectionist Systems for the resolution of real problems of prediction and interpretation of the real world, as well as image recognition, medical diagnosis, meteorological prediction, stock-market prediction, etc.

Syllabus

1. Introduction
2. Linear Discriminant FUNCTION
3. Feed-Forward Network: Multi-layer Perceptron
4. Other Connectionist Paradigms

Practice

For the practical sessions in this subject artificial neuronal network simulation software will be used (Stuttgart Neural Network Simulator). They are structured in three blocks: Introduction to the SNNS environment; Comparison of different training algorithms and different samples of parameters with the Multi-layered Perceptron, and connectionist Classifier/Predictor with the Multi-layered Perceptron.
Evaluation Standard
The subject grade will be determined by the extra-course-content tasks and the satisfactory completion of the practical sessions of the subject.

Evaluation standards

The subject grade will be determined by the extra-course-content tasks and the satisfactory completion of the practical sessions of the subject

Bibliography

• Bishop, Ch. M. "Neural Networks for Pattern Recognition." Clarendon Press. Oxford. 1995.
• Duda, R. O., Hart, P., Stork, D. G. "Pattern classification". John Wiley. 2001.
• Ripley, B. D. "Pattern Recognition and Neural Networks." Cambridge Univ. Press. 1996.
• MacKay, D. "Information Theory, Inference and Learning Algorihtms". Cambridge Univ, Press. 2004.

OPERATING SYSTEM DESIGN

Degree	Computer Science Degree					
Department	DISCA					
Lecturer in charge	Juan Carlos Pérez y Sergio Sáez					
Type	Optional					
Total credits	Total	6	= Theory	3	+	Practice 3
Code	6068					DSO
Course	5º					A

Objectives

• The objective of this subject is to familiarise the student with the implementation and design of operating systems, following on from the theory knowledge acquired in the previous Operating Systems subject.
• It is a fundamentally practical subject, in which students work with a real operating system. Until the 1997-1998 academic year, in previous subjects Minix (a completely operative reduced UNIX) was used as an example O.S., but since the 1998-1999 academic year we have studied the most recent operating system: Linux
• There is a large amount of information available about this operating system, most of it being freely accessible. On the other hand, the availability of this system in several educational laboratories in the School as well as the Computing Faculty makes doing practical work outside of the course timetable easier.

Syllabus

• Basic aspects of the system
1. Introduction. Historical evolution. Source code structure.
2. I386 architecture
3. Linux processes. Process table
4. Initialisation of the Linux kernel
• Linux kernels mechanisms
5. System calls
6. Interruption management hardware
6.1. Innovation and installation of a device driver
6.2. Clock interrupt driver
7. Internal services
7.1. Introduction. Softirqs
7.2. Tasklets
7.3. Bottom-halves
8. Synchronisation mechanisms
8.1. Wait-queues for processes
8.2. Design and implementation of kernel traffic-lights
9. Process management
9.1. The planning diagram
9.2. Change of context

Practice

• The proposed practical sessions try to cover the most important aspects of the system and are the following:
PL1. Compilation of the kernel
PL2. Modules of the kernels
PL3. Device drivers
PL4. System calls

PL5. Timed message display screen
PL6. (optional) Message display screen with interruptions

Evaluation standards

• 30% of the final grade (3 points) will be obtained from the practical work evaluation (except the first, which is introductory). The remaining 70% (7 points) will be the weight of the written exam. The written exam will be composed mainly of theory questions, but also questions relevant to the laboratory work. At least 4 out of 10 in the theory and practical sessions will be needed to pass.
• The final grade in the re-sit exam will be the same, if the student has attained a grade of 4 or higher, or only the exam grade, if the student hasn't passed or completed the practical sessions during the corresponding semester.
• The optional practical work is oriented to learning, not improving the grade. This means that those who wish to undertake it are those who are interested and who want to dedicate some time to master the linux nucleus and its internal structure a little more. Nevertheless, its evaluation will add one point to the practical grade (equivalent to +0.3 of the overall grade). On doing unguided practical work, the tutors will not direct their completion. They will only respond to accurate questions and explicitly explain the concepts about which they are asked. Therefore, the students will have to look for most of the information by themselves.

Bibliography

• IMPORTANTE: Página web de la asignatura: http://futura.disca.upv.es/~dso

• "The Linux Process Manager: the internals of scheduling, interrupts and signals", John O´Gorman. Ed: John Wiley and Sons. ISBN 0-470-84771-9
• "Understanding the Linux kernel", 2nd edition, Daniel P. Bovet and Marco Cesati. Ed: O´Reilly. ISBN 0-596-00213-0
• "Linux Core Kernel commentary", Maxwell, S. Ed: Coriolis Group. ISBN 1576104699
• "Linux Kernel Internals", M. Beck, H. Bohme, M. Dziadzka, U. Kunitz, R. Magnus, D. Verworrner. Ed: Addison Wesley ISBN 0-201-33143-8
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• "The Linux Kernel book", Remy Card, Eric Dumas, Franck Mevel. - Chichester : John Wiley, 1998. ISBN 0471981419
• "Programacion Linux 2.0 : API de sistema y funcionamiento de nucleo", Remy Card, Eric Dumas, Franck Mevel. - Barcelona : Gestión 2000, D.L. 1997. ISBN 8480882077
• Linux device drivers / Alessandro Rubini, Jonathan Corbet. - 2nd. ed. : O´Reilly, 2001. ISBN 0596000081 [ONLINE]
• "The Linux Kernel" David A. Rusling. LDP.

DISTRIBUTION SYSTEMS DESIGN AND APPLICATION

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Joan Vila Carbó
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6069 DYA
Course	5º A

Objectives

a) To learn about distributed application design patterns (client-server, distributed objects, process groups, peer to peer, etc.) and the main design objectives: Scalability, Security, Code mobility, Availability, etc.
b) To learn about and acquire skills in present-day environments and tools for the development of distributed applications: Java, CORBA, XML, SOAP, etc.

Syllabus

1. Basic Java
2. Sockets in Java
3. Distributed objects in Java (RMI)
4. Heterogeneous applications with CORBA
5. Multi-diffusion and groups
6. Applets and graphic interfaces in Java
7. Servlets
8. Distributed applications with SOAP
9. Security: digital signatures and ssh
10. FINAL TASK: The agency of robots

Practice

Evaluation standards

• 2 types
a) Exam
Type of exam: consisting of 15-20 short and concise questions about the theory topics and practical work.
b) Practical work
Pass policy:
1. To be able to pass with this type of evaluation without a written exam, the obligatory part of ALL OF THE PRACTICAL SESSIONS should be submitted (9 practical sessions + final task).
2. The grade will vary between 5 and 8 on the basis of the work completed in each practical session (optional parts) and on the submission time.
3. To attempt to attain grades 9 and 10 the final exam also needs to be passed (grade>6).

Bibliography

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• G. Coulouris, J. Dollimore, T. Kindberg, Distributed Systems. Concepts and Design, Addison Wesley, 3ª edición.
• W. Emmerich, Enginnering Distributed Objects, Wiley 2000.
• M. Campione, K. Walrath, The Java Tutorial: Object Oriented Programming for the Internet

(Tomo 2), Addison Wesley Java Series, 3ª edición.
• http://java.sun.com

DISTRIBUTED SYSTEMS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Pablo Galdámez Saiz
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6070 SD
Course	5º A

Objectives

• The explosion in the use of systems like WWW, internet and intranets, makes distributed applications more and more important.
• This course aims to teach the basics of the creation of systems in distributed environments. As such, the main characteristics of a distributed system will be studied, as well as how they can be used for new applications.
• In this subject, students will also study some of the standards which have emerged for distributed application design.
• The nature of the subject is mixed, with essential theory contents and practical work which will equip those students interested in designing distributed applications.

Syllabus

1. Introduction
2. Communication
3. Processes
4. Naming
5. Synchronisation
6. Consistence and replication
7. Tolerance and Faults
8. Security

Practice

• 4 practical tasks: 1 on communication via sockets and 3 on the development of an object call manager.
• They are carried out and submitted in groups of 1 – 2 students.
• Final date for submission: THE DAY OF THE FINAL EXAM

Evaluation standards

• Theory exam: 60%
• Grade should be >=4
• Practical: 40%
• Each practical sessions: 10%
• EACH grade should be >=4
• ALL practical work must be submitted BEFORE the final exam
• Second exam and following
• Only the exam is considered
• Practical work is NOT CARRIED OVER

Bibliography

• Distributed systems : principles and paradigms (Tanenbaum, Andrew S.), Activo □
• Thinking in Java (Eckel, Bruce), Distributed systems: concepts and design

LOCAL AREA NETWORKS AND NETWORK INTERCONNECTION

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Juan Vicente Capella Hernández
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6071 RAL
Course	5º A

Objectives

• Cover the basic concepts of Local Area Networks, which includes aspects relative to transmission forms, topologies and transmission techniques.
• Study the basic concepts of the structure, organisation and operation of local networks.
• Study the most significant architectures used in Local Area Networks.
• Analyse the problems surrounding Network Interconnection, and describe possible solutions at both architectonic and device level.
• Use and configure tools which permit the interoperability of systems in local environments.
• Study different Application Programming Interfaces (APIs) as network services access tools.
• Acquire experience in the installation, utilisation and management of local networks using operating systems in commercial networks.
• Explore and analyse the possibilities of Intranets.

