COMPUTER SCIENCE

Coordinator: Luís Carlos Gonçalves dos Santos Seco, lgseco@ismai.pt

Admission exams: Mathematics (16)[1]

Publication in the Official Gazette: Notice no. 6424/2014 (2nd series), no. 100 of 26/05/2014

The Bachelor's degree in Computer Science is based on the best international standards and the current needs of senior technical staff. It is able to meet the challenges of emerging jobs in the area of Information and Communication Technologies (ICT) as the result of continuous improvement and evolution over more than 20 years.

In a field that requires constant updating, this course has been redesigned and renewed over time and now takes the form that is best adjusted to its students' expectations. It includes technical skills, entrepreneurial and creative spirit and leadership and teamwork abilities, which are qualities requested more and more frequently in the labour market.

It deals with one of the most dynamic employment sectors, in which the supply of jobs for competent professionals is significantly higher than demand both in Portugal and abroad. ISMAI wishes to provide companies with professionals who are best qualified and adapted to their actual needs.

The Bachelor's degree in Computer Science at ISMAI includes six areas of specialisation: mobile computing; geoinformatics; management; next-generation networks; business information systems; and information systems and software. Specialisations are chosen at the end of the 2nd year and are explored in greater depth in the final semester, when students carry out a project or work placement in the relevant specialisation area. This format provides diversified training that has greater flexibility and includes students' active participation in choosing the profile closest to their actual needs.

What makes this course different?

ISMAI has established a series of partnerships that provide access to modern infrastructures such as data centres, virtualisation, telecommunications networks, and business technologies for software development. In this field, particularly important partnerships have been established with: SAP Portugal, which includes the opportunity to join a global SAP certification course; PH Informática, which includes access to technology to develop location-based systems; Alcatel Lucent, which enables Network Routing Specialist I and II certification to be integrated into the course; the City of Porto/Porto Digital Project for access to the telecommunications network, IPTV, a data centre and cloud computing; and OPOLAB, which offers ISMAI students and alumni special conditions to use a co-working space.

[1] Note: students who only hold a Mathematics B (*Matemática B*) qualification will need to take a Further Mathematics course unit, which is free to attend.

SPECIALISATION **MOBILE COMPUTING**

The specialisation in Mobile Computing covers one of the fastest-growing areas of IT. As well as dealing with fundamental computing and programming topics, including operating systems, the different areas of programming, the internet, databases, information systems and security, the course will discuss topics such as the creation of graphical user interfaces that automatically adapt to mobile device screens, the development of applications and games for tablets and smartphones, the use of networks and sensors, and services that use cloud computing or are based on information about the mobile device's location.

Professional opportunities

Computer science, information technology, computer and mobile device networks; analysis and programming of systems and applications, including mobile devices; developing digital games for mobile devices; designing and managing databases and information systems; cloud computing, data mining and big data.

SPECIALISATION **MOBILE COMPUTING**

YEAR 1

SEMESTER 1 • 30 ECTS

- 5 Fundamentals of Information Systems
- 5 Introduction to Programming
- 5 Discrete Mathematics
- 5 Business Organisation and Management
- 5 Operating Systems I
- 5 Internet Technology

SEMESTER 2 • 30 ECTS

- 5 Algorithms and Data Structures
- 5 Systems Analysis
- 5 Complements of Information Systems
- 5 Multimedia
- 5 Object-oriented Programming
- 5 Operating Systems II

YEAR 2

SEMESTER 1 • 30 ECTS

- 5 Databases
- 5 Data Communication and Networks I
- 5 Development of Applications with Graphical User Interfaces
- 5 Development of Information Systems
- 5 Statistics and Probability
- 5 Operational Research

SEMESTER 2 • 30 ECTS

- 5 Complements of Databases
- 5 Data Communication and Networks II
- 5 Software Engineering
- 5 Web Programming
- 5 Decision Support Systems
- 5 Security of Computer Systems and Safe Computing

