UNIVERSIDAD
COMPLUTENSE
MADRID

Bachelor's Degree

Faculty of Computer Science

Computer Science Engineering

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.
** Includes 12 ECTS for general electives and 6 participation credits.

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
Seven Itinerary Electives	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

YEAR THREE ITINERARY SUBJECTS CONTINUATION	ECTS
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
Architecture and Programming of Quantum Computers	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 Music	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
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

Bachelor's Degree in Computer Science Engineering

Field of Knowledge: Computer Science and Systems Engineering

Faculty of Computer Science

Campus de Moncloa

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For further information: www.ucm.es/estudios/grado-ingenieriainformatica

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