Syllabus

• Basics of local area networks
- Introduction
- Topologies and forms of transmission
- Protocol architecture (IEEE 802 Standard)
• Ethernet Family
- Ethernet
- Fast Ethernet
- Gigabit Ethernet
• Wireless Networks
- IEEE 802.11
- Bluetooth
• Local area network design
- Structured wiring
- Local network interconnection
- VPNs
- VLANs
- Concepts and applications
- IEE 802.1Q
• Intranets
• Switches (LAN – METRO)
STP
- Routing in bridges/switches
- The problem of cycles
- IEEE 802.1D
- RSTP
- Source Routing
Metro Ethernet
- Envronment and definitions (POP, superPOP, intraPOP, ISP, NSP, Sonet, DWDM…)

- Sonert vs. RSTP (ATM vs 10gE)
- RPR (ieee 802.17)
- Routers (WAN)
Access, edge and core routers
- Switching vs. routing
- Longest match routing
- PATRICIA
• Routing
- IGP: Revision Distance Vector, Link State
- EGP: Path vector. Introduction to BGP-4

Practice

P1. X Server Architecture (2 sessions)
P2. Network file systems, Samba, NFS. (1 session)
P3. Local area network simulation with OPNET. (2 sessions)
P4. Bluetooth. Protocol stack BlueZ. Use of Bluetooth tools. (3 sessions)
P5. Visit to Ono or Telefonica communications centre (1 session)

Evaluation standards

• The evaluation is based on a final exam, 80% of which is related to the subject theory and 20% to the laboratory work.
• It is possible to do voluntary tasks to improve the final grade.

Bibliography

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• "Designing Campus Networks", Terri Quinn-Andry, Kitty Haller - Cisco Press
• "Ethernet - The definitive guide", Charles Spurgeon - O´Reilly
• "Gigabit Ethernet", Rich Seifert - Addison Wesley
• "The Switch Book", Rich Seifert - John Wiley & Sons

MULTIMEDIA NETWORKS

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	José Oliver
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6072 RMM
Course	5º B

Objectives

• The objective of this subject is to provide the student with a comprehensive vision of multimedia data transport systems, dealing with the most noteworthy aspects at all levels: from network technologies (especially multimedia data transport on the Internet) to multimedia applications (e.g. Videoconference and streaming), looking at different strategies for the encoding and efficient transport of multimedia data (image and video compression, mechanisms for the protection and concealment of errors, service quality, etc.).

Syllabus

1. Introduction
- Subject presentation.
- Justification and context of the contents.
- Multimedia data transmission: Historical evolution.
2. Network multimedia applications
- Introduction
- Definition and types of applications
- Internet multimedia applications
- MBONE tools, Iphone, Cu-SeeMe, NetMeeting, etc.
- Network requirements.
- Introduction to data compression.
- Conclusions.
3. Audio encoding
- Introduction
- Audio characteristics
- Digitalisation
- Audio signal quality
- Specific parameters
- Audio compression
- Telephonic quality
- CD quality
- Conclusions
4. Image encoding
- Introduction
- Image characteristics
- Image capturing and digitalisation (digital cameras)
- Image types (according to their resolution)
- Encoding (from RGB to YCbCr YCbCr with subsampling)
- Image compression. Spatial redundancy.
- JPEG standard
- Wavelets
- JPEG 2000 standard
- Conclusions

5. Video encoding
- Introduction
- Video characteristics
- Analogical video capturing
- Video digitalisation
- Video types (according to quality)
- Specific network parameters
- Video compression
- Temporal redundancy
- Moving estimation: algorithms
- Standards: MPEG-* and H.26*.
- Conclusions
6. Multimedia transport protocols on the Internet
- Introduction
- Multi-destination communications
- IP multicast
- MBONE (Multicast Multicast BackbONE)
- RTP/RTCP Protocols
- RTSP Protocol
- Protocols with quality of service (QoS) support
- RSVP, IPv6 and IP Switching
7. Video diffusion techniques
- Introduction
- Management control
- Hierarchic video encoding
- Protection and concealment of errors
- Video on demand
- Transcoding techniques
- Conclusions

Practice

• Multimedia tools for the compression of audio and video, and to do streaming on the network.
• Capturing and reproduction of audio and video on Windows. Description of Windows' API to access audio and video hardware devices.
• Entropy encoding. Development of basic lossless data-compression algorithms (Huffman, arithmetic coding). Performance analysis.
• Audio compression. Development of basic audio-compression algorithms (ADPCM). Performance analysis.
• Image compression. Development of basic image-compression algorithms (conversion RGB to YCbCr, JPEG). Performance analysis.
• Audio and/or video transmission on the network. Using the results obtained in the previous practical work, develop a client-server application which establishes an audio and/or video session among machines using protocols to support multimedia data transmission.

Evaluation standards

• The evaluation of the theory part of the subject will be done via a final written exam which will make up 50% of the final grade. The other 50% will be based on subject tasks, which are related to the aspects studied in the theory sessions, and developed during the practical sessions.

Bibliography

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• [KUO98] F. Kuo et al.,"Multimedia Communications", Prentice Hall, 1998.
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• [AudioFAQ] FAQ Internet sobre codificación y compresión de audio. [txt]
• [IP Phone FAQ] FAQ sobre el software de telefonía IP

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• [MP3 site] http://www.iis.fraunhofer.de/amm/techinf/layer3/index.html

- Codificación de imagen y vídeo:
• [GIB98] Gibson et al., "Digital Compression for Multimedia", Morgan Kaufmann, 1998.
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• [JPEG site] http://www.jpeg.org
• [MPEG site] http://www.mpeg.org

- Protocolos de transporte multimedia:
• [RFC1112] S. Deering, "Host Extensions for IP Multicasting", [txt]
• [RFC2205] R. Braden, L. Zhang, et. al. "Resource Reservation Protocol (RSVP) - Version 1 Functional Specification", IETF Network Working Group, [txt]
• [RFC2236] W. Fenner, "Internet Group Management Protocol, Version 2", [txt]
• [RFC2326] H. Schulzrinne, A. Rao, R. Lanphier, "Real Time Streaming Protocol (RTSP)", [txt]
• [RFC2327] M. Handley, V. Jacobson,"SDP: Session Description Protocol", [txt]
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• [RTP] S. Schulzrinne, S.Casner, R. Frederick, V. Jacobson, "RTP: a Transport Protocol for Real-Time Applications". [RFC1889.txt] [RFC1890.txt] [draft-ietf-avt-rtp-new-07.txt]
• [DaFa99] Ismail Dalgica and Hanlin Fangb, "Comparison of H.323 and SIP for IP Telephony Signaling", Proc. of Photonics East, Boston, MA, September 20-22, 1999.

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• [Sad02] H. Sadka, “Compressed video communications” John Wiley & Sons, 2002.
• [Vet03] A. Vetro, C. Christopoulos, and H. Sun "Video Transcoding Architectures and Techniques: An overview", IEEE Signal Processing Magazine, March 2003.
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COMPUTER NETWORK SECURITY

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Lourdes Peñalver Herrero
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6073 SRC
Course	5º B

Objectives

• Become familiar with and characterise security problems which can affect computer networks. (Said networks can be connected to the internet, or not)
• Study and analyse the most commonly used strategies and tools for guaranteeing an adequate level of security on a determined system based on a computer network.
• Be able to configure a system based on a computer network with a level of security appropriate for its use.
• Become familiar with and be able to configure and use some of the tools available for detecting, analysing and restoring a compromised system.

Syllabus

1. Introduction. Characterisation of a secure system.
2. Confidentiality, Authentication and Digital Signatures. Introduction to cryptography.
3. Basic security on UNIX and TCP/IP protocol stack.
4. Secure protocols. IPSec, ssh, ssi.
5. Web security. Vulnerabilities and possible solutions for servers and clients.
6. Firewalls.
7. System maintenance. Secure Operations.
8. Intrusion detection and forensic analysis tools.
9. Wireless networks. Characteristics and solutions for this type of network.

Practice

• The practical work will consist of the completion of a task, to be chosen among a group of tasks suggested at the end of each topic, in the laboratory. Some examples: Creation of a key manager for the PGP program; Configuration of a secure anonymous ftp server; Configuration of a secure web server (based on apache); Design of a firewall based on IPTables, etc. The idea is that each group of two students completes 4 of these types of task.

Evaluation standards

• The evaluation of this subject will consist of two parts: 50% theory part and 50% practical part.
• The evaluation of the first part could be via an exam or personal and individual task to be chosen by the student. The quality of the task will be evaluated, as well as the bibliographic study carried out and the presentation of the task to the rest of the students in the class.
• The other 50% which corresponds to the practical part will be the result of the continuous evaluation carried out in the laboratory, and the reports handed in by the students as a result of said tasks.

Bibliography

• Este grupo de libros cubre los aspectos básicos que se tratan en el temario de la asignatura, aunque se irá actualizando para los contenidos más específicos y actuales a lo largo del curso.

• Garfinkel & Spafford, “Practical Unix & Internet Security”; ed. O’Reilly, 2002 3ª. ed.

• Chapman B., “Building Internet Firewalls”, ed. O’Reilly, 2000, 2ª ed.
• Kaufman Ch., Perlman R., & Speciner M. “Network Security”; Ed. Prentice – Hall. 2002, 2ª ed
• S. Garfinkel. G. Spafford , “Web Security, Privacy & and Commerce”; Ed O´Reilly, 2002, 2ª ed.
• R. L. Ziegler “Linux Firewalls. Incluyes full coverage of iptables”; Ed New Riders 2002, 2ª ed

INFORMATION SYSTEMS MANAGEMENT AUDIT

Degree	Computer Science Degree
Department	DOEEFC
Lecturer in charge	Rafael Bernal Montañes, CISA, CISM
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6075 AGS
Course	5º B

Objectives

• Basic objectives:
1. Familiarise the student with the basic principles and methodologies of Auditing.
2. Information Systems Auditing: Objectives, methodology and Audit report.
3. Auditing of specific areas: Data Processing Centres, Security, Databases, Communications, Legal Aspects, Data Protection and privacy
4. New ASI trends.

Syllabus

• The syllabus of the subject follows a book published by UPV SPUPV-019 Publication Service, titled “Auditoría de Sistemas de Información” (Information Systems Auditing), by the authors:
- Prof. Rafael Bernal, CISA (UPV)
- Prof. Oscar Coltell, CISA (UJI)
• Furthermore, complementary material such as transparencies, magazine articles, questionnaires and Auditing programs, etc., will be used, which will be included in this subject’s MicroWeb.

