

MASTER OF SCIENCE IN SOFTWARE ENGINEERING



MSc in Software Engineering

The MSc in Software Engineering provides a thorough grounding in how to apply rigorous engineering principles to deliver elegant, effective software solutions at the first time of asking. Covering all the classical aspects of the software development process, it is ideal preparation for a senior career in this complex field.

Programme outline

The MSc in Software Engineering offers full coverage of the theory and practice of software development in a project-based environment. It provides you with a complete understanding of every aspect of the development process, including concept, design, testing, QA and implementation.

Studying in our virtual classroom, you will gain a unique global perspective on the latest thinking, technologies and methodologies from around the world. Collaborative and group work in a project-based environment, sharing responsibilities across boundaries and cultures will mirror the real-world development process.

Core modules cover computer structures, professional issues, software engineering, systems analysis and design, IT project management, QA and testing, and either Java programming or programming the internet. You can then personalise your degree with an elective module chosen from database analysis, communication and networks, security engineering, operating systems concepts, XML applications, human-computer interaction, e-commerce and managing the software enterprise. You complete your degree with an original dissertation.

On graduation, you should have the technical and project management skills and the commercial and related knowledge required to manage even the most complex software development projects. You should be equipped for a senior professional career in one of the most exacting and dynamic fields in IT.

Programme structure

The programme comprises eight modules (six required, a choice of one of two programming modules, and a further elective chosen from nine options), culminating in a dissertation.

Your first module lasts nine weeks and incorporates a week-long introduction to the programme and our online learning platform. Each of the other modules are eight weeks long.

Personalised study

Students can customise their degree according to their individual requirements.

A Core modules

- Computer structures
- Professional issues in computing
- Software engineering
- Systems analysis and design using an object-oriented approach
- IT project management
- Management of QA and software testing

You will choose one of the following two programming modules

- Object-oriented programming in Java
- Programming the internet

B Elective modules

- Databases
- Computer communications and networks
- Security engineering
- Operating systems concepts
- Programming the internet
- Web XML applications
- Human-computer interaction
- E-commerce
- Managing the software enterprise

C Dissertation

Students refine their dissertation topic in conjunction with their Personal Dissertation Advisor, an academic supervisor who will provide support throughout the study and writing process.

Programme duration

The programme takes, on average, 30 months to complete. However, since students progress at their own pace, you may choose to complete your studies in as little as 18 months or spread them over the six-year maximum.

MSc Modules

Core modules:

Computer structures

Aim: To provide a comprehensive overview of core software and hardware technologies.

This module covers everything from computer architecture to databases, algorithms, languages, operating systems, communications, computer networks, artificial intelligence and the theoretical foundations of computation. It will give you a sound theoretical and practical grounding on which to build your understanding of future technical developments.

Professional issues in computing

Aim: To provide a broad understanding of the social and legal context in which information technology operates.

This module examines the relationship between IT, society and the law. It helps develop an understanding of external matters affecting computer systems and organisations, provides an overview of professional and ethical issues and develops the skills required to manage systems in a way that is both effective and sensitive to their operating environment.

Software engineering

Aim: To provide a firm theoretical foundation and practical skills in software engineering.

This module encompasses the theoretical foundation and practice of the three key phases of problem definition, software development and maintenance. It covers identification, definition, design, analysis, verification and management of basic requirements, coding, testing, evaluation and quality assurance. You will emerge equipped to lead a programming project and deliver products on time and within budget.

Systems analysis and design using an object-oriented approach

Aim: To help you develop the critical skills to understand complex systems and problems and to create automated solutions.

This module takes a modern object-oriented approach to modelling systems and producing designs for software packages that can automate those systems. It will provide the skills you need to master this technique, as well as how to use the Unified Modelling Language (UML) to describe these models.

IT project management

Aim: To provide a full understanding of the management roles, responsibilities and techniques needed in technology projects.

This module shows how technology project management adapts to the evolution of a computer system from concept to implementation. You will master all areas of the subject, including organisation, work breakdown structure and scheduling, resources and project financing, project control and evaluation, management considerations, critical success factors and risk management.

Management of QA and software testing

Aim: To provide an extensive understanding of how to guarantee software quality, including testing, maintenance and effective management.

