

CORE MODULES: FdSc Computing and Information Systems

You must take modules worth 120 credits at each level of the course. Each module is worth a specified number of credits.

Year one for full-time students (Level 4)

Systems Design and Development (30 credits)

- *This module will introduce students to structured software development involving the systems development lifecycle concept, to include requirements analysis, design methodologies and implementation of a relational database solution with SQL queries to meet a specified user need.*

Programming Concepts (15 credits)

- *You will use industry-standard tools and techniques to design, implement, test and document simple programs using a current procedural language such as C#. The module delivers the principal concepts of high-level programming, emphasises good programming practice and supports the techniques required to develop software which is robust, usable and maintainable. Skills developed will be directly transferable to the workplace.*

IT at Work (15 credits)

- *This module is intended to support the development of understanding of the nature of the work sector including the environments in which the sector operate, its performance within these contexts and factors that influence the operation of organisations. Students will explore the impact of political, social and economic factors on the sector and consider the legal and ethical frameworks informing the sector while reflecting on their current role or potential roles within the work sector.*

Workplace Practice (15 credits)

- *The module enables students to reflect on their work practice, critically appraise their own performance and report reflectively on the experience of learning at work. The student will be expected to demonstrate information gathering and evaluative and analytical skills along with an awareness of ethical issues relevant to their practice and studies.*

Computer Architecture and Networking (30 credits)

- *This module introduces students to the components present in modern computer systems and networks. On completing this module, students will be able to specify, construct and maintain networked computer systems, and gain an in-depth understanding of common computer and network architectures, their function and confidently solve their problems.*

Maths for Computing (15 credits)

- *This module aims to provide you with an understanding of the underlying mathematical concepts that support the diverse fields supported by software engineers. The module covers conditional statements, graphics and gaming (geometry and vectors), relationships in databases, methods and procedures, matrices in the handling of arrays, large datasets and mapping, statistics and set theory.*

Final year for full-time students (Level 5)

Advanced Database Design (15 credits)

- *This module builds on the fundamentals of database design from Level 4 giving students opportunities to develop an understanding of the concepts and issues relating to databases and database design as well as the practical skills to translate that understanding into the design and creation of complex databases.*

Developing Interactive Web Solutions (15 credits)

- *This module will expose students to client side interactive and dynamic web design techniques. Students will create and analyse web-based solutions using industry standard toolkits and frameworks for example Bootstrap, JQuery, AJAX and Foundation.*

Workplace Project (30 credits)

- *This module provides you with the opportunity to plan and undertake a work-related project. You will also evaluate the impact of theoretical perspectives on workplace practice and demonstrate the influence of work-based learning on academic perspectives.*

Principles of Digital Security (15 credits)

- *This module explores the technology and practices required to provide security in digital systems. The students study programming techniques to defend against attacks such as SQL Injection and buffer overflow, fail-safe, defence-in-depth and least privilege. Encryption algorithms are researched and critically assessed.*

Plus 45 credits of optional modules dependant on pathway

- **OPTIONAL MODULE: Networking Essentials (15 credits)**
This module focuses on the key concepts of network switching and routing. It introduces the learner to converged networks and examines some of the underpinning building blocks of this technology. The module then looks at how networking devices are configured and how the data is switched and subsequently routed between networks. Network security features are also considered. There is a focus on how data can be handled discreetly and more securely by the implementing and configuring Virtual Local Area Networks (VLAN). This knowledge is then extended so the network can be configured to allow inter VLAN routing to take place. The module is delivered as a mixture of theory, delivered through a series of lectures, and practical implementation, delivered through a series of guided laboratory exercises. In the lab sessions students will gain deep understanding on the routing and switching concepts and acquire hands-on-skills using advanced network simulation tools that comply with industry standard router platforms. Students studying this module will be able to access on-line materials including the Cisco Networking Academy online curriculum, the VLE, and access a specialist laboratory. Assessment is by designing and implementing a small network to meet a brief with a report justifying the decisions taken and the functionality achieved.
- **OPTIONAL MODULE: Object Oriented Programme Development (15 credits)**
Object oriented programming is a programming language model organised around objects rather than actions and data rather than logic. Industry dictates that the reuse of code is a fundamental skill required of graduates as this leads to cleaner, more robust code. Object Oriented programming also facilitates the generation of Test Driven Development. The module will expose students to the fundamentals of Object Oriented Program Design and Development. Students will receive a solid understanding of Object Oriented Techniques including Inheritance, Association, Aggregation, Polymorphism and Encapsulation and how these techniques are utilised in a business environment. Design techniques such as CRC cards will aid the creation of software and students will develop Class Diagrams and other UML documentation. Students will gain practical programming knowledge through the development of programs in an object-oriented language such as C# and Java. The learning will be assessed through weekly in-class tasks and by the students writing a program to meet a brief supported by a report justifying their design choices and object-oriented architecture. Delivery of this module will be supported using the Virtual Learning Environment and students will be expected to undertake interactive online activities on a weekly basis to support understanding and to share knowledge.