Practice

OBJECTIVES:
• The main objectives of the practical work of this subject are the following:
1. That the students become familiar with current or emerging technology, locate and systemise documentation, using basically 3 sources of information:
- Non-periodical static: Books, technical manuals, etc.
- Periodical static: Magazines, etc.
- Dynamic: www Internet pages
2. Show a current view of the technology mentioned, naming commercial products, actual implementation and future trends. Give a bibliographic and topic-related web page list.
3. Locate Auditing techniques, processes and tools which are applicable or related to the chosen technology. In particular, the drawing up of Auditing questionnaires for application to the chosen technology will be assessed
4. Present some conclusions which assess the technology or topic studied.
5.
WORK TO BE DONE:
• The practical class group will use the means available to them (bibliography, the Internet enquiries, asking the tutor, company visits, etc.) to develop the previous points.
• The presentation of the work will be done preferably using Microsoft Word, on paper as well as magnetic hardware. HTML format also for the internet searches carried out, or for the presentation of the task text.
LIST OF PRACTICAL TOPICS:
1. Encryption techniques and tools.
2. Electronic Commerce.
3. Internet and Internet Security.

4. Ofimática/Groupware tools.
5. Hackers & Crackers: current state.
6. CAAT tools. (Computer Aided Audit Tools)
7. Expert Systems. Audit and application for Auditors and Information Systems Audit.
8. Electronic Document exchange. EDI.
9. Info-centres and Call Centres.
10. “Automatic Auditing” tools
11. ON-LINE Auditing tools.
12. Assessment of assets in Information Systems.
12.+1: Portable computing. The mobile office.
14. Electronic mail
15. Electronic Bank
16. Video on-demand
17. Systems Auditing methods
18. Client/server technologies
19. Contingency plans
20. Virus & Antivirus
21. Data Warehousing
22. Distributed Databases
23. RAD tools: Rapid Application Development.
24. Acquisition of computing material
25. File/document protection in ofimática tools
26. Local Networks (LAN)
27. Wide Area Networks (WAN)
28. Legal data protection.
29. Hospital Management Computing.
30. Topic to be chosen by the group (by consent of the tutors)

Evaluation standards

• The subject will be evaluated in two parts: 50% of the final grade will be the evaluation of the theory, via two partial exams, and the other 50% will be the grade of a task to be completed throughout the semester in a group of a maximum of 4 students.

Bibliography

• "Auditoria de los Sistemas de Informacion" Ed. UPV, SPUPV-019

QUALITY CONTROL

Degree	Computer Science Degree
Department	DEIO
Lecturer in charge	Luisa Rosa Zúnica Ramajo
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6076 CDC
Course	5º B

Objectives

• Study the basic concepts and main techniques of Statistical Quality Control, as a basic tool in the framework of a Total Quality philosophy, oriented to prevention and continuous improvement.

Syllabus

• Total Quality: Political Philosophy and Tools
• Basic concepts of Process Control
• Basic Tools
• Process Capacity studies
• Study of measuring systems capacity: R&R analysis
• General concepts of control graphics
• X/R graphic : basis; construction; falta de control signals; power
• Other variable graphics
• Attribute graphics: P, NP, C and U graphics
• CE graphic (Negative Binomial)
• Introduction to advanced graphics: CUSUM, EWMA
• Autocorrelation process graphics
• Introduction to Process Control Off-Line: Taguchi methods
• ISO 9000 quality guarantee standards

Practice

• The basic idea is that students do not limit themselves to the analysis, via computer programs, of data made available to them, but, as much as possible, get involved in the whole organisational process and take decisions which involve the use of real data. To do this, students must work using simplified processes which are set up in the Department Quality Control laboratory. Statgraphics software will be used.
• The course includes two conferences, given by distinguished specialists in the practical application of quality control

Evaluation standards

• Class and practical session points, which are done every week.
• Qualifying Partial half way through the course and
• Final written evaluation

Bibliography

• R. Romero y L.R. Zúnica: "Apuntes de Control Estadístico de Calidad: 1ª Parte y 2ª Parte" SPUPV 2003.874
• "Formulario y Tablas Estadísticas de Control Estadístico de Calidad"

MANAGEMENT AND ORGANISATION OF COMPUTER PROJECTS

Degree	Computer Science Degree
Department	DOEEFC
Lecturer in charge	Julián M. Marcelo Cocho
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6077 DYO
Course	5º A

Objectives

• The acquisition of the basic concepts and techniques of the Management and Organisation of projects, especially computer-based, in the private and public sectors (including computer service companies) allows the professional management of their development with the greatest possible degree of success, identifying the needs of the client, as well as the necessary capacities of the negotiation and development team, to obtain the required results and fully integrate them in the complex organisations of the evolutionary real world.

Syllabus

• The contents of the theory classes encompass standards such as CEN/CWA 14925 ICT-Skills, Eurométodo, IEEE Std 1490:2003, ANSI/PMI 99-001:2004, ISOIEC 1761: 2003…
• Index
• The Project Manager profession
• Project types. Models, methods, rules, phases
• Pre-contractual phase of the project: client, negotiation, contract
• Initial processes of the project: scope and focus
• Planning Processes related to breakdown and time
• Planning Processes related to cost and quote
• Planning Processes related to resources
• Processes related to the risks of the project
• Development and Execution processes: appropriate methods and techniques
• Monitoring and Control Processes: changes, configuration, incidences
• Project Closing Processes
• Documentation, communication and team work
• Strategic context: Integration, portfolio, project office

Practice

• The subject involves two practical tasks which deal jointly with the two large types of project Activities: the drawing up of the documentation necessary for the launch and 'sale' of a real project (including the student's PFC); the other covers the management of planning, estimation, analysis, design and implementation techniques applicable to the aforementioned real project, or another, with the exposition and critique of real cases.
• Practice A Is done in teams of 2 students – 3 by exception – at least one of whom having to attend every session; following the UNE 157.801 standard, required to submit:
- Project Report, including a Viability Study, a first breakdown of tasks and the early estimation of its cost and timescale
- System Specifications, sufficient for the subsequent development; and a
- Project Functional Points Estimation and continuity-change decision
- Presentation and sale of the project, with the help of transparencies which justify the advisability of its roll-out.
• Practice B includes several practical exercises which familiarises groups of up to 4 students with the knowledge necessary for the preparation of projects – potentially coinciding with

practice G – and consisting of:
- Discuss a project development Case in a service company or project team.
- Analyse an information system and draw up a critique, suggesting alternative solutions or improvements for the system.
- Carry out the functional analysis and technical conceptual design of a subsystem to include in a computer system to cover determined requirements.
- Estimate realization times in phases and evaluate project costs from the unit cost of the technicians and their dedication throughout the project.
- Establish the quote to present, taking into account the profit margin to be achieved, the payment method to suggest to the client and the resulting net value.

Evaluation standards

• The overall evaluation is the average of the two mid-term Theory exams (25% each one), the first practical task (20%) and the second (30%), provided that the grade exceeds 3 in all of them.

Bibliography

• Apuntes de la Asignatura
• Colección de normas y estándares.
• Comisión Europea. Eurométodo v.1. Ministerio de Administraciones Públicas, 1998.
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• Domingo Ajenjo, A. Dirección y Gestión de Proyectos Informáticos. Ra-Ma. 2000
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• Webster, G. La gestión de proyectos en la empresa. AENOR, 2000.

COMPUTER PROJECT MANAGEMENT

Degree	Computer Science Degree
Department	DEIO
Lecturer in charge	Antonio Lova y Pilar Tormos
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6078 GPI
Course	5º A

Objectives

• The objective of this course is to teach the students to plan, program and control computer projects. Different stages of project management will be studied, as well as the tools associated with each one, and also advanced network and resource management techniques .

Syllabus

1. Introduction to Project Management
2. Project Planning
3. The critical path method
4. Minimal cost project programming
5. Resource Demand Balancing
6. Project programming with limited resources
7. Monitoring and control of projects
8. Risk and uncertainty of project management
9. Other activity sequencing problems

Practice

• Critical Path Method
• Minimal cost project programming
• Resource demand balancing
• Project programming with limited resources. Multi-project programming.
• Monitoring and control of projects

Evaluation standards

• EXAMS (JANUARY)
The passing of the exams will be determined by by:
• 30% Class work
• 30% Laboratory practical work
• 40% Work on course contents
Students who do not attain >=5 in the previous sections must take the final exam (100%)
• RE-SIT EXAM (JUNE): 100% Exam

Bibliography

BIBLIOGRAFÍA BÁSICA:
• Apuntes de la asignatura.

BIBLIOGRAFÍA COMPLEMENTARIA:
• McConnell, S. (1997): Desarrollo y gestión de proyectos informáticos. McGraw-Hill/Interamericana de España.
• Meredith, J.R. y Mantel, S.J. (2000): Project Management. A managerial approach. Wiley. 4ª ed.
• Moder, J.J., C.R. Phillips y E.W. Davis (1983): Project Management with CPM, PERT and

Precedence Diagramming, 3ª edición. Blitz Publishing.
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• Thayer, R.H. (1992): Software engineering project management. Tutorial. IEEE Computer Society Press.

BUSINESS COMPUTING TOOLS

Degree	Computer Science Degree
Department	DOEEFC
Lecturer in charge	Andrés Boza García
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6079 HIE
Course	5º B

Objectives

THEORY KNOWLEDGE:
• Concept of management systems and business subsystems
• Concept of Business Process Management (BPM)
• Identification and description of the main ERP application characteristics
• Identification of the elements involved in ERP implementation projects
• Concept of decision support systems (DSS) and executive information systems (EIS)
• Identification of applications for a better business management
SKILLS:
• Identify the information needs of management systems
• Identify the ERP application modules necessary in different types of company
• Analyse DSS and EIS tools, and their performance framework
ABILITIES:
• Analysis of the concepts studied in real situations
• Obtain, select and organise information efficiently to increase knowledge in functional business areas
• Know how to relate to organisations in their environment
• Analyse application on the market and their adaptations in different organisations
• Synthesis of the work and ease communication

Syllabus

• Topic. Business, business process and Information System (IS).
Unit 1. Management systems. Business subsystems. Business Process Management (BPM).
Unit 2. Business modelling tools.
Unit 3. Business Information systems. IS to support operational needs. IS to support management needs.
• Topic. ERP
Unit 4. Introduction to ERP Systems. Definition and characteristics. Motivation for their acquisition. Impact on the organisation.
Unit 5. ERP modules. ERP parameterisation.
Unit 6. ERP selection. Analysis of business situation. Search and evaluation of ERP solutions. The
consulting company.
Unit 7. ERP implementation. The implementation project. Personnel involved. The implementation company.
Unit 8. Evolution of the ERP. SCM y CRM.
Unit 9. ERP market.
• Topic. Information Systems for control in management, decision-making and business strategy.
Unit 10. Decision Support Systems (DSS). Executive Information Systems (EIS).
Unit 11. Performance measurement systems.
Unit 12. Performance measurement tools. Data warehouse, Data mining, Business Intelligence.

