Computing Curricula at the University of Alicante

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Content

• Introduction
• Computing Disciplines
  – Computer Engineering
  – Computer Science
  – Information Systems
  – Information Technology
  – Software Engineering
• Degree on Computing
• Master Degrees on Computing
Introduction

• Computing is a broad discipline that crosses the boundaries between mathematics, science, and engineering
• New computing disciplines emerge over time
• Several reports that define and update guidelines for computing curricula have appeared over the past four decades

Introduction

• Computing Curricula 2005 (CC2005):
  – A cooperative project of:
    • The Association for Computing Machinery (ACM)
    • The Association for Information Systems (AIS)
    • The Computer Society (IEEE-CS)
  – CC2005 is oriented to higher education in the United States and Canada
  – Download from:
    • http://www.acm.org/education/curricula.html
    • http://computer.org/curriculum
Introduction

• Five discipline-specific volumes:
  – Computer engineering (CE)
  – Computer science (CS)
  – Information systems (IS)
  – Information technology (IT)
  – Software engineering (SE)


Introduction

• **CC2005 Overview Report:**
  – Its goal is to provide perspective for those in academia who need to understand what the major computing disciplines are and how the respective undergraduate degree programs compare and complement each other

• **The Guide to Undergraduate Programs in Computing:**
  – This guide will offer guidance to a broader audience, including prospective students, their parents and guidance counselors, and others who have reason to care about the choices that await students who move from high school to college

Computer Engineering

• Spanish: *Ingeniería de computadores*

• Content:
  – The design and construction of computers and computer-based systems
  – It involves the study of hardware, software, communications, and the interaction among them
  – Its curriculum focuses on the theories, principles, and practices of traditional electrical engineering and mathematics and applies them to the problems of designing computers and computer-based devices
Computer Science

• Spanish: Computación
• Content:
  – Theoretical and algorithmic foundations
  – Robotics
  – Computer vision
  – Intelligent systems
  – Bioinformatics

Information Systems

• Spanish: Sistemas de información
• Content:
  – Its curriculum focuses on integrating information technology solutions and business processes to meet the information needs of businesses and other enterprises, enabling them to achieve their objectives in an effective, efficient way
• Two main degree programs:
  – Computer Information Systems: strong technology focus
  – Management Information Systems: emphasize the organizational and behavioral aspects of IS
Information Technology

• Spanish: *Tecnologías de la información*
• Content:
  – The professional on IT assumes responsibility for selecting hardware and software products appropriate for an organization, integrating those products with organizational needs and infrastructure, and installing, customizing, and maintaining those applications for the organization’s computer users

Software Engineering

• Spanish: *Ingeniería del software*
• Content:
  – A foundation in programming fundamentals and basic CS theory
  – Problem modeling and analysis
  – Software design
  – Software verification and validation
  – Software quality
  – Software process
  – Software management
Degree in Computing Engineering

- 240 ECTS = 4 years
- 1 ECTS = 25 hours

6000 hours, 1500 hours per year

- Total price: 4,250.40€ (17.71€/credit) ≈ 17,700 Zloty
- Modules:
  - Fundamentals: 60 ECTS
  - Common of computing: 108 ECTS
  - Specific: 48 ECTS
    - Computer Engineering
    - Computer Science
    - Information Systems
    - Information Technology
    - Software Engineering
  - Professional training or English: 12 ECTS
  - Final project: 12 ECTS
- All subjects: 6 ECTS

Degree in Computing Engineering

- Fundamentals:
  - Programming 1 (algorithms)
  - Mathematics 1 (calculus)
  - Physics fundamentals of computing
  - Fundamentals of computers
  - Business administration
  - Discrete mathematics
  - Mathematics 2 (algebra)
  - Programming 2 (fundamentals, procedural programming)
  - Fundamentals of databases
  - Statistics
Degree in Computing Engineering

• Common of computing:
  – Computer structures
  – Data structures and algorithms
  – Programming 3 (object-oriented paradigm)
  – Operating systems
  – Design of databases
  – Computer networks
  – Languages and programming paradigms
  – Analysis and design of algorithms
  – Advanced tools for application developing
  – Computer architecture

Degree in Computing Engineering

• Common of computing:
  – Administration of operating systems and computer networks
  – Distributed systems
  – Analysis of computing software
  – Intelligent systems
  – Computer engineering
  – Design of computer software
  – Software verification and validation
  – Software projects management
Degree in Computing Engineering

• Specific → **Computer Engineering:**
  – Real-time systems
  – Concurrent programming
  – Computer and network maintenance
  – Home automation and intelligent environments
  – Embedded systems
  – Industrial systems
  – Software development for parallel architecture
  – Automation and robotics