- **OPTIONAL MODULE: Database Driven Websites (15 credits)**

This module is designed to introduce students to the design, development and implementation of client / server applications for Internet or Intranet web sites. Building on from Introduction to Programming, web pages created with HTML, and scripting languages access a database via SQL statements embedded in appropriate pages. It is expected that students will have a thorough knowledge of HTML, CSS and Scripting languages before beginning this module. Whilst it is necessary that the student deliver a working web site without code errors, it is also a requirement that the design of the pages is user centered. It is considered essential that the student understands the necessity for a web site, whether it is on the Internet or Intranet, to be usable by its clients both internal and external. Additionally, the student is required to produce documentation that fully describes the web site such that others can easily make future revisions. In order to understand the design of client / server web site it is necessary that the student researches current design standards and existing related web sites.

- **OPTIONAL MODULE: Design Patterns for Software Engineering (15 credits)**

Design patterns are commonly defined as time-tested solutions to recurring design problems. The term refers to both the description of a solution that you can read, and an instance of that solution as used to solve a particular problem. Students will be introduced to not only what design patterns are but how and why their use facilitates creation of robust code. The knowledge of modern design patterns has become a key requirement for the employment of software engineering graduates, therefore real-world scenarios will be utilised throughout the module ensuring currency of knowledge. This module provides students with a broad range of accepted design solutions for everyday software problems. Students will select and implement the appropriate design patterns for given scenarios. Key design patterns will be appraised such as Singleton, Factory, Observer and Decorator. Implementation will be via an appropriate object-oriented programming language such as C#. Assessment is through in-class tasks and a final report which might analyse a body of code, identifying the patterns in use and explaining the value of each one. Delivery will be supported using the Virtual Learning Environment and students will be expected to undertake interactive online activities on a weekly basis to support understanding and to share knowledge.

- **OPTIONAL MODULE: E-Commerce and E-Crime (15 credits)**

The connected world is changing, with the widespread use of fast internet connections and the move to online shopping so comes new dangers with online security. With this advent also comes new ways for criminals to use technology to their advantage. This module will introduce students to the concepts of E-Commerce together with an appreciation of E-Crime including how this is employed and how it can be mitigated. Students will be able to evaluate E-Commerce websites for content and security and to identify concepts used to make Ecommerce successful. E-Crime will be assessed and contingency planning considered. Students will consider relevant news articles each week and discuss these in class. Assessment will be through a report critically analysing e-commerce websites and evaluating their commercial success factors and their security.

- **OPTIONAL MODULE: Management of Information Technology (15 credits)**

The effective management of IT necessitates the consideration of an increasingly wide range of both technical and human elements. This module focuses on giving students an understanding of the particular issues and practices involved in the administration and management of enduser support. It will include the key practical aspects of network administration e.g. setting up user rights as well as the management issues concerned with helpdesks, product and service acquisition. Students will be made aware of the need for a problem resolution framework and efficient configuration and infrastructure management procedures. There will also be consideration of the changing nature of the maintenance role and computing job roles in this context and the potential professional implications of these for the future. After consideration of a case study scenario students will be required to produce justified recommendations in a formal written report and be prepared to discuss these at a presentation to a management board.

- **OPTIONAL MODULE: The Mobile Web (15 credits)**

With the advent of cheap tablets and internet enabled smart phones, access to web content is moving away from the traditional desk based to a more mobile consumption of content. This module will build upon previous knowledge gained in Digital Asset Development and highlight the need for mobile solutions. Working with mobile technologies, students will analyse the need for mobile web solutions and will use existing frameworks and new technologies to produce mobile content. This module will also look at the constraints and opportunities when it comes to delivering information in this mobile world. Students will utilise and evaluate a number of technologies to build mobile content including Frameworks such as Bootstrap and Online App Builders such as App Maker. The fundamentals of creating content for the mobile web will also be examined including the way the user interacts with the website and how this differs to desktop use. Web APIs for mobile use will also be explored such as Google Maps API and other Geolocation data. Assessment is by designing, building and demonstrating a website aimed at mobile users and also by a report on techniques for good usability and performance which may be shown by the artefact.

- **OPTIONAL MODULE: Advanced Network Routing (15 credits)**

This module builds on the key concepts of network switching and routing by focusing on routing protocols and some of the more advanced elements of network device configuration. This module introduces the learner to static and dynamic routing theory and the protocols associated with this element of the technology. Open Shortest Path First (OSPF) will be used to create a routed network and further security features such as Access Control Lists (ACL) will be presented. Network addressing features such as Dynamic Host Configuration Protocol (DHCP) and Network Address Translation (NAT) are finally implemented to complete the network configuration. The module is delivered as a mixture of theory, delivered through a series of lectures, and practical implementation, delivered through a series of guided laboratory exercises. In the lab sessions students will gain a deep understanding on the routing and switching concepts and acquire hands-on-skills using advanced network simulation tools that comply with industry standard router platforms. Students studying this module will be able to access on-line materials including the Cisco Networking Academy online curriculum, the VLE, and access a specialist laboratory. Assessment is through a closed book exam and a practical assignment with documentation.