Practice

Week Description
1. Business Game
2. Business Modelling/Vision
3. ERP
4. ERP
5. ERP
6. ERP
7. Analysis of applications
8. Analysis of applications
9. Analysis of applications
10. Analysis of applications
11. EIS/DSS/BI/Cognos
12. EIS/DSS/BI/Cognos

Evaluation standards

• 6 Points Theory
• 4 Points Practice
• More than 40% of the grade must be attained to calculate the average

Bibliography

• Cuenca,Ll., Boza,A., Introducción a la gestión de empresas y su parametrización con el ERP Baan IVc, Editorial UPV,2005
• Guarch,J.J.,Cuenca,Ll., Las aplicaciones informáticas y las empresas. Soluciones ERP, Editorial UPV,2002
• Laudon,K., Laudon,J. Sistemas de Información Gerencial, Pearson Educación,2002
• Muñoz,L., ERP: Guía práctica para la Selección e Implantación, Gestión2000.com, 2004
• O'brien,J.A., Sistemas de Información Gerencial, McGraw-Hill,2001

PRODUCTIVE, LOGISTICAL AND COMMERCIAL SYSTEM INFORMATION

Degree	Computer Science Degree				
Department	DOEEFC				
Lecturer in charge	Llanos Cuenca González				
Type	Optional				
Total credits	Total 6	= Theory 3	+	Practice 3	
Code	6080			ISP	
Course	5º			A	

Objectives

ABILITIES
• Prepare the student with professional skills via the study of real cases.
• Teach the student not to focus on technicalities and to be able to deal with people from different areas of the organisation.
• Team work
• Interest in learning and exploring the reality of businesses
THEORY KNOWLEDGE
• Introduction to organisations, studying commercial, logistical and productive systems in-depth.
• Introduction to process management, analysing circuits and documents
• Human Resources in the company

Syllabus

1. Introduction to organisations
2. Systems and subsystems
2.1. Commercial subsystem
2.2. Productive subsystem
2.3. Logistical subsystem
2.4. Other subsystems
3. Process management
4. Circuits and documents
5. The importance of human resources

Practice

• The course practical sessions are focused on getting to know the reality of business management, its characteristics and requirements.
• Real companies will be worked on
• The final task could lead to the carrying out of the PFC

Evaluation standards

NORMAL EXAMS
• Continuous evaluation of the work done by the student, which allows a complete assessment of their work over the length of the course.
- cases (10%)
- exercises (10%)
- practice (30%)
- level tests (30%)
- voluntary tasks (20%)
• The students can opt to sit a final exam (100%)
SPECIAL EXAM
• Exam (100%)

Bibliography

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• Boza A., Cuenca Ll..(2006) Gestión y Mantenimiento de Empresas Industriales. SPUPV-2006. 017
• Cuenca, Ll.; et al.(2002) La empresa y sus sistemas de información. SPUPV-2002. 293

COMPLEMENTARIA
• BUENO, E. (1.999): Curso básico de economía de la empresa. Ed. Piramide, Madrid.
• DE MIGUEL, E. (1.999): Gestión de empresas. Ed. Universitat Politecnica de Valencia
• VICENS Salort E., et al. (1999) Apuntes de gestión industrial en sistemas de producción e inventario. SPUPV-99399

OPERATIVE INVESTIGATION – II

Degree	Computer Science Degree				
Department	DEIO				
Lecturer in charge	Antonio Lova y Pilar Tormos				
Type	Optional				
Total credits	Total	6	= Theory	3	+ Practice 3
Code	6081				IO2
Course	5º				A

Objectives

• Students learn to formulate and resolve complex decision problems, with special emphasis on the formulation of linear and integer programming models, as well as other advanced Operative Investigation techniques.

Syllabus

1. Formulation of linear and integer programming models:
- Production planning. Problems of expenses and mixes. Multi-period production planning. Other models.
- Binary variables. Establishment of work shifts, cut of raw materials and covering models. Investment planning. Production planning. Other models.
2. Special linear programming problems:
- Transport models
- Assignment models
- Other network models
3. Multi-objective programming:
- Basic concepts. Restriction methods. Weighing methods.
- Other multi-objective techniques.
4. Goal Programming:
- General structure of a goal programming model. Weighted goal programming. Lexicographic goal programming. Applications. Other multi-criteria approaches.
5. Non-linear programming:
• Characteristics of non-linear programming methods. Non-linear programming methods without restrictions. Restricted non-linear programming. Quadratic programming. Applications.
6. Metaheuristics

Practice

• Formulation of models
• Multiobjective programming
• Goal programming
• Non-linear programming

Evaluation standards

Normal exam:
• Final exam (100%)
Additionally, students can voluntarily complete a task (individually or in groups of 2 students) which will improve the final grade up to 2.5 points.
Special exam:
• Final exam (100%)

Bibliography

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INFORMATION SYSTEMS CONCEPTUAL MODEL

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Arturo González del Río Rams
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6082 MCS
Course	5º A

Objectives

• Define and clarify basic information system concepts.
• Provide the student with criterion for the investigation and perception of requirements of an Information System.
• Study the appropriateness of descriptive techniques for the needs of the users.

Syllabus

1. Systems. Information Systems.
2. Revision of data models.
3. Dynamic modelling.
4. Requirements.
5. Information obtaining techniques.

Practice

1. Diagramming techniques
2. Acquisition structures
3. Requirements specification
4. Dynamic specification
5. Project

Evaluation standards

• Evaluation of practical work for those who attend 80% of the classes.
• Evaluation via exam for those who cannot attend.

Bibliography

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• Davis , A.M. Software Requirements Prentice Hall, 1993.
• Power,M.J. Computer Information Systems Development South-Western Publishing Co.1983
• Fairley,R. Ingeniería de Software McGraw-Hill 1987
• De Marco, T. Structured Analysis and SystemSpecification. Yourdon Press 1979.
• Pressman,R.S. Ingeniería de software: un enfoque práctico. McGraw-Hill 1993

DATABASE TECHNOLOGY

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Juan Carlos Casamayor Ródenas
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6083 TBD
Course	5º A

Objectives

• Study of SGBDs: components, functions and architectures
• Study of transaction
processing and QUERY optimisation
• Study of DATA independence,
integrety and security control mechanisms
• Study of the implementation of databases
• Study of administration tasks in an SGBD

Syllabus

1. Database management systems
2. Transaction processing
3. Integrity management
4. Security management
5. Database implementation
6. Database optimisation

Practice

1. Presentation of Oracle 9i
2. Transaction processing
3. Semantic integrity control
4. Concurrency control
5. Recovery control
6. Security management
7. Database implementation
8. Optimisation

Evaluation standards

- Final written exam containing questions on the theory and practical aspects (80% of the final grade)
- Deliverables from the practical sessions (20% of the final grade)

Bibliography

+ Fundamentos de Sistemas de Bases de Datos (3ª ed.)
Elmasri, R.; Navathe, S.
Addison Wesley, Prentice Hall. 2000

+ Introducción a los Sistemas de Bases de Datos (7ª ed.)
Date, C.J.
Prentice Hall. 2001.

+ Database System Implementation

García Molina, H.; Ullman, J.; Widom, J. ç
Morgan Kaufman. 1997

+Databases and Transaction Processing
Lewis, P.; Berstein, A.; Kifer, M.
Springer, 1999

+ Database Tuning
Shasha, D.; Bonet, P.
Morgan Kaufman. 2003

+ Database Management Systems
Ramakrishnan, R.
WCB/McGraw Hill, 1998

ERROR TOLERANCE IN COMPUTERS

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Pedro Gil Vicente
Type	Optional
Total credits	Total 4,5 = Theory 3 + Practice 1,5
Code	6841 TFC
Course	5º A

Objectives

• To learn the concepts and terminology related to the reliability of information systems.
• To learn redundancy techniques which allow the design of highly reliable systems.
• Study error-tolerant system reliability modelling and evaluation techniques
• Study examples of real error-tolerant systems in different fields of application: Space satellites, avionics, communication, banking, electronic commerce.

Syllabus

Topic 1: Introduction to reliability. Basic definitions.
Topic 2: Redundancy techniques in information.
Topic 3: Redundancy techniques in hardware.
Topic 4: Redundancy techniques in software.
Topic 5: Redundancy techniques in time.
Topic 6: Modelling and evaluation of error-tolerant systems.
Topic 7: Error-tolerant system architecture.
Topic 8: Applications and examples or error-tolerant systems.

Practice

Practice 1: Design and simulation of an error correction circuit based on Hamming's SEC code.
Practice 2: Design and simulation of an error-tolerant circuit, based on hybrid self-purging redundancy hardware.
Practice 3: Obtaining reliability of components and systems with the Relex program.
Practice 4: Modelling and evaluation of error-tolerant systems using Cmarkov.

Evaluation standards

• Submission of practical session reports.
• Coursework.