Degree in Computing Engineering

• Specific → **Computer Science:**
  – Computability
  – Artificial vision and robotics
  – Automatic reasoning
  – Interactive graphic systems
  – Programming challenges
  – Language processing
  – Use of information
  – Architecture and technology of robots
Degree in Computing Engineering

- Specific → **Information Systems**:
  - Data processing for information systems
  - Technology scenarios in organizations
  - Information management
  - Requirements engineering
  - Business intelligence and process management
  - Integration of applications and business processes
  - Electronic business management
  - Business management

Degree in Computing Engineering

- Specific → **Information Technology**:
  - Security strategies
  - Management and government of information technologies
  - Application development in internet
  - Content and users web management systems
  - Management and implementation of computer networks
  - Administration and implementation of internet services
  - Databases administration and management
  - Network interconnection
Degree in Computing Engineering

- **Specific → Software Engineering:**
  - Agile methods of software development
  - Security in software design
  - Distributed applications in internet
  - Advanced techniques of software specification
  - Software quality assurance
  - Collaborative development of applications
  - Web engineering
  - Methods and technologies of system integration

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![Graph showing enrollment trends](image)
Master Degrees on Computing

- Master Degree in Development of Applications and Web Services
- Master Degree in Computer Engineering
- Master Degree in Computing Technologies
Master Degree in Development of Applications and Web Services

- 60 ECTS = 1,500 hours of study
  - 52 compulsory subjects
  - 8 final project
- 2 semesters
- Price: 1,884.60€ (31.41€/credit) ≈ 7,500 Zloty

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Advanced software development methodologies</td>
<td>3</td>
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<td>Advanced software systems analysis</td>
<td>3</td>
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<tr>
<td>Pattern-led design</td>
<td>3</td>
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<tr>
<td>User interface design</td>
<td>2</td>
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<tr>
<td>Quality testing and control</td>
<td>3</td>
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<td>Software systems architecture</td>
<td>3</td>
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<td>Web servers</td>
<td>2</td>
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<td>Application servers</td>
<td>2</td>
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<tr>
<td>Advanced programming in desktop environments</td>
<td>4</td>
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<tr>
<td>XML</td>
<td>2</td>
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<tr>
<td>Databases</td>
<td>4</td>
</tr>
<tr>
<td>Developing web applications</td>
<td>3</td>
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<tr>
<td>Developing distributed applications</td>
<td>3</td>
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<tr>
<td>Programming mobile devices</td>
<td>4</td>
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<tr>
<td>Analysing internet trends</td>
<td>3</td>
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<tr>
<td>Browser-orientated internet technologies</td>
<td>3</td>
</tr>
<tr>
<td>Developing rich internet interfaces</td>
<td>5</td>
</tr>
</tbody>
</table>
Master Degree in Computer Engineering

- 90 ECTS = 2,250 hours of study
  - 60 compulsory subjects
  - 30 optional subjects
- 3 semesters
- Price: 2,826.90€ (31.41€/credit) ≈ 11,300 Zloty
Master Degree in Computing Technologies

• 60 ECTS = 1,500 hours of study
  – 15 compulsory subjects
  – 39 optional subjects
  – 6 final project
• 2 semesters
• Price: 1,884.60€ (31.41€/credit) ≈ 7,500 Zloty

Master Degree in Computing Technologies

• Modules:
  – Introduction to research method
    • Scientific research method
    • Communication, technical documents and strategies of team work
Master Degree in Computing Technologies

• Modules:
  – Artificial intelligent
    • Automatic learning
    • Intelligent system development
    • Learning based on structured data and searching based on similarity
    • Management of musical information
    • Virtual reality
    • Autonomous robots
    • Artificial vision

Master Degree in Computing Technologies

• Modules:
  – Human language technologies
    • Human language technologies
    • Intelligent searching of information on the Web
    • Textual information extraction
    • Automatic translation: fundamentals and applications
    • Advanced automatic translation
    • Use and design of ontologies of natural language and semantic web
Master Degree in Computing Technologies

• Modules:
  – Internet technologies and data warehouses
    • Quality in the design of web applications
    • Design of data warehouses
    • Advanced software production
    • XML text markup and digital libraries

Master Degree in Computing Technologies

• Modules:
  – Infrastructure for the society of information
    • Ubiquitous computing
    • Design of embedded systems
    • Special architectures
    • Parallel programming
    • Cryptographic techniques
    • Advanced computer manufacturing
Master Degree in Computing Technologies

• Modules:
  – Services and applications for the society of information
    • E-business
    • E-home
    • Health care computer systems
    • Interfaces for intelligent systems
    • Cryptography
    • Communication security