

# LM338 – MSc in Software Engineering

**Contact Course Director:**

Dr Michael English

Tel 353 (0) 61 202772

Email: michael.english@ul.ie

Software Engineering involves the application of specialised knowledge and skills to develop different kinds of large, complex software systems. There is continuous demand for software engineering graduates both internationally and nationally. This course will provide an opportunity for students to gain up-to-date knowledge and skills in software engineering.

Students will develop their ability to critically evaluate current software engineering research. The course consists of both a taught component and a project. It will equip graduates with a detailed knowledge of the theories, processes, methods and techniques of building high-quality software in a cost-effective manner. The course is offered in both full time and part time mode (one day per week), with both versions having the same academic content.

#### Programme Objectives:

- To equip graduates with a detailed knowledge of the theories, processes, methods and techniques of building high-quality software in a cost-effective manner.
- To increase the awareness of the opportunities offered by current research in Software Engineering and its application to current practice.
- To meet industry's needs for graduates having the above qualities.
- To enhance graduates existing educational base and employment prospects.



Department of Computer Science and Information Systems

University of Limerick  
Limerick  
Ireland  
[www.csis.ul.ie](http://www.csis.ul.ie)

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## Autumn

Module	Description
Software Design	<p>This module equips students with the fundamental knowledge and skills necessary to design quality object-oriented software. The emphasis is on the support of functional requirements using data driven design. The focus is on programming in the small, modular decomposition, interfaces, Object-Oriented Analysis and Design (OOAD), and The Unified Modelling Language (UML). Students will investigate the array of techniques necessary to design quality object-oriented software. Students will design quality blueprints for enterprise-level systems that incorporates architectural and design patterns. Students will develop an appreciation of the importance of analysis and design techniques in the development of enterprise-level software systems.</p>
Software Engineering Evolution	<p>Many reports since the late '80s suggest that the majority of software development occurs after delivery of the 'finished' product. This phase of development deals with redressing faults in the original system or, more commonly, evolving the system in line with changing business contexts and requirements. However undergraduate and graduate courses seldom incorporate this (possibly infinite) phase of the software lifecycle explicitly. The aim of this module is to focus on the tools, technologies, theories and practices of software evolution. In doing so, it will make students aware of the wide range of software evolution challenges faced by the software industry today and will equip students to meet these challenges.</p>
Software Development Paradigms	<p>The purpose of this module is to study the underlying principles and concepts of software development and the different categories of software development methods. Students will compare and contrast different software development paradigms and will be able to determine how to tailor software development methods based upon such considerations as the system to be developed, the development context and the influence of the development team. Students will also investigate various issues that arise when development approaches incorporate such concepts as Global software development and Open source systems. And they will understand ideological motivations motivating open source participation.</p>

Parallelism and Concurrency in Software Development	Parallel and Concurrent programming skills are of growing importance as super computer and multi-core processor technology advances. A sound understanding of the associated concepts and obstacles is essential. This module introduces fundamental theories of parallel and concurrent software development. It discusses how designs can be made parallel and identifies the common faults in concurrent programs and how to avoid them. It introduces a range of widely used programming paradigms and techniques for writing concurrent and large scale parallel systems.
Philosophy of Research.	The aim of this module is to introduce students to the philosophical and methodological underpinnings of research. The basic principles of research methods and the overall research process will be covered. The module will also cover qualitative research methods which were originally developed in the social sciences to enable researchers to understand and explain social and cultural phenomena. Increasingly these issues become more important as software becomes more pervasive in modern life.

### Spring – Choose 4 of the Following

Module	Description
Software Engineering Requirements	System and software requirements exist at the boundary between the often conflicting needs and expectations of stakeholders and the myriad capabilities and potential of software to fulfil them. This module aims to provide students with a critical awareness of the inherent challenges and barriers to success in the engineering of requirements in addition to the knowledge and skills to elicit, document, verify, validate and manage software requirements in a variety of development situations.
Software Quality	This module gives students and understanding of the management of software quality, software process quality, software product quality, quality issues that arise during the development of software and measurement techniques for monitoring software quality. It investigates software development processes (examples include project management, risk management, reviews, configuration management) and mechanisms that promote the institutionalization of processes within a software development organization.
Human Computer Interaction	This module investigates the design of technologies that are safe, easy to learn and use, efficient, and provide the user with a positive experience of use. Human-Computer Interaction (HCI) traditionally takes a user-centred approach to design, putting the user of technology at the centre of the design process. This module introduces

	<p>HCI and its associated fields - ergonomics, human-factors, interaction design, computer-supported cooperative work. It considers HCI in the design lifecycle: user-centred design, participatory design, usability engineering and HCI technologies. It also includes the psychology of Human-Computer Interaction; the principles for usability in user-interface design; task analysis; methods for studying users in context; HCI design and prototyping methods; and methods for the evaluation of computer systems taking account of usability and user experience.</p>
<p>Software Architecture</p>	<p>This module provides students with a sound technical exposure to the concepts, principles, methods, and best practices in software architecture. It investigates what a software system is designed to do and how the properties and interactions among different components and connectors influence the quality of a system. The course will examine the practical applicability of architecture research, specifically its relationship to the work in software reuse, model-driven, and service-oriented architectures. The major topics of the course will be illustrated by a selection of "industrial-strength" case studies.</p>
<p>Quantitative Research Methods for Science, Engineering &amp; Technology</p>	<p>The purpose of this module is to introduce students to the principles and concepts behind statistical research methods. It will examine the appropriate statistical methods for monitoring and controlling quality, analysing designed experiments, assessing reliability, modelling relationships, and data mining tools. The module will prepare students in presenting statistical research findings in scientific journals, critiquing research findings from scientific journals, and responding to statistical criticisms from referees and editors.</p>
<p>Research Project</p>	<p>The aim of the project is to enable the student to research, analyse and present a number of related papers or a single dissertation on a particular chosen Software Engineering research topic or problem. The objective of the project is to provide experience with defining and organising a selected research topic; to provide familiarity with collecting and analysing primary and secondary sources of data; - obtain deeper insight into the selected topic in the context of software engineering; to integrate aspects learned from previously studied modules; to develop effective working relationships with those individuals or companies that contribute to the project research in any way.</p>