Bibliography

• D. K. Pradhan: Fault-Tolerant Computer System Design. Ed. Prentice Hall, 1996
• B. W. Johnson: Design and analysis of fault tolerant digital systems. Ed. Addison--Wesley, 1989
• D.P. Siewiorek, R. S. Schwarz: Reliable computer systems: Design and evaluation (2nd. Edition). Ed. Digital Press, 1992
• P. Verissimo y L. Rodrigues, Distributed Systems for System Architects (Advances in Distributed Computing and Middleware, Volume 1). Ed. Kluwer Academic Publishers, 2001.
• H. Kopetz: Real-Time Systems. Design Principles for Distributed Embedded Applications. Ed. Kluwer Academic Publishers,1997.
• Pankaj Jalote. Fault-Tolerance in Distributed Systems. Ed. Prentice-Hall. 1994
• J. Arlat y otros, coordinados por J. C. Laprie:"Guide de la sûreté de fonctionement". Ed. Cépaduès editions, Toulouse, Francia, 1996.
• P. J. Gil: Confiabilidad, conceptos básicos y terminología. Informe interno, DISCA--GSTF,

1996

OPERATING SYSTEM ADMINISTRATION

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Andrés Terrasa (aterrasa@dsic.upv.es)
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	6842 ASO
Course	5º A

Objectives

This subject is related to one of the most typical jobs in Computer Science, the administration or management of operating systems (or "system administration"). The subject will include all the regular tasks normally involved in this job, from the installation of a single system to the design of administration policies at the enterprise level.

The subject is completely centered on the laboratory activity. During the semester, the students will progressively install, configure and manage their own domains of systems according to real-life scenarios which are applicable to existing mid-size enterprises. These configurations will be implemented by using two of the most widely used operating systems nowadays: Linux and Windows Server 2003.

Syllabus

1. Installation of CentOS Linux
2. Installation of Windows Server 2003
3. Protection in Linux
4. Protection in Windows Server 2003
5. Windows Server 2003 Domains
6. Linux Domains
7. Integration of Linux and Windows Server 2003 Domains

Practice

• A two-hour laboratory activity is completed for each topic of the theory programme (system installation, DNS, protection, etc.), in each of the operating systems. Due to their complexity, some activities will be completed in two sessions instead of one.
• In the laboratory students organise themselves into groups of 4 to 8 people (depending on the attendance) and must complete the practical tasks in groups. Each group has to install/configure 4 laboratory computers.
• The activities are presented to the student as an installation and configuration requirements document, which must be achieved within the given time of the laboratory session. It is advisable to prepare for the practical sessions in advance, reading the heading and creating a laboratory activity design to be developed to meet the given requirements.
• Each practical session is evaluated upon finishing the corresponding session(s), according to the activities carried out by the group in the laboratory. All of the group members receive the same grade. The subsequent handing in of any kind of report is not required.

Evaluation standards

1) Normal Exams. Consist of two parts:
(a) Laboratory activity: make up 70% of the final grade and is applied to all of the group members. Each practical sessions is graded with Suspend, Notable or Outstanding. Lack of attendance reduces the practical session grade by 10% for each session missed, although the absences are recoverable in other sessions completing “the same” practical task. Passing the practical work is a requirement for passing the subject.
(b) Written exam: makes up 30% of the final grade, and is applied individually. Passing the exam is a requirement for passing the subject.
2) Special exam. There are 2 alternatives, depending on the passing (or not) of the practical work.
(a) Written exam for students who have passed the practical work. Makes up 30% of the grade, since the practical grade is carried over to the special exam.
(b) Written exam for students who haven’t passed the practical work. Makes up 100% of the grade and is different to the aforementioned exam. This exam contains a practical case (not trivial) in which the student
must demonstrate her/his abilities as a system administrator.

Bibliography

• Existe un libro de apuntes de la asignatura que trata todos los temas del temario. El libro se publica en la microweb de la asignatura, así como en el Servicio de Reprografía.
• Adicionalmente, para los alumnos que lo soliciten, se pueden proporcionar referencias a libros, manuales, enlaces web, con información específica para cada aspecto del temario.

INDUSTRIAL INSTRUMENTATION

Degree	Computer Science Degree	
Department	DISCA	
Lecturer in charge	Ginés Benet Gilabert	
Type	Optional	
Total credits	Total 4,5 = Theory 4,5 + Practice 3	
Code	7164	IIN
Course	5º	A

Objectives

• The course is dedicated to the study of industrial instrumentation in its entirety, and includes the following aspects:
- Sensors and transducers, responsible for capturing and acquiring signals.
- A/D and D/A conversion and Digital Signal Processing (DSP).
- Commercial industrial instrumentation management programs (Labwiev and similar).

Syllabus

Topic 1. Transducers
Definitions, classification. Signal types. Physical magnitudes.
Topic 2. Industrial Data Acquisition Systems.
Data acquisition cards. Block diagrams.
A/D and D/A data converters. Converter types.
Data acquisition cards performance.
Topic 3. Digital Signal Processing (DSPs)
Practical examples of application.
Programming and development tools with DSPs.
Practical examples of application.
Topic 4. Automatic Measuring Systems
Introduction. Programmable instrumentation.
Instrumentation Buses.
Instrument programming languages.
Graphic programming environments (Labwiev and similar). Current trends.

Practice

• 5 laboratory practical sessions have been scheduled. These practical sessions consist of a guided first part, in which the student is in contact with the elements of the practical work and attains minimal skill. In the second part the students are expected to be more creative, developing the answer to a given question themselves in the outline of the practical session, and proposing a simple application of those already studied.
Pratice 1: Sensors a transducers. Temperature, Optical Barriers. Cardiac rhythm.
Practice 2: PCL-812 card. Data acquisition. Conversion programming.
Practice 3: Introduction to DSP. Digital filtering. Basic programming tools in DSPs.
Practice 4: Programmable Instrumentation Systems. Bus IEEE-48. SCPI language.
Practice 5: Instrument management in graphic programming environments (Labwiev).

Evaluation standards

• The subject evaluation includes the following aspects: attendance at the laboratory practical classes (20%), the quality of the final task of the course (60%) and the final exam grade (Brief development questions) (20%)

Bibliography

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• [NIST-IEEE1451] National Institute of Standards and Technology, IEEE 1451, Draft Standard Home page. URL:<http://ieee1451.nist.gov/>http://ieee1451.nist.gov/>

INDUSTRIAL LOCAL AREA NETWORK

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	José Carlos Campelo Rivadulla
Type	Optional
Total credits	Total 4,5 = Theory 3 + Practice 1,5
Code	7165 RLI
Course	5º B

Objectives

• In the world of industrial automation, where distributed control systems applied to these environments are evermore present, it is necessary to pay attention to the communication networks employed in these environments. In these there are different types of requirements, from the laxest to the strictest which make up critical real-time systems. For this reason there are different communication protocols which cover the wide range of necessities.
• That is why, apart from the study of necessities, restrictions and requirements which distributed control systems demand from communication systems (field buses), those with the most future potential will be studied.
• The course syllabus is based on three clearly differentiated blocks: in the first there is an introduction and study of the historical evolution of field buses, as well as the common characteristics regarding physical and link levels. In the second block a study and analysis of the most-used protocols with the greatest future in the industrial field (i.e. Profibus, Industrial Ethernet, C.A.N. and T.T.P.). Finally, in block three each student studies a specific protocol (apart from the ones studied in class) and completes a task and presentation on it. This task could focus on theory or practice.

Syllabus

1. Introduction.
2. Physical level in industrial networks.
3. Link level in industrial networks.
4. Study of protocols.

Practice

1. Microcontrollers in industrial environments (0.5 credits)
2. Use of channel series Microcontrollers (0.4 credits)
3. Communication via C.A.N. (0.6 credits)

Evaluation standards

• The evaluation of the course will be based on the grades attained in the coursework and practical sessions.

Bibliography

• D.J. Sterling & S.P. Wissler. The industrial Ethernet networking GUIDE. Ed. Thomson Delmar-learning, 2003
• Mahalik, N.P. Fieldbus technology : industrial network standards for real-time distributed control. Ed. Springer. 2003
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Protocol TTP/C: High-Level Specification Document. Specification edition 1.0.0, document number D-032-S-10-028. 2002.
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• Lawrenz, Wolfhard. CAN system engineering: from theory to practical applications. Ed. Springer. 1997
• Kopetz, Hermann. Real-time systems : Design principles for distributed embedded applications. Ed. Kluwer Academic, 1997.
• J.R. Jordan . Serial Networked Field Instrumentation. Ed. John Wiley & Sons, 1995.

ROBOTICS

Degree	Computer Science Degree
Department	DISA
Lecturer in charge	Martín Mellado
Type	Optional
Total credits	Total 4,5 = Theory 1,5 + Practice 3
Code	7166 ROB
Course	5º A

Objectives

• Study the wide and general concepts related to the structure, organisation and operation of robotics systems
• Study and learn the basic programming methods of each of the different types of robot

Syllabus

Topic 1: Rudiments of robotics
Topic 2: Articulated robots
Topic 3: Mobile robots
Topic 4: Humanoid robots

Practice

• Programming of articulated robots
• Programming of mobile robots
• Programming of humanoid robots

Evaluation standards

• Coursework (80%)
• Continuous evaluation and voluntary tasks (20%)

Bibliography

• Practicas de Programacion de Robots, M. Mellado, A. Sánchez, E. Vendrell, R. Zotovic, Editorial UPV, Ref. 2002.253, ISBN: 8497052455, 2002. 5,68 Euros
• Robótica Industrial, M. Mellado. Libro de Apuntes, Editorial UPV, 2002. Referencia: 2002.884 (AGOTADO, pero estarán disponibles en la microweb las trasparencias).
• Simulación en Robótica mediante VirtualRobot, M. Mellado. Libro de Apuntes, Editorial UPV, 2003. Ref.: 2003.443 (AGOTADO, pero estará disponible en la microweb en formato digital).

COMPUTER-ASSISTED MANUFACTURING

Degree	Computer Science Degree
Department	DISA
Lecturer in charge	Eduardo Vendrell
Type	Optional
Total credits	Total 4,5 = Theory 3 + Practice 1,5
Code	7167 FAC
Course	5º B

Objectives

• To know and learn about the basic principles of Computer-Assisted Manufacturing.
• To know and learn about components and the characteristics of a Flexible Manufacturing Cell.
• To know and learn about the use and characteristics of Numeric Control machines.
• Give the student an introduction to NC machine programming and, in particular, ISO code.

