

MSc Degree

Software and Systems for Mobile Networks

UNIVERSITY COLLEGE CORK

UCC was founded in 1845 and is internationally acclaimed as one of Ireland's leading research institutions. The University occupies a unique place in the history of computing because Boolean algebra, which provides the mathematical basis for computer design, was named after George Boole, UCC's first Professor of Mathematics. UCC's Department of Computer Science is internationally recognised for its research leadership in several areas, including mobile networking.

OVERVIEW OF PROGRAMME

Recent years have seen tremendous developments in mobile computing technologies. Personal devices like mobile phones, laptops, PDAs, palmtops, tablet PCs, game consoles and even sensors/tags are radio-enabled, making them part of a larger, mobile Internet. Users on the move have near-permanent connectivity through cellular or WiFi networks, providing access to Internet services and resources, while enjoying the set of applications of each mobile device.

The large penetration of mobile wireless makes the Internet change from a static (wired) topology to a more dynamic one, where some regions will service devices that are embedded and/or mobile. As the markets for mobile networks evolve there will be a demand for graduates that understand the core technologies at all levels including device, system, network and application.

The MSc programme provides students with a firm grounding in mobile technologies and modern networks such as 3G/4G, WiFi, WiMax, Bluetooth, mesh and sensor networks. The emphasis is on software and systems, specifically services and protocols, middleware, security and mobile applications. Regarding facilities, students on the MSc will have access to a wide range of mobile devices and networks. In addition students will be exposed to the relevant research activities in the Department, including the Mobile & Internet Systems Laboratory (MISL).

The main aim of this programme is to provide the graduates with the knowledge and skills required to contribute to this vital area of information technology as mobile software developers, mobile network designers and next-generation researchers.

College of
Science, Engineering & Food Science



ELIGIBILITY

Formal Eligibility: Candidates must have obtained at least a Second Class Honours degree or equivalent in Computer Science or a closely related technical discipline.

The MSc is targeted at candidates holding a strong undergraduate degree in Computer Science and with a passion for mobile technology and software development.

PROGRAMME STRUCTURE

The Masters Degree consists of 90 credits. This comprises taught modules for a total of 60 credits and a research project for a total of 30 credits. The 60 credits of taught modules comprise 40 credits of core modules and 20 credits of elective modules. Students are required to seek approval of the Head of Department for their choice of elective modules, following consultation with the programme coordinator. Not all elective modules will be offered each year. Laboratory work will be associated with many of the units.

SUMMARY OF PROGRAMME REGULATIONS

The MSc is a full-time taught Masters' Degree programme running for 12 months from the date of first registration. Students take taught modules in teaching Periods 1 and 2, followed by a research project from May-September. Students will have completed all taught modules and related examining prior to commencing the research project.

Students who achieve an aggregate of at least 60%, with not less than 40% in each module, at their first attempt across the taught modules are deemed eligible to proceed to the Research Project. Students failing to reach this standard but who achieve an overall pass in the taught modules graduate with a Postgraduate Diploma (Software and Systems for Mobile Networks). Students may also opt to graduate with a Postgraduate Diploma as long as they have achieved an overall pass mark.

MSc Degree

Software and Systems for Mobile Networks

CS6300 Research Project (30 credits)

Research-oriented project in the theme of the MSc.

CORE MODULES

CS6310 Research Methods (5 credits)

Scientific research methods. Overview of quantitative and qualitative research methodologies. Proof, refutation and experimentation. Statistics and metrics in Computer Science. Discrete Event simulation, performance evaluations. Data Analysis. Rapid prototyping tools. Literature Review. Technical writing and presentation. Document preparation and typesetting. Project planning.

CS6311 Mobile Network Protocols (5 credits)

History of radio communication, radio spectrum and licencing. Introduction to fundamentals of wireless including signal propagation, path loss, fading, antennas and modulation. Network architectures, including cellular. Medium access control, including contention-based, scheduled, and polled. Case study: IEEE 802.11 (WiFi). Mobility management, including Mobile IP and IPV6 mobility support. Impact of wireless on transport layer, specifically TCP. Novel protocols, including for ad-hoc and sensor networks.

CS6312 Mobile Devices and Systems (5 credits)

Understanding the features of mobile devices is a key aspect of their effective use. Analysis of hardware resource management, power saving strategies, then operating systems such as Tiny OS, Mantis, Windows Mobile, Symbian OS will be part of the module. Programming applications for mobile devices will be taught using Java ME, CLDC and MIDP. Bluetooth and IEEE 802.11 will be discussed as networking enabling technologies.

CS6313 Services and Mobile Middleware (5 credits)

Students will learn different mobile networks architecture, infrastructure-based, nomadic and hybrid, how to set up and manage IP-based and non-IP mobile networks, deploy and use basic services such as DHCP and DNS. The mobile middleware services of naming, discovery, routing, event notification and context awareness will be presented and analysed. Service-oriented mobile applications will then be introduced.

CS6314 Mobile Applications Design (5 credits)

Develop understanding of the main technologies used to design and develop mobile application on various types of existing platforms. Acquire a range of skills for mobile software development in mobile and ubiquitous computing using industry standards.

CS6315 Mobile Systems Security (5 credits)

Mobile and Wireless security protocols. Virtual private networks. Protocol vulnerabilities. Identity and Authentication Services, Federated identify. Trust Management and decentralized authorization. Mobile code security. Java security architecture and secure Java programming for mobile systems. Electronic payment/transactions for mobile systems.

CS6316 Cellular network Services (5 credits)

Evolution of cellular telecommunication networks, including transition from analog to digital. Cellular architectures, frequency reuse, capacity planning. Public Switched Telephone Systems, including SS7 signaling protocol. GSM - architecture, services, protocols. 3G-architecture, services, protocols. Service design and deployment, including Integrated Multimedia Services (IMS). Network management. Next generation networks.

CS6317 Mobile Multimedia (5 credits)

Develop understanding of the novel digital media aspects of mobile, ubiquitous and pervasive computing systems. Cover the industry-standards for creating and delivering multimedia content on wireless and 3G/4G networks. Acquire a range of skills for software development in mobile and ubiquitous computing using industry-standard tools.

ELECTIVE MODULES

(5 credits each)

CS6320 Formal Methods for Distributed Systems

CS6321 Model-Based Software Development

CS6322 Optimisation

CS6323 Analysis of Networks & Complex Systems

CS6324 Special Topics in Mobility

CS6325 Network Security

CS3506 Networks and Data Communications

CS3311 Middleware

February '10

The MSc receives substantial support from Government under a major initiative to meet future IT skills needs, with EU students paying significantly reduced fees.



The MSc is affiliated with the Symbian Academy. (Symbian is a trademark of Symbian Software Ltd

symbian

London)

Further Information/Application Procedure

Department of Computer Science:

<http://www.cs.ucc.ie/courses/pgprogrammes.php>

Postgraduate Admissions Office

Telephone +353 -21 -4902876/3241

Email: postgrad@ucc.ie Web: <http://www.ucc.ie/postgraduate>

Fees: <http://www.ucc.ie/academic/postgraduate/calendar/general/index.html>