YEAR 3

SEMESTER 1 • 30 ECTS

- 5 Data Mining and Big Data
- 5 Management of Information Systems
- 5 Mobile Computing
- 5 Interface Design for Mobile Applications
- 5 Game Development
- 5 Sensor Networks and the Internet of Things

SEMESTER 2 • 30 ECTS

- 5 Innovation and Entrepreneurship
- 10 Project/Work Placement
- 5 In-company Mobile Computing
- 5 Cloud Computing
- 5 Location-based Systems

SPECIALISATION **GEOINFORMATICS**

The specialisation in Geoinformatics provides students with skills in two complementary areas: information technology and geographical information systems (GIS). The aim is to train professionals for GIS consultancy and development, including the development of applications that include location-based, map-based and spatial analysis systems. Thanks to the free availability of geographical data all over the planet, the inclusion of GPS on most mobile devices and the emergence of the internet of things, there is an increasingly large amount of geographical information that must be processed and viewed in the context of decision-support systems in many areas of application.

Professional opportunities

Computer science, information technology, computer and mobile device networks; analysis and programming of systems and applications, including advanced location-based systems; designing and managing databases and information systems, including spatial database and GIS; developing GIS web solutions; cloud computing, data mining and big data.

SPECIALISATION **GEOINFORMATICS**

YEAR 1

SEMESTER 1 • 30 ECTS

- 5 Fundamentals of Information Systems
- 5 Introduction to Programming
- 5 Discrete Mathematics
- 5 Business Organisation and Management
- 5 Operating Systems I
- 5 Internet Technology

SEMESTER 2 • 30 ECTS

- 5 Algorithms and Data Structures
- 5 Systems Analysis
- 5 Complements of Information Systems
- 5 Multimedia
- 5 Object-oriented Programming
- 5 Operating Systems II

YEAR 2

SEMESTER 1 • 30 ECTS

- 5 Databases
- 5 Data Communication and Networks I
- 5 Development of Applications with Graphical User Interfaces
- 5 Development of Information Systems
- 5 Statistics and Probability
- 5 Operational Research

SEMESTER 2 • 30 ECTS

- 5 Complements of Databases
- 5 Data Communication and Networks II
- 5 Software Engineering
- 5 Web Programming
- 5 Decision Support Systems
- 5 Security of Computer Systems and Safe Computing

YEAR 3

SEMESTER 1 • 30 ECTS

- 5 Data Mining and Big Data
- 5 Management of Information Systems
- 5 Mobile Computing
- 5 Spatial Databases
- 5 Fundamentals of Geographical Information
- 5 Geoinformatics

SEMESTER 2 • 30 ECTS

- 5 Innovation and Entrepreneurship
- 10 Project/Work Placement
- 5 Business GIS
- 5 Location-based Systems
- 5 Geo-spatial Web

SPECIALISATION **MANAGEMENT**

The specialisation in Management is the result of the restructuring and modernisation of the Bachelor's degree in IT for Business Management that was taught at ISMAI for more than 20 years. The Bachelor's degree in Computer Science with specialisation in Management (IT for Management) provides students with skills in two complementary areas: Information and Communication Technologies and business sciences. The goal is to train professionals in information systems that support business management, including production, logistics, marketing, sales, financial management and human resources. Students receive complete training to become versatile and flexible, qualities which are greatly valued in the market by SMEs and large companies alike.

Professional opportunities

Computer science, information technology and computer networks; analysis and programming of systems and applications; designing and managing databases and information systems; consultancy and audit in ICT; managing IT systems and projects; organising and managing companies, technical management, resource management, planning; senior commercial activities in the ICT sector.