Syllabus

1. Basic Concepts of CAM
2. CAM systems
3. Machine-tool programming
4. CAD/CAM integration

Practice

• Programming of a numeric control
- Programming in ISO code
- Design and programming of a component
• Coursework
- Completion of a personalised task based on the course contents

Evaluation standards

• First exam:
- Attendance and completion of practical sessions (10%)
- Completion of a task defined by the tutor (90%)
• Second exam
- Attendance and completion of practical sessions (10%)
- Exam (90%)
• Remaining exams:
- Exam (100%)

Bibliography

• La bibliografía, al no existir un libro único para todos los contenidos de la asignatura, se suministra con cada tema.

• La bibliografia, al no existir un llibre únic per a tots els continguts de l´assignatura, se subministra amb cada tema.

INFORMATION CODING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Tomás Pérez
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	7168 COD
Course	5º B

Objectives

• Study the basic topics of Information and Coding Theory along with some of their main applications: data compression algorithms and error-correction codes. An introduction to complex structured data coding via XML will also be dealt with. The main objective is to provide theory-practical knowledge and abilities necessary to efficiently use these techniques in current computer applications.

Syllabus

1. Information Theory I: generalities, information concept, entropy, information sources, communication channels, coding.
2. Codes.
3. Lossless data compression.
4. Lossy data compression. Multimedia applications.
5. Information Theory II: types of channels, information transmission via communication channels, mutual information, capacity of a channel, reliable transmission in unreliable channels.
6. Correction codes and error detectors.
7. Structured data coding: XML
8. Algorithmic Information Theory.

Practice

• Practice sessions will consist of the implementation of coding and decoding algorithms for data compression.

Evaluation standards

• The evaluation will be based on the exercises, practical laboratory sessions and proposed tasks.

Bibliography

• N. Abramson, Teoría de la información y codificación, Paraninfo, 1981.
• T.M. Cover, J.A. Thomas, Elements of information theory, John Wiley & Sons, Inc, 1991.
• D. Peltzer, XML Language Mechanics & Applications, Pearson Education, Inc, 2004.
• K. Sayood, Introduction to data compression, Morgan Kaufmann Publishers, Inc, 2000.
• R. B. Wells, Applied coding and information theory for engineers, Prentice Hall, 1999.

LANGUAGE THEORY

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Pedro García Gómez
Type	Optional
Total credits	Total 6 = Theory 6 + Practice 6
Code	7169 TDL
Course	5º B

Objectives

• To comprehensively study some aspects of Formal Language Theory, with a special emphasis on regular and context-free language types and on rational transductions.

Syllabus

BLOCK I AUTOMATA, LANGUAGES AND SEMIGROUPS
Topic 1. Deterministic Finite Automaton Minimisation
Topic 2. Non-Deterministic Finite Automaton Minimality
Topic 3. Local languages. Homomorphic characterisation of regular languages.
Topic 4. Monoids, homomorphisms and congruencies.
Topic 5. Syntactic monoids of a language.
Topic 6. Pseudo-varieties and varieties of a language.

BLOCK II TRANSDUCTION
Topic 1. Transductors and Generalised Sequential Machines.

BLOCK III CONTEXT-FREE LANGUAGES
Topic 1. Context-free grammars. Equation systems.
Topic 2. Lemas de iteración.
Topic 3. Semi-linear sets. Parikh Theorem.
Topic 4. Homomorphic characterisation of context-free languages. Dyck languages.
Topic 5. Battery-powered automata.
Topic 6. Closure Properties
Topic 7. Deterministic context-free languages. Closure Properties.

Practice

Practice 1: Implementation of test algorithms for explorable conditions.
Practice 2: Implementation of automaton minimisation algorithms.
Practice 3: Implementation of analysis algorithms in context-free grammars.
Practice 4: Implementation of transformation algorithms between transductors.

Evaluation standards

• June exam:
- 40% practical laboratory sessions
- 30% class work
- 30% class exercises
(The latter can be substituted for an exam out of 10 points)
• September exam: Exam out of 10 points

Bibliography

• Varieties of Formal Languages, J.E. Pin., North Oxford. 1986.
• Automata, Languages and Machines (Vols. A y B), S. Eilenberg., Academic Press. 1974.
• Transductions and Context-Free Languages, J. Berstel., Teubner Studienbucher. 1979.
• Introduction to Formal Language Theory, M. Harrison., Addison Wesley. 1978.
• Handbook of Formal Languages (Vols. I, II y III), G. Rozenberg, A. Salomaa (eds.)., Springer Verlag. 1997.

INTELLIGENT SYSTEMS

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Vicent J. Botti (vbotti@dsic.upv.es)
Type	Optional
Total credits	Total 6 = Theory 6 + Practice 6
Code	7170 SIN
Course	5º A

Objectives

• Agent-based systems are one of the most important and exciting areas of investigation and development to have emerged in information technologies during the 90s, and offer support to many aspects of current computing applications infrastructures. Therefore, many observers believe that agents represent a new software development paradigm – the most important since object orientation. In fact, the concept of the intelligent agent is already present in a diverse range of information technology sub-disciplines, such as software engineering, computer networks, object-oriented programming, artificial intelligence, interaction between humans and machines, concurrent and distributed systems, mobile systems, telematics, computer-supported cooperative work, control systems, and electronic commerce.
• Agent-based technology is not restricted to a specific domain within computing or telecommunications. Rather, it probably plays a principle role in diverse aspects of computing. Crucial areas of interest tackle diverse aspects related to complex problem solving in science, society, industry and commerce; as much in terms of technological development as in its acceptance and utilisation, which is why agent technology can and will provide better access to computing knowledge and resources in these areas.
• The objective of the course is to learn the basic concepts and techniques necessary to be able to develop intelligent agents and multi-agent systems. This objective is divided in two: learn the basic concepts and agent/multi-agent system technology and learn artificial intelligence techniques, complementary to those already studied, which allow us to provide “intelligence” to our artificial agents. The techniques studied must be contrasted and evaluated, applying them to the practical resolution of problems.

Syllabus

a) Intelligent Agents:
- Distributed Artificial Intelligence. Agents and Agent Types. Concepts. Agent Models and Architectures. Applications. Laboratory Practical work.
b) Multi-agent Systems:
- Multi-agent Architecture. Platforms. Concepts. Communication between agents. Coordination in SMA. Methods and Tools. Applications. Laboratory Practical Sessions.
c) Incorporating ‘Intelligence’ in artificial agents:
C1) Planning:
- The problem of planning. Concepts. Partially-ordered planning. Planning graphs. Planning and action in the real world. Planning-based agents. Applications. Laboratory practical sessions.
C2) Case-Based Reasoning:
- CBR cycle. Concepts. Case-Based Reasoning techniques. Case representation. Indexing. Warehousing. Recuperation. Adaptation. Tools. Classification and synthesis tasks. Applications.
C3) Decision Theory:
- Basics of utility theory. Functions of utility and multi-attribute utility. Decision Networks. Sequential decision problems. Repeating of Values. Repeating of Policies. Agents based on decision theory.

Practice

Evaluation standards

• The course grade will be determined by:
- 50% Coursework
- 50% Developed practical work

Bibliography

• Inteligencia Artificial. Un enfoque moderno. S. Russell, P. Norvig. Prentice Hall (2004).
• Agentes Software y Sistemas Multiagente: Conceptos, Arquitecturas y Aplicaciones. Ana Mas. Pearson-PrenticeHall. 2004.
• Applying Case-Based Reasoning: Techniques for Enterprise Systems. Ian Watson. Morgan Kaufmann. 1997.
• Monografia:Desarrollo de Sistemas Multi-Agentes. Inteligencia Artificial, Rev. Iberoamericana de IA (AEPIA). Número 13, Verano 2001.
• Monografico Inteligencia Artificial Distribuida y Sistemas Multiagentes. Inteligencia Artificial, Rev. Iberoamericana de IA (AEPIA). Número 6, Otoño 1998.
• Presentaciones de la asignatura.
• Otras referencias

ARTIFICIAL INTELLIGENCE TECHNIQUES

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Federico Barber
Type	Optional
Total credits	Total 6 = Theory 6 + Practice 6
Code	7171 TIA
Course	5º A

Objectives

• Expound, in a practical way, new Artificial Intelligence techniques and methodologies, which allow the recognition and resolution of new types of problems, close to real environments.
• Contrast and evaluate the application of these techniques in the practical resolution of different types of problem.
• Student should acquire a broader vision of AI techniques, which permits them to recognise and deal with new types of problem, as well as carry out a critical and contrasted application of these techniques.

Syllabus

1. Knowledge-Based Systems: Expert Systems.
- Knowledge Engineering. Concepts.
- Representation, Inference and Control.
- Development Methodologies.
- Development Environments.
- Applications. Laboratory practical sessions.
2. Approximated Reasoning:
- Dealing with uncertainty. Probabilistic Methods.
- Dealing with Imprecision. Diffused Logic. Diffused Uncertainty.
- Applications.
3. Constraint Satisfaction Problem (CSP)
- CSP typology problems. Application areas.
- CSP specification: variables, domains and restrictions.
- CSP Inference Techniques
- CSP Resolution Techniques: Search. Heuristics. Optimisation in CSP
- Application environments. Applications in real environments. Laboratory practical sessions.
4. Evolutionary Computing
- Genetic Algorithms and Combinatorial Problems.
- Representation of State. Selection, Cross-Over and Mutation. Survival.
- Applications. Evaluation of Algorithms.

