Online Master’s Programme in Computer Science

Module Descriptions

Distributed Systems Security

This module covers the theoretical and practical techniques used to provide security and protection to networked and distributed systems. It examines how the issues and concerns of operating systems design are modified when extended in this context. Case studies will be used throughout. Some themes apply throughout the module: viz models, design, standards, protocols, and performance.

Measures and Models for Software Engineering

In this module we will examine advanced issues of software engineering theory and practice. We will show you how to measure and model a range of software engineering products and processes making up a software project. The software engineering products we will explore in the module will include user requirements, design documents and code. The software engineering processes we will consider in the module will include testing and debugging. The aim of the module is to enable you to use the modelling and measuring of products and processes such as these to make quantified decisions during software development.

Learner Centred Design

Learners are faced with an information ecosystem that is complex, in constant flux and of varying validity and reliability. This places particular demands on how learning technologies may be designed to support learners in their studies. This module is concerned with the particular challenges of producing educationally effective learning designs and draws on a wide range of techniques for supporting this work.

Web Services

Web services are the building blocks of “service oriented architectures” (SOA) and Web 2.0 “mash-ups”. They enable information sharing and integration of functionality from different applications in a decentralised network environment such as the Internet. In this module you will learn about the fundamentals of web services and their underlying protocols and standards, from basic technologies through to architectural issues and evaluation. You will study real world examples such as ecommerce, and information retrieval.
Multimedia Specification, Design and Production

In this module you will gain an advanced understanding of the stages in the development of interactive, multimedia computer applications. This includes the analysis, design, implementation and evaluation of the software as well as the design and development of its component media. There is a large practical element.

You will develop advanced skills in a particular multimedia programming tool such as Macromedia Flash, which you will use in conjunction with the theoretical principles gained on the module to develop an interactive multimedia application.

Web Scripting and Application Development

Making a successful community web application requires a synthesis of varied skills. Firstly you need to identify a niche community and then produce a site with features which will satisfy that community. However, those features will be the result of a lot of careful consideration at the level of database design, user interface design and the establishment of a clear business logic in the application. This course therefore is about how to bring these things together in a site that users will wish to use.

Programming and Program Design

This module introduces the basic facilities found in procedural and object-oriented programming languages. It develops the skills needed to use such languages to build and verify high quality programs to solve clearly-specified problems. It assumes no previous programming experience and uses a practical approach and up-to-date tools to explore the basic principles underlying modern approaches to program development.

Wireless, Mobile & Ad-hoc Networking

This module examines a range of wireless communication technologies and addresses the issues of mobile ad-hoc and wireless networks. You will learn how to handle users and computers that move from place to place and yet wish to remain in contact with the net.

Multicast & Multimedia Networking

This module addresses the issues that must be solved to integrate diverse network applications onto a single network infrastructure. You will learn how to deal efficiently with applications that have to send the same data to many different destinations, and how to mix applications with very different quality of service requirements.
Software Engineering Practice & Experience

In this module you develop advanced knowledge and skills in software engineering, readily transferable to professional practice. The module covers each element of the software engineering process. It explores the use of overarching development approaches such as eXtreme Programing and Component Based Software Engineering. Leading edge practices are introduced, such as using program slicing to find code faults. Specialised software development approaches are investigated such as those required for safety critical systems. Industrially- relevant process models, such as one of the SEI models, are evaluated.

E-Learning Applications Development

E-learning applications development is a specific form of technological development activity; we can derive techniques from other development approaches, but educational requirements place particular demands on our work. Developmental techniques for different educational interactions and the selection of appropriate technologies are a central part of the work of this module. We are interested in developmental techniques that can support the creation of e-learning applications that elicit, or are at least more likely to elicit, educationally effective interactions.

Advanced Database

The aim of this module is to enhance your understanding and knowledge of selected current and emerging database issues. The study is grounded in sound understanding of relevant theory, practice and principles, and made concrete by practical work using (among others) an enterprise scale DBMS such as Oracle. Thus you will acquire a practical understanding and critical awareness of the selected issues. This module is designed for those with existing database experience.

Mobile Standards, Interfaces & Applications

Mobile and pervasive computing is rapidly evolving and so, in this module, there is an emphasis on close reading of the most up-to-date research, with associated seminars and lectures. Themes covered typically include pervasive computing, mobile HCI, privacy and security, location and context awareness, mobile development platforms, networking and data standards. Alongside this, you will follow a practical course in programming for mobile devices based on an industry standard development platform. Finally you will work in a project to create a substantial mobile application.
Interaction Design

Interaction Design is fundamental to the design of a positive user experience of computing systems in all their diversity. It encompasses the types of interaction we may design and the types of interfaces that may be used in these interactions. This module is principally concerned with how we can enhance and support the user experience with our interaction design work; what are the factors that influence the user experience and how we can take these into account in our design work. Equally, how we can evaluate the final design to ensure it provides effective interaction.

Secure Systems Programming

The variety and proliferation of malicious attacks made against users of networks and distributed systems has led to a need for pro-active defence mechanisms against such attackers. For individuals and enterprises, the impact ranges from extreme frustration to significant cost and damage to their reputation. This module will be both theoretical and practical, exploring concepts and applications from the fields of computer systems and their security weaknesses.

Contemporary Practices in Information Technology

This module complements the technical content of the degree programme by introducing you to the legal, ethical and professional landscape in which computing professionals must work. We will present ways of addressing ethical issues you may encounter, and promote a professional approach at a societal level on issues such as sustainable computing. You will also be able to develop and present your own informed opinions on the use of computing and data in society.

Software Development Tools & Methods

This module introduces you to industry standard and current best practice tools and techniques for the development of software systems. The Unified Modelling Language (UML) is used to produce models of the system at various stages in a software project, from analysis through to design, implementation and deployment. You will explore patterns and frameworks that occur across a range of problems and applications and be introduced to alternative models of the process of software development. This is a practical module with an emphasis on the use of standard software tools.
Computer Science MSc Project

The project is a showpiece opportunity for students to apply their knowledge and skills to the design and development of a computerised solution to a particular problem within the domain of computer science, and in doing so demonstrating what they know about current research and practices in computer science. The project is a self-directed piece of work, conducted with minimum online supervision that demonstrates the student’s ability to plan and manage a substantial piece of work, and steer their own efforts. Students are expected to be thorough in their work, and, particularly, identify and tackle any difficult or challenging aspects of the problems they are trying to solve. It is not just the quantity, or even the quality of work that is considered when grading the project, but the level of difficulty and the scope of the problem being addressed.

April 2015

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