MRes Computer Science modules 2012-13

Critical Reading

To become an effective researcher requires the ability to rapidly assimilate and assess large amounts of information. One of the most effective means of achieving this is to read and critique academic and scientific materials that are related to a given area. The means by which these materials are accessed has changed dramatically over recent years, but the core skills of critical reading remain unchanged. This module will equip students with robust critical reading skills, which will provide a foundation for other research techniques. On completion of the module students will be able to synthesis a large body of work and manage literature using a range of tools.

High Performance Computing

This module provides students with tools and techniques associated with programming in a High Peformance Computing (HPC) environment. The module gives fundamental knowledge and understanding of techniques associated with HPC and its practical application. Students will practice parallel programming through the use of OpenMP, MPI and OpenCL and use the tools available to profile code and the use of libraries to improve application performance. This module will also cover the architectures and programming models of High Throughput Computing using platforms such as Condor and application acceleration using General Purpose Graphics Processing Units (GPGPUs).

Research and Entrepreneurship Skills

This module aims to equip the student with skills to undertake research in their chosen field on a practical basis. A short supervised project will be undertaken to develop methodological design and implementation skills as relevant to a particular area. The module pays attention to the impact that research can have on the wider world. The fundamentals of intellectual property rights are explored, as are the entrepreneurship skills associated with exploiting research. Legal, ethical, societal and professional issues and business planning are tackled with reference to the steps associated with establishing a business in the technology sector.

Research Rigour and Investigation

Sustained, successful research often arises from the diligent, rigorous and transparent pursuit of a hypothesis. Since new research often builds on the results and methods developed from previous work, it is important to be able to replicate and validate published results. The module develops a professional and ethical understanding of the quantitative and qualitative methods of scientific research, peer review and academic publishing. From undertaking the module, students will be able to critically assess and validate academic contributions to the state-of-the-art.

Visual Computing

This module aims to provide students with fundamental knowledge and practical understanding of the programming, algorithmic and mathematical techniques

associated with Visual Computing. Students will study and practice topics in Computer Aided Geometric Design, Advanced Image Processing and Computer Vision, together with the underpinning mathematical skills. The tools and techniques taught in this module are transferrable to a wide range of applications from robotic vision, rendering and biometrics. These techniques underpin many of the advanced applications that support diverse multimedia.

Web and Social Computing

The web now increasingly facilitates and exploits social interactions between individuals for a wide range of purposes and applications, from social network services for communication and self-expression through to collaborative crowd sourcing for collaborative filtering, online auctions and reputation systems. At the same time, an enormous diversity of devices and information sources are becoming connected to the web, including sensors and linked databases. Increasingly social services are woven with the physical world through the use of mobile devices and sensors, enabling social services to have a spatial or geographical context, often able to draw on highly-local data. This module looks at how social computation can be exploited to provide knowledge and feedback for societal and commercial applications. The module examines a range of key theoretical, modelling and implementation issues that underpin social computing via the web.