Practice

a) Knowledge-Based Systems: Expert Systems.
- KAPPA Knowledge Environment
- Development of an SBC prototype
b) Constraint Satisfaction Problems (CSP).
- CSP Presentation environment (Con'flex)
- CSP problem modelling
- Evaluation of alternatives

Evaluation standards

a) Evaluation of the Syllabus (40%)
- Basic questionnaire on the course topics.
- Application task: Approximated Reasoning.
- Application task: Genetic Algorithms.
b) Evaluation of Practical Work (60%)
- Presentation of the report from the SBC/KAPPA development practical task
- Presentation of the report from the CSP development practical task

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• ´On-Line Guide To Constraint Programming´ R. Barták. http://kti.mff.cuni.cz/~bartak/constraints/index.html
• KAPPA- User Manual
• Con'Flex- User manual (http://www.inra.fr/bia/T/conflex/)
• Presentaciones de la asignatura.
• Otras referencias.

SIGNALS, SYSTEMS AND RADIO-COMMUNICATIONS

Degree	Computer Science Degree					
Department	DCOM					
Lecturer in charge	Miguel Rodríguez					
Type	Optional					
Total credits	Total	6	= Theory	3	+	Practice 3
Code	7172					SSR
Course	5º					B

Objectives

• The syllabus of the Signals, Systems and Radio-communications course gives an overall view of the different telecommunication systems which currently exist.
• The objective of the course is for the student to learn and understand, at a basic level at least, the operation and design of the most common communication systems. More specifically, in the last part of the course, linear transmission systems, fibre optic systems, radio-communications systems and mobile communications systems will be studied. To be able to understand these systems, some background knowledge is necessary and this will be covered in the initial topics. For example, in the first few topics basic concepts such as signal, system, spectrum, power, bandwidth, sampling, analogical and digital modulations, and signal to noise ratio or probability of error will be taught. At the end of the course an open topic is put forward whereby, with the collaboration of the students, the operation of other systems which have been selected by the students themselves, is demonstrated.

Syllabus

Topic 1. Introduction
1. Basic terms and definitions.
2. Basic outline of a communication system.
Topic 2. Signals and Systems
1. Continuous signals.
2. Continuous systems.
3. Fourier analysis of continuous signals and systems.
4. Discrete signals.
5. Discrete systems.
6. Discrete Fourier Analysis.
7. Signal sampling.
Topic 3. Modulations.
1. Introduction.
2. Analogical modulations.
3. Digital modulations.
Topic 4. Linear Communications Systems
1. General description of the system.
2. Transmitters.
3. Receivers.
4. Lines
5. Disturbances.
6. Linear system design.
7. Frequency-division Multiplexing.
8. Time-division Multiplexing.
Topic 5. Fibre-optic communication systems.
1. General description of the system.
2. Fibre-optics.

3. Optical transmitters.
4. Optical receivers.
5. Fibre-optic communication system design.
Topic 6. Radio-communication systems.
1. General description of the system.
2. Diffusion methods.
3. Antenna.
4. Management and nomenclature of the radio-electric spectrum.
5. Radio-communication system design.
Topic 7. Mobile communication systems.
1. General system architecture
2. The mobile channel.
3. Multiple access.
4. GSM systems.
5. UMTS systems.
Topic 8. Other systems.

Practice

0. Introduction to MATLAB
1. Continuous signals and systems.
2. Discrete signals and systems
3. Sampling.
4. Analogical modulations
5. Digital modulations

Evaluation standards

- The grade is divided in two parts: 75% of the grade corresponds to the theory part and 25% to the practical part. The theory part grade will be obtained in 50% for the continuous evaluation which will be carried out in class via small question plus a final task; the other 50% of the grade will be obtained via a written exam. The practical grade will be obtained with 50% for the continuous evaluation of the practical work and the other 50% for a written exam, to be done alongside the theory exam.
- For students who have difficulty attending class and carrying out a prior continuous evaluation, there is a second chance for evaluation via exam only, whose grade corresponds to 100% of the final course grade.

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MEDICAL COMPUTING

Degree	Computer Science Degree
Department	DFA
Lecturer in charge	Montserrat Robles Viejo
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	7173 IM
Course	5º A

Objectives

• Facilitate reciprocal understanding among computer and health professionals.
• Learn to apply the knowledge learnt on this course and on others to health sciences.
• Familiarise the student with the world of medical computing through basic knowledge typical to this field.

Syllabus

1. Medical Computing context.
2. Bioelectric signals. Electrocardiography. Electroencephalography.
3. Medical images: X-Rays and TAC, Nuclear Magnetic Resonance, Ultrasounds, Nuclear Medicine.
4. Biomedical signal digital processing.
5. Biomedical image digital processing.
6. Hospital Information Systems. Electronic Clinical History.
7. Application of classification/decision systems in medicine.

Practice

1. Biomedical databases on the Internet.
2. Practical medical computing cases. Technical report and presentation.
3. Obtaining electrocardiograms and quantification.
4. Attendance and active participation in conferences (Neuroscience, Telemedicine, Health Information Systems).
5. Biomedical signal analysis.
6. Biomedical signal filtering.
7. Visit to Dr Peset Hospital Imaging Service.
8. Digital biomedical image processing.
9. SNNS applied to medical diagnostic.

Evaluation standards

• Evaluation of the syllabus: questions related to the syllabus (50%)
• Practical sessions reports 25%
• Active participation in conferences and hospital visit 10%
• Technical report and presentation of the case 15%

Bibliography

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• Belmonte MA, Coltell O, García Maojo V, Mateu J, Sanz F: Manual de Informática Médica. 2004. ISBN: 84-933481-0-4.Ed. CADUCEO MULTIMEDIA, S. L.
• Informática Biomédica. ISBN: 84-609-1770-3. 2004. Ed. INBIOMED

BIOCOMPUTING

Degree	Computer Science Degree
Department	DFA
Lecturer in charge	Juan Miguel García Gómez
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	7174 BIO
Course	5º B

Objectives

• Synthesize the role biocomputing in the omic era.
• Analyse models and algorithms used in biocomputing from the view of the designer.
• Apply biocomputing tools for the resolution of projects developed in teams.
• Install and administer small biocomputing systems and assume responsibilities.

Syllabus

DIDACTIC UNIT 1: The biomedical environment
1.1 What is biocomputing? (Theory)
1.2 Biological bases (Theory)
1.3 Basic biotechnology (Theory)
1.4 The human genome project and the omic era (Conference)
1.5 The biocomputing expert as a professional (Conference)
DIDACTIC UNIT 2: Biocomputing algorithm design.
2.1 Sequence similarity algorithms (Theory and Problems with resolution in computing classroom)
2.2 The learning of molecular structure models (Theory and Problems with resolution in computing classroom)
2.3 Data mining and the search for biological patterns (Theory and Problems with resolution in the computing classroom)
DIDACTIC UNIT 3: The resolution of projects via biocomputing (Theory classes to develop course project concepts, explanation in the practical section)

Practice

DIDACTIC UNIT 3: The resolution of projects via biocomputing.
3.1 Applications of the analysis of genetic sequences (Resolution of projects, theory, seminar and laboratory work)
3.2 Molecular structure prediction (Resolution of projects, theory, seminar and laboratory work)
3.3 Biochips: analysis of genetic expression (Resolution of projects, theory, seminar and laboratory work)
DIDACTIC UNIT 4: Design and administration of Biocomputing systems
4.1. Computing necessities of biological computing (Conference)
4.2. Public Access Biocomputing Information Systems (Practice)
4.3. Public Biocomputing Software (Practice)
4.4. Genetic ontology (Practice)
4.5. Installation and administration of biocomputing systems (Practice)

Evaluation standards

1) Evaluation of Conceptual Didactic Units (Didactic Unit 1: Grade 11%. Didactic Unit 2: grade 24%):
2) Active participation in Conferences (Didactic Units 1 and 4: grade 8%):
3) Introductory practical session work (Didactic Unit 4: Grade 6%):

a. Elaboration of the practical work during the session.
b. Running of the laboratory: group server: correct installation of the information system.
4) Development of course project (Didactic Unit 3, Grade 51%).

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• European Bioinformatics Institute. http://www.ebi.ac.uk/

BASICS OF MULTIMEDIA SYSTEMS

Degree	Computer Science Degree
Department	DISCA
Lecturer in charge	Manuel Agustí Melchor
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	7175 FMM
Course	5º A

Objectives

• Provide a sufficient technological base to work with digital media.
• To learn about the specific characteristics of each media: audio, images and video.
• To learn and know how to characterise the representation most used in each media.
• Apply the above knowledge to digital media editing.
• To learn and characterise the development of multi-platform multimedia products.
• Characterisation of a typical application: Author tools.

Syllabus

• Concept and taxonomy. Standards.
• Acquisition and digital representation of information.
• Text and types of documents.
• Audio.
• Image.
• Video.
• Multimedia in networks.

Practice

• Multimedia creation. Introduction to the use of an author tool.
- MetaCard and Revolution.
• Acquisition and representation of multimedia information.
• Text
- Introduction to the use of XML language and its application to document processing and electronic publication.
• Audio
- Audio acquisition and processing. Generation of effects.
• Images
- Bitmap image editing.
- Vector image editing.
• Video
- Video acquisition, editing and encoding.
• Multimedia in networks
- Production and diffusion of multimedia contents through the Internet via streaming techniques.

Evaluation standards

• Evaluation standard
• Final written exam including question on the laboratory practical sessions.

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• Compresión de imagen y vídeo: fundamentos teóricos y aspectos prácticos. J. Oliver y M. Pérez. Univ. Politécnica de Valencia, 2000.
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• Streaming Media Bible, S. Mack, Hungry Minds, Inc, 2002.

MULTIMEDIA INTEGRATION

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Fernando García Granada
Type	Optional
Total credits	Total 4,5 = Theory 3 + Practice 1,5
Code	7176 IMM
Course	5º B

Objectives

• Give a general overview of the different computer tools and technologies aimed at the coordinated unification and presentation of different multimedia elements in a single document or application. Clarification and presentation of the basic terminology, common problems from the point of view of the user and the author. Solutions.

Syllabus

1. The multimedia creation process.
2. Production scenarios.
3. Media integration tools and languages.
4. Storage, conversion and integration formats.
5. Introduction to image and audio composition techniques.
6. Introduction to image animation techniques.
7. Multimedia outline metaphors and implementation.