SPECIALISATION **MANAGEMENT**

YEAR 1

SEMESTER 1 • 30 ECTS

- 5 Fundamentals of Information Systems
- 5 Introduction to Programming
- 5 Discrete Mathematics
- 5 Business Organisation and Management
- 5 Operating Systems I
- 5 Internet Technology

SEMESTER 2 • 30 ECTS

- 5 Algorithms and Data Structures
- 5 Systems Analysis
- 5 Complements of Information Systems
- 5 Multimedia
- 5 Object-oriented Programming
- 5 Operating Systems II

YEAR 2

SEMESTER 1 • 30 ECTS

- 5 Databases
- 5 Data Communication and Networks I
- 5 Development of Applications with Graphical User Interfaces
- 5 Development of Information Systems
- 5 Statistics and Probability
- 5 Operational Research

SEMESTER 2 • 30 ECTS

- 5 Complements of Databases
- 5 Data Communication and Networks II
- 5 Software Engineering
- 5 Web Programming
- 5 Decision Support Systems
- 5 Security of Computer Systems and Safe Computing

YEAR 3

SEMESTER 1 • 30 ECTS

- 5 Data Mining and Big Data
- 5 Management of Information Systems
- 5 Mobile Computing
- 5 General Accounting
- 5 Production Management and Logistics
- 5 Marketing

SEMESTER 2 • 30 ECTS

- 5 Innovation and Entrepreneurship
- 10 Project/Work Placement
- 5 Human Resource Management
- 5 Information Security Management
- 5 Financial Management

SPECIALISATION **NEXT-GENERATION NETWORKS**

The specialisation in Next-Generation Networks provides its students with skills in two complementary areas: IT as the main area, including software and information system development, and computer and telecommunications networks as an additional area. Since it is an additional area, the telecommunications component focuses essentially on practical features.

Professional opportunities

Computer science, information technology and computer networks; analysis and programming of systems and applications; designing and managing databases and information systems; managing IT systems and projects; IT system and network administration and management; telecommunications.

SPECIALISATION **NEXT-GENERATION NETWORKS**

YEAR 1

SEMESTER 1 • 30 ECTS

- 5 Fundamentals of Information Systems
- 5 Introduction to Programming
- 5 Discrete Mathematics
- 5 Business Organisation and Management
- 5 Operating Systems I
- 5 Internet Technology

SEMESTER 2 • 30 ECTS

- 5 Algorithms and Data Structures
- 5 Systems Analysis
- 5 Complements of Information Systems
- 5 Multimedia
- 5 Object-oriented Programming
- 5 Operating Systems II

YEAR 2

SEMESTER 1 • 30 ECTS

- 5 Databases
- 5 Data Communication and Networks I
- 5 Development of Applications with Graphical User Interfaces
- 5 Development of Information Systems
- 5 Statistics and Probability
- 5 Operational Research

SEMESTER 2 • 30 ECTS

- 5 Complements of Databases
- 5 Data Communication and Networks II
- 5 Software Engineering
- 5 Web Programming
- 5 Decision Support Systems
- 5 Security of Computer Systems and Safe Computing

YEAR 3

SEMESTER 1 • 30 ECTS

- 5 Data Mining and Big Data
- 5 Management of Information Systems
- 5 Mobile Computing
- 5 Data Communication and Networks III
- 5 Sensor Networks and the Internet of Things
- 5 Transport and Access Network Technology

SEMESTER 2 • 30 ECTS

- 5 Innovation and Entrepreneurship
- 10 Project/Work Placement
- 5 Data Communication and Networks IV
- 5 Telecommunications Network Convergence
- 5 New Telecommunications Technologies

SPECIALISATION **BUSINESS INFORMATION SYSTEMS**

The specialisation in Business Information Systems provides students with skills in two complementary areas: Information and Communication Technologies and business sciences. Its aim is to train professionals in integrated systems to support medium-sized and large companies' resource management, including decision support systems and business intelligence. The specialisation includes the industry training, examination and certification "Integration of Business Processes in SAP ERP (TERP10)", which allows students to add SAP business certification to their academic qualification.