This module provides the techniques you need to design and implement tests, conduct inspections and employ release and maintenance procedures. It also addresses key management aspects of the quality assurance process.

You will choose one of the following two programming modules:

Object-oriented programming in Java

Aim: To provide a theoretical and practical understanding of object-oriented programming and design using Java.

This module develops the essential problem-solving and programming skills you need to write well structured object-oriented programs in Java. On the way you will explore many other important techniques (such as modern distributed systems and component technology) based on the concepts that have made object-oriented programming today's predominant software development method.

Programming the internet

Aim: To give you the theoretical and practical tools necessary for building advanced, content-rich internet sites.

This module covers markup languages and advanced technologies, including HTML, JavaScript, DHTML, CSS, XML and CGI. On completion, you will be able to design and create an advanced website and will be equipped to undertake complex internet projects.

Elective modules:

Databases

Aim: To equip you with a thorough understanding of the fundamental principles of database construction.

As already dominant database technology develops even further, you will analyse how data is stored, manipulated, queried (with an emphasis on relational databases) and backed up. You will also become acquainted with various paradigms and technologies (parallel as well as distributed) related to database design, implementation and maintenance.

Computer communications and networks

Aim: To familiarise you with the principles and techniques of computer networks.

As the development of computer communications accelerates with the exponential growth of the internet, this module examines a growing range of hardware technology protocols and network applications. You will learn the principles of communication networks and protocol architectures, assessing the suitability of different switching and multiplexing techniques for carrying a variety of distributed systems.

Security engineering

Aim: To provide a grounding in the principles and practice of building secure distributed systems.

This module provides a foundation in the principles and practice of building secure distributed systems. You will discover how to protect systems against malicious attacks, using your understanding of technologies such as cryptology, software reliability, secure message transmission, tamper resistance, secure printing and auditing.

Operating systems concepts

Aim: To cover the core concepts of modern operating systems, and provide an understanding of their application.

This module covers modern operating systems from the three key perspectives of design, functionality and applicability, giving you insight into the *what* and *why* of their structure. You will apply what you learn from simulations and projects in areas such as databases, networking and communications, programming languages and development, security, distributed systems, and internet-based development.

Programming the internet

Aim: To give you the theoretical and practical tools necessary for building advanced, content-rich internet sites.

This module covers markup languages and advanced technologies, including HTML, JavaScript, DHTML, CSS, XML and CGI. On completion, you will be able to design and create an advanced website and will be equipped to undertake complex internet projects.

NB You can only choose this elective module if you have not taken it as a required module.

Web XML applications

Aim: To offer an overview of the uses of the XML language and its role in the next generation of e-business applications.

This module provides an understanding of core XML technologies, the standardised development environment they provide and their implications on future developments with internet applications. You will study XSL, databases and the information discovery and exchange standards, SOAP, WDSL, UDDI, and the use of XML for structuring data on the semantic web.

Human-computer interaction

Aim: To provide an understanding of the design, evaluation, and development of usable interactive application interfaces.

This module provides a thorough grounding in human-computer interaction, including user interface design principles, task analysis, interface design methods, auditory interfaces, haptics, user interface evaluation and usability testing. You will make extensive use of interface design tools to prototype user interfaces for traditional, web-based and mobile environments.

E-commerce

Aim: To provide an overview of key e-commerce issues.

An introduction to the fundamentals of e-commerce, from business models through technical infrastructure and implementation to social, legal and ethical considerations. You will act as a CIO/CEO working on an e-commerce business proposal, with evaluations from a peer review group. Learning to build an e-business holistically in a risk-free environment will help you become a more effective and successful manager.

Managing the software enterprise

Aim: To examine the development, use and evolution of software, and the wider contexts of its use.

This module focuses on the roles and activities involved in managing software engineering within an organisation. Using human, social, knowledge, business and technical perspectives, it will enable you to understand the various contexts and processes surrounding the acquisition, development, maintenance and management of software.

Dissertation

Aim: To undertake a piece of original research to demonstrate your mastery and integration of knowledge you have acquired during the programme.

You choose your dissertation topic in conjunction with your personal dissertation advisor, an academic supervisor, who will provide support throughout the study and writing process. Your dissertation will apply your new knowledge and work experience and must have merit beyond the narrower scope of your particular need.