Practice

1. Introduction to PD language.
2. Audio and Midi in PD
3. Introduction to Geom
4. Video and 3D in Geom
5. Integration project in PD and Geom
6. Image processing in Photoshop and GIMP
7. Video processing in Premiere and After Effects
8. Final task

Evaluation standards

• Final exam: 30%
• Practical work: 20%
• Final task: 50%

Bibliography

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INTRODUCTION TO SYNTHESIS, EDITING AND POSTPRODUCTION

Degree	Computer Science Degree					
Department	DISCA					
Lecturer in charge	Álvaro Domenech Pujol					
Type	Optional					
Total credits	Total	4,5	= Theory	3	+ Practice	1,5
Code	7177				AUD	
Course	5º				B	

Objectives

• General Objective:
- Obtain, manipulate and combine sound materials (in different formats) to obtain a fragment or all of a sound band.
• Specific objectives:
- Capture sound with microphones and other analogical devices.
- Digitally manipulate the sound
-Create and manipulate MIDI files
-Mix audio object and process the result.

Syllabus

1. Introduction to audio
2. Audio digital formats
3. Physical audio supports
4. Sound capturing
5. The MIDI system
6. Sound synthesis
7. Audio processing

Practice

Evaluation standards

Bibliography

DATA WAREHOUSE AND DATAMINING

Degree	Computer Science Degree
Department	DSIC
Lecturer in charge	Matilde Celma
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	7178 AMD
Course	5º B

Objectives

• The general objective of the course is to provide information necessary for the design and construction of decision support information systems (data warehousing systems) as well as the study of data mining techniques, appropriate for the extraction of useful knowledge for data analysis and decision making.
• More specific course objectives aim to enable the student to:
- Recognise the problems involved in the analysis of large volumes of data and the benefits of using new technologies, such as data warehouses and data mining, with the objective of obtaining summarised information in real time or obtaining predictive or descriptive models and patterns.
- Use Data Warehouse technology
- Use a Data Warehouse design and construction methodology
- Produce complex reports using OLAP tools
- Develop the Data Warehouse maintenance system (ETL)
- Learn about the phases of Information System Knowledge Discovery and its importance in the success of the process (especially data cleaning and selection)
- Learn the different automatic and statistical learning techniques used in Data Mining, their potential, their computational cost and representation and intelligibility limitations.
- Select, for a specific problem, which Data Mining techniques are the most appropriate and use them, by means of a Data Mining tool or package.
- Evaluate the quality of a model, using simple evaluation techniques (cross-validation).
- Learn the special problem of Web Mining (text or hypertext documents, XML) and the most common techniques.

Syllabus

1. The knowledge extraction process in S.I.
1.1. Necessities of the Analysis of Large Volumes of Data
1.2. Data Analysis Phases
1.3. Kinds of Tools (OLAP, DM, EIS,…)
1.4. Applications
2. Introduction to Data Warehouses
2.1. Definition and characteristics
2.2. Components of a Data Warehouse system
2.3. Data Warehouse technology (ROLAP/MOLAP)
3. Data Warehouse operation: OLAP tools
3.1. Multidimensional data model
3.2. Data Warehouse enquiries
3.3. OLAP operators
4. Data Warehouse design
4.1. Design methodology
4.2. Design orientations: fact design, dimension design
4.3. Physical design and optimisation

5. Data Warehouse maintenance
5.1. Extraction
5.2. Transformation
5.3. Data loading
6. Introduction to Data Mining (DM)
6.1. Motivation
6.2. Relation of DM to other disciplines
6.3. Data Mining Techniques Typology
6.4. Implementation methodologies: CRISP-DM
7. Data Mining techniques
7.1. The problem of learning on Data Bases
7.2. Hypothesis evaluation
7.3. Unsupervised and descriptive techniques
7.4. Supervised and predictive techniques
8. Web Mining
8.1. The problems of Unstructured Information
8.2. Knowledge Extraction from HTML and text Documents
8.3. Knowledge Extraction from semi-structured Information (XML)

Practice

• Practice 1: use and administration of an OLAP1 tool
- Objectives: Design enquiries and complex reports on a data warehouse. Run an OLAP tool. An Oracle OLAP: Discoverer tool will be used.
• Practice 2: data Warehouse construction
- Objectives: design of a data warehouse using the methodology presented in the theory sessions and their implementation on an Oracle server. Develop some data warehouse maintenance modules: Data loading and cleaning from a transactional database.
• Practice 3: Descriptive Data Mining
- Objectives: obtain data descriptive models (unsupervised): functional dependencies, associations (e.g. shopping basket), segmentation, etc., on part of the data warehouse data. Validation and use of decision-making models. The data mining package (SPSS Clementine) will be used for this.
• Practice 4: Predictive Data Mining
- Objectives: obtain predictive data models (supervised): classification using neuronal networks, decision trees and other types of model, on part of the data warehouse data. Validation and use of decision-making models. The data mining package (SPSS Clementine) will be used for this.

Evaluation standards

• Theory: evaluation via final exam.
• Practice: continuous evaluation via the submission of the practical session solutions.

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MOBILE DEVICE APPLICATION DEVELOPMENT

Degree	Computer Science Degree				
Department	DSIC				
Lecturer in charge	Lenin G. Lemus Zúñiga				
Type	Optional				
Total credits	Total	6	= Theory	3	+ Practice 3
Code	7179				ADM
Course	5º				A

Objectives

• When discussing mobiles devices most people associate this concept with mobile telephones or personal assistant or PDA.
• This is normal as these are currently the most common mobile devices on the market. However, we are living in a period in which the technological advances in telecommunications material, computing and component miniaturisation allow us to imagine sophisticated mobile devices which in the future will be omnipresent in our lives and undoubtedly improve our day to day living.
• Until recently, the implementation of programs for these devices was somewhat complex, only to be achieved by a handful of experts. At the rate technology is evolving the possibility of adding functionality to these devices to adapt them to our necessities in increasing. Why conform to the programs which come with mobiles or PDA's by default when we can develop our own applications?
• Currently, personalising the operation of our mobile devices, by means of new "tailor-made" applications is something that requires the knowledge of a certain development platform and its programming language.
• On this course we aim to introduce the students to the world of mobile device application development.
• To do this, they will study in-depth the two approximations, based on virtual machine, which currently exist on the market: Java 2 Micro Edition (J2ME) and .NET (.NET Compact Framework) platforms.
• For each of these, a series of case studies will be presented which permit the deduction of strengths and weaknesses, as well as weighing up their applicability to the problem to be resolved.
• The use of device emulators as a requisite for testing prior to the distribution of a commercial application will also be covered.
• Finally, the different capabilities offered by existing devices on the market will be identified, as well as the business possibilities that the knowledge acquired on this course can offer.

Syllabus

• First block
This block succinctly explains the concepts of: Web application, mobile device, application server and the basic structure of a application server based on Apache-Tomcat.

• Second block
Once the Web application environment has been identified, in this block the development platform provided by Sun Microsystems: J2ME (Java 2 Micro-Edition) will be explained.
In this block the following will be explained:
- What J2ME consists of
- Its use for carrying out communications management using GPRS and Bluetooth
- The sending/reception of SMS and MMS messages
- Multimedia programming

• Third block
In this block the proposal by Microsoft to develop mobile device applications will be analysed: The .Net Compact Framework environment.
The objective is to learn how to implement:
• Graphic interfaces
• File and database management
• Communications management using IrDa, Bluetooth
• Multimedia programming
• Fourth block
The objective of this final block is discuss how an application is developed using J2ME or .Net Compact Framework

Practice

Evaluation standards

• There will be a practical approach to this course and therefore the evaluation will consist of a final task which implements a Web application that displays its contents in a mobile device.
- Exams to be done in theory sessions
- Expositions of completed tasks
- 4 tasks to be developed throughout the course
- Development of an application
• To complete the tasks, each student must submit 4 reports and a documented final application.
• The tasks to be submitted are:
• Manual with a detailed description of the J2EE Sun Microsystems development environment.
O What is J2EE?
O Detailed description of APIs
• Manual with a detailed description of the .Net development environment.
O What is .Net?
O Detailed description of development APIs
• Manual with detailed description of Bluetooth functionality
• Manual with the detailed description of IrDa functionality
• Manual with detailed description of the protocol employed by wireless networks WiFi
• Manual with the configuration of an Application server

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4.JBoss. http://www.jboss.org
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MECHATRONICS

Degree	Computer Science Degree
Department	DISA
Lecturer in charge	Ángel Valera
Type	Optional
Total credits	Total 6 = Theory 3 + Practice 3
Code	7180 MEC
Course	5º B

Objectives

• Give the students an introduction to the basics of mechatronic systems, including the design of high technology machines and equipment and their control by computer.
• To learn the basic elements that compose a mechatronic system, including actuators, sensors and computer systems.
• Understand the general principles related to the control of mechanisms by computer.
• Develop and use computer programs for applications in automation and control of equipment, mechanisms and industrial processes.

Syllabus

• The course syllabus is centred around the following contents:
1. Introduction
2. Sensors and Transducers
3. Conditioning of signals
4. Actuator systems
5. Closed Loop Controllers
6. Communication systems
7. Planning, coordination and supervision
8. Applications: mini/micro-robotic, etc.

Practice

• The laboratory practical sessions will be centred around the programming and control of mechatronic systems. Therefore different activities will be carried out for the programming of data acquisition systems and actuator systems (continuous current motors), system sensor reading (position, light, etc.).
• Finally, on the course a mini-robot must be developed, using a pre-programmed a series of objectives and missions to complete, using the robot.

Evaluation standards

• The course is oriented so that the evaluation is carried out directly from the work developed by the students, taking into account the tasks completed in the theory classes as well as the laboratory practical sessions.
• Furthermore, for the evaluation, a task with a mini-robot must be carried out and groups of students will be in competition with each other. The grade for this task will take into account the performance (precision, speed, etc.) attained using the mini-robots.

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