Professional opportunities

Computer science, information technology and computer networks; analysis and programming of systems and applications; designing and managing databases and information systems, consultancy and audit in ICT; SAP consultancy; information system management for organisations in all sectors of activity; senior commercial activities in the ICT sector.

SPECIALISATION **BUSINESS INFORMATION SYSTEMS**

YEAR 1

SEMESTER 1 • 30 ECTS

- 5 Fundamentals of Information Systems
- 5 Introduction to Programming
- 5 Discrete Mathematics
- 5 Business Organisation and Management
- 5 Operating Systems I
- 5 Internet Technology

SEMESTER 2 • 30 ECTS

- 5 Algorithms and Data Structures
- 5 Systems Analysis
- 5 Complements of Information Systems
- 5 Multimedia
- 5 Object-oriented Programming
- 5 Operating Systems II

YEAR 2

SEMESTER 1 • 30 ECTS

- 5 Databases
- 5 Data Communication and Networks I
- 5 Development of Applications with Graphical User Interfaces
- 5 Development of Information Systems
- 5 Statistics and Probability
- 5 Operational Research

SEMESTER 2 • 30 ECTS

- 5 Complements of Databases
- 5 Data Communication and Networks II
- 5 Software Engineering
- 5 Web Programming
- 5 Decision Support Systems
- 5 Security of Computer Systems and Safe Computing

YEAR 3

SEMESTER 1 • 30 ECTS

- 5 Data Mining and Big Data
- 5 Management of Information Systems
- 5 Mobile Computing
- 5 General Accounting
- 5 Production Management and Logistics
- 5 Business Management Systems I

SEMESTER 2 • 30 ECTS

- 5 Innovation and Entrepreneurship
- 10 Project/Work Placement
- 5 Information Security Management
- 5 Business GIS
- 5 Business Management Systems II

SPECIALISATION **INFORMATION SYSTEMS AND SOFTWARE**

The specialisation in Information Systems and Software provides students with skills in Information and Communication Technologies more focused on analysing, specifying, developing and maintaining software and computer applications. Its goal is to train professionals specialised in developing and maintaining advanced computer systems with particular emphasis on programming, developing and integrating systems, allowing students to acquire training so they are able to develop software and participate in software development teams.

Professional opportunities

Computer science, information technology and computer networks; analysis and programming of systems and applications; designing and managing databases and information systems; managing IT systems and projects; cloud computing, data mining and big data; IT system and network programming.

SPECIALISATION **INFORMATION SYSTEMS AND SOFTWARE**

YEAR 1

SEMESTER 1 • 30 ECTS

- 5 Fundamentals of Information Systems
- 5 Introduction to Programming
- 5 Discrete Mathematics
- 5 Business Organisation and Management
- 5 Operating Systems I
- 5 Internet Technology

SEMESTER 2 • 30 ECTS

- 5 Algorithms and Data Structures
- 5 Systems Analysis
- 5 Complements of Information Systems
- 5 Multimedia
- 5 Object-oriented Programming
- 5 Operating Systems II

YEAR 2

SEMESTER 1 • 30 ECTS

- 5 Databases
- 5 Data Communication and Networks I
- 5 Development of Applications with Graphical User Interfaces
- 5 Development of Information Systems
- 5 Statistics and Probability
- 5 Operational Research

SEMESTER 2 • 30 ECTS

- 5 Complements of Databases
- 5 Data Communication and Networks II
- 5 Software Engineering
- 5 Web Programming
- 5 Decision Support Systems
- 5 Security of Computer Systems and Safe Computing

YEAR 3

SEMESTER 1 • 30 ECTS

- 5 Data Mining and Big Data
- 5 Management of Information Systems
- 5 Mobile Computing
- 5 Fundamentals of Geographical Information
- 5 Advanced Programming
- 5 Distributed Systems

SEMESTER 2 • 30 ECTS

- 5 Innovation and Entrepreneurship
- 10 Project/Work Placement
- 5 Cloud Computing
- 5 Information Security Management
- 5 Systems Integration