Bachelor's Degree

Engineering

Computer Science Engineering

Complutense University of Madrid

Syllabus

A group in English is offered.

Type of subject	ECTS
Core Studies	60
Compulsory	90
Itinerary Electives	48*
General Electives	30
Final Year Project	12
Total	240

* These 48 credits must complete one of the eligible itineraries.

Year One	ECTS
Business Management	6
Calculus	6
Discrete Mathematics and Mathematical Logic I & II	6+6
Fundamentals of Programming I & II	6+6
Introduction to Computers I & II	6+6
Introduction to the Concepts of Electricity and Electronics	6
Linear Algebra	6

Year Two	ECTS
Advanced Mathematics	6
Computer Organization	6
Computer Programming Technology I & II	6+6
Data structures	4.5
Databases	6
Fundamentals of Algorithms	4.5
Probability and Statistics	6
Software Engineering I & II	4.5+4.5
Technology and Organization of Computer Systems	6

Year Three	ECTS
Computer Networks	6
Five Itinerary Subjects	36
Operating Systems	6
Two General Electives	12

Year Four	ECTS
Advanced Operating Systems and Networks	6
Computer Architecture	6
Ethics, Legislation and Profession	6
Two Itinerary Electives	12
Three General Electives	18
Final Year Project	12

Year Three Itinerary Subjects	ECTS
Itinerary: Specifics of Computing Technology	
Algorithmic Methods in Problem Solving I & II	4.5+4.5
Artificial Intelligence I & II	4.5+4.5
Concurrent Programming	6
Declarative Programming	6
Foundations of computer languages	6
Itinerary: Specifics of Information Technology	
Advanced Databases	6
Computer Networks Security I & II	4.5+4.5
Enterprise Software	6
Information Systems Audit I & II	4.5+4.5
Web Applications	6

Year Four Itinerary Electives	ECTS
Itinerary: Specifics of Computing Technology	
Interactive Systems Development	6
Language Processors	6
Itinerary: Specifics of Information Technology	
Evaluation of Computer Systems	6
Interactive Systems Development	6

Third and Fourth Year General Electives	ECTS
Application Programming for Mobile Devices	6
Artificial Intelligences Applied to Control Systems	6
Cloud and Big Data	6
Company Creation	6
Company Internship I & II	6
Competitive Programming	6
Computer Tools for Gambling	6
Constraint Programming	6
Cryptography and Coding Theory	6
Data Mining and the Big Data Paradigm	6
Emergent Scientific and Technological Scenarios and the Defense	6
Evolutionary Computation	6
GPU and Accelerator Programming	6
Intelligent Behaviours Engineering	6
Linux and Android Internals	6
Machine Learning and Big Data	6
Network Security (only for the Computing Itinerary)	6
NoSQL Databases	6
Operational Research	6
Robotics	6
Serious Games	6
Social Network Analysis	6
Software Testing	6
User Interfaces	6
Web Engineering	6
Web Technologies for Game Development	6

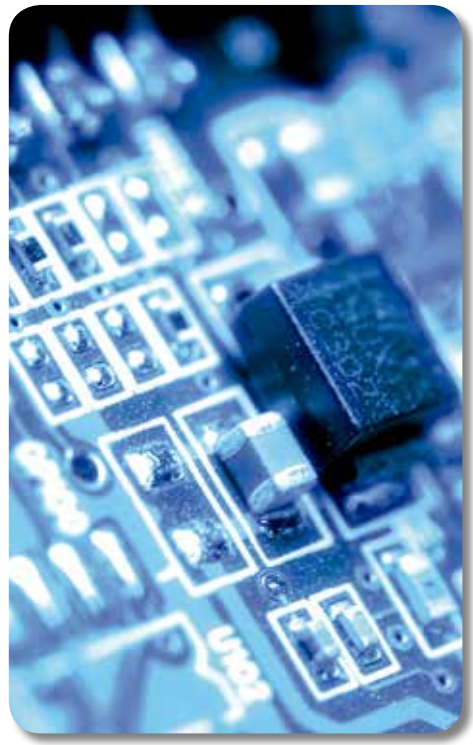
Participation Credits	ECTS
Any course	6

Knowledge
acquired

- Theoretical fundamentals of programming languages and related lexical, syntactic and semantic processing techniques.
- Ability to evaluate computational complexity of a problem and understand which algorithmic strategies may lead to its resolution.
- Fundamentals, paradigms and techniques specific to smart systems.
- Ability to develop and evaluate interactive systems and to present complex information.
- Techniques for computational learning and automatic data mining based on large volumes of data.
- Ability to understand organisation environments and their information and communication technology needs.
- Computer system security.
- Management of computer projects, services and systems in all areas, leading their implementation and continuous improvement while assessing their financial and social impact.
- Preparation of technical specifications for computer installations in compliance with applicable standards and regulations.
- Administration and maintenance of computer systems, services and applications.
- Basic algorithmic procedures of computer technologies to design solutions to problems, analysing appropriateness and complexity of algorithms proposed.
- Most appropriate data types and structures to resolve problems.
- Robust, secure and efficient design of applications, choosing the best paradigm and programming language.
- Operating systems.
- Design of web-based applications.
- Design, analysis and implementation of database applications.
- Information systems, including those that are web-based.
- Parallel, concurrent, distributed and real-time programming.
- Principles, methodologies and life cycles of software engineering.
- Person-computer interfaces that guarantee accessibility and usability of computer systems, services and applications.
- Fundamentals and basic techniques of smart systems and their practical applications.

Professional
opportunities

- System engineer.
- Project engineer.
- Software and application developer.
- Software design architect.
- Person-computer interface designer.
- Information system developer.
- System or solution architect and designer.
- Integration, implementation and testing specialist.



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Grados UCM

Faculty of Computer Science

Campus Moncloa
http://informatica.ucm.es

For further information: www.ucm.es/estudios/grado-ingenieriainformatica
January 2021. Contents of this brochure is subject to changes

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