

A GUIDE TO THE BSc INFORMATION & COMMUNICATION TECHNOLOGY At De Montfort University

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Welcome

Welcome to the guide to the innovative new degree course in ICT at De Montfort University.

This course has been designed to prepare you for the rapid changing world of ICT in organisations. You will become an effective professional able to contribute to the success of any organisation through an understanding of how to deliver IT services and systems which deliver value to the organisation.

The world of ICT in commerce and industry has changed dramatically in the last few years. The focus of activity has moved away from programming and constructing IT systems from scratch to delivering a coherent service by mustering technical, managerial and people resources.

This guide will show you exactly what the course is about, what you will learn and what the philosophy is behind the course.

You have a big decision about investing in your future. What course should you do? What should you learn? What will your career direction be? The ICT team at De Montfort are serious about investing in your future. We'll give you the right knowledge and skills in an exciting state-of-the-art technical environment.

ICT is an exciting, fast moving leading-edge subject. Your study at De Montfort will reflect that. The course will inspire you, challenge you and give you future direction for you career.

We hope you will find this guide informative and look forward to welcoming you to De Montfort.

The ICT Team

The ICT Team.

Neil McBride (Principal Lecturer in Information Systems) Neil's principle area of study is in IT service management. He has written over seventy articles in academic and trade journals and regularly speaks at conference. He has 22 years of commercial and academic experience in computing and a background in biological research.

John Bennett (Senior Lecturer in Computing) John is a teacher fellow, developing formative self-assessment systems to support the personal tutoring system practiced in the School of Computing. He is also a member of the Earth and Planetary Remote Sensing Research Group within the School of Computing.

Brian Kiely (Principal Lecturer in Computer Science) Brian is developing a new Games Programming degree and acted as a technical advisor to the ICT degree.

Ivor Perry (Senior Lecturer in Information Systems) Ivor has a marketing background within the IT industry. He teaches modules on Innovation and Technology and is researching into how new computer systems affect organisational culture.

Peter Messer (Head of School of Computing). Peter leads the School of Computing. He has over 25 years of experience of computing in higher education. He has responsibility for providing managerial direction for the BSc ICT and developing the supporting technical infrastructure.

Tim Watson (Senior Lecturer in Computer Science) Tim gained a first class honours degree in Information Technology at De Montfort University. He was recently awarded a PhD in Evolutionary Computation for his work on cooperative behaviour. He is the School's Open Source evangelist and developed the new Principles of Open Source Software which features in the BSc ICT.

Richard Howley (Principal Lecturer in Information Systems) Richard manages the INFO area of Computing which is responsible for a number of ICT modules. He works within the Centre for Computing and Social Responsibility where he is researching into Privacy and Data Protection.

Ian Smith (Principal Lecturer) Ian leads the Information Management Division of the School of Computing at De Montfort which is responsible for managing the BSc ICT. As school teacher by background, he has an expert understanding of teaching and as a Teacher Fellow has developed teaching strategies in a number of computing subjects.

Hussein Zedan (Professor of Software Engineering) is a leading international expert on formal methods in software engineering. He directs the Software Technology Research Laboratory. He has written four books and over 140 articles.

Why Study ICT?

You're looking for a qualification that will give you entry into a wide variety of organisations – small businesses, large businesses, private sector, public sector, retail, insurance, health and education. You're looking for an area that will always be changing and developing where there always be something new and different. You're looking for a qualification that will give you contact with people, where you're make a difference to what people are trying to do in their jobs; where you're enabling them to achieve more, to solve problems, to tackle tasks in different ways.

ICT skills, with a service focus, will enable you to work in any organisation. ICT is at the heart of any organisation and studying ICT gives you the skills to keep your finger on the pulse of a business and keep it functioning effectively. ICT is part of the necessary set of functions in any organisation along with finance, human resources and marketing. An ICT degree gives you the skills to help people in work and at home get the information they want, use the technology they want and above all communicate however they want. ICT is about providing a service to people and organisations, so that the right technology is available, information spreads throughout the organisation and people communicate effectively and knowledgably.

ICT requires communication skills. It involves talking to employees, understanding their needs, buying and delivering the correct systems and teaching them to use them effectively. It involves working with management to translate business strategies into practical ICT implementations. It involves negotiation with suppliers to buy the right systems. It involves changing the way employees work and how they see the use of technology in the organisation. It involves helping create the global image of the organisation through the window of its web-based systems and technology.

ICT involves helping people to use technology to change the way they live. Providing independence for the disabled, the freedom for school children to pursue new knowledge, support for clinicians to identify the right treatment and manage the patient experience.

In ICT the challenge is in understanding the people, understanding the technology and crossing the gap to join them together. To do this requires a service mindset and an understanding of people as much as technology. It's not about hiding behind a screen but facing the people and being prepared to challenge the way organisations view and use their computer systems. It's about providing a service to support and encourage better sharing of knowledge, better communication and better understanding of each other and of customers. It's about understanding how ICT changes communication patterns and how ICT changes social interaction.

You'll need to understand and manage rapid technological change. You will be educated in a broad spectrum of ICT related skills from managing the information security to installing new systems and collaborating with other organisations to create systems that are used

ICT staff become the organisation's eyes and ears, surveying new technology in the search for new applications and new business opportunities. They become the trouble shooters, solving business problems and restoring broken