Mobile computing allows people to use computing and information systems without being tied to a desktop computer. Thanks to the improved portability and processing power of laptop computers, Personal Digital Assistants, and even mobile phones, as well as improved battery life and wireless data communications networks, mobile computer users can now make use of almost the same range of services as desktop users. While the use of current mobile computers often follows the traditional pattern of a single user interacting with their dedicated computer via its own display and keyboard, mobile computing is still at an early stage of development.

The next stage of this development will be truly ubiquitous computing in which interconnected (mobile) computers are embedded unobtrusively in everyday appliances and environments and co-operate to provide information and services on behalf of their users thanks to new sensor technologies and miniaturisation of computational devices. In his seminal paper on the computer for the 21st century Marc Weiser noted that:

“The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.”

The ubiquitous computing vision is now becoming a reality enabled by recent and expected developments in new sensor technologies – increasing the range of stimuli that can be effectively sensed, by wireless networking – allowing mobile computer systems to co-operate, by miniaturisation of computational devices – allowing massive deployment of sensor-based systems in everyday environments and artefacts, and by the development of software to collect, interpret, and respond to sensor data.

The Course

The particular focus of this course is to equip students with the theoretical and practical knowledge that is necessary to enable them to participate in the design and deployment of mobile and ubiquitous computing solutions in a wide range of applications and environments.

The M.Sc. programme is a full-time programme and runs for an eleven-month period. It is based on a combination of lectures, seminars, laboratory classes, and a research dissertation.

Topics covered through in the course modules include:

**Visions of Mobile and Ubiquitous Computing**
gives students a broad knowledge of the current development in the area of mobile and ubiquitous computing and familiarises them with the most significant visions that guide ongoing research in the area.

**Embedded Systems**
addresses the development of complex embedded systems that control real-world artefacts by taking input from a variety of sensors and acting on the assessment of this data.

**Sensing and Context Awareness**
covers advanced sensing techniques for ubiquitous computing and the techniques used to build highly contextualised systems that adapt to their users, tasks, and environments. A focus of this module is the discussion of techniques that deal with partial knowledge and uncertainty.

**Knowledge Management**
explores the management, delivery and inter-operability of information and information systems as well as machine learning and inference techniques. It includes such areas as integration of heterogeneous information repositories, schema and semantic (ontology) representation, adaptive hypermedia transformation and delivery, and dynamic semantic web service composition.

**Data Communications and Wireless Networking**
provides in-depth theoretical and practical knowledge of Internet protocols and the most important wireless communication standards in current and likely future use along with a discussion of their strengths and weaknesses.

**Middleware for Mobile and Ubiquitous Computing**
covers the most important paradigms for building distributed applications for use in mobile and ubiquitous computing settings.

**Human computer Interaction and Design**
addresses the main issues underlying the usability of systems and the main techniques and processes for interaction and product design and evaluation. It gives students a firm understanding of the principles of graphic design with particular emphasis on the field of information design and of usability problems in interactive system design, the reasons underlying these problems and the methods which have been developed to address these issues within systems development.

**Computer Vision**
is a practical course where along with gaining an understanding of the theory underlying the processing and interpretation of visual information, students are encouraged to apply the theory to realistic problems to gain practical experience of the difficulties involved in developing computer vision solutions.

In addition to the course modules, each student will undertake an individual research project leading to the submission of a dissertation.
Career Opportunities
Ubiquitous computing technologies including wireless communication, sensor-based systems, and context-aware systems are likely to drive the deployment of the next generation of Information Technology (IT). They have the potential to support improved quality of life for an increasingly aging population, to support rehabilitation from serious injuries, and to support lifelong learning outside the traditional classroom. Development of mobile and ubiquitous computing applications to address these needs will therefore represent an increasingly important and valuable business giving rise to significant new opportunities for those with the skills to participate. Moreover, the individual technologies that comprise the ubiquitous computing vision are increasingly important in their own right.

An understanding of wireless communications, personalisation and context awareness, and knowledge management will increasingly be a prerequisite for a career in the IT industry.

Application Details
Applications must be submitted online through PAC (Postgraduate Applications Centre):

www.pac.ie/tcd (Course Code TR553)

Entry Requirements
Admission to the M.Sc. programme is normally restricted to graduates who have achieved an upper second class honours degree, or better, in computing, information technology, or a related discipline. Well-qualified candidates from other disciplines who have sufficient knowledge of computing – including the ability to program – may also be accepted.

Fees and Closing Date
See course website: www.scss.tcd.ie/postgraduate/mscmuc/

Further Information
Web www.scss.tcd.ie/postgraduate/mscmuc/
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The College reserves the right to update or change syllabi, fees, timetables or other aspects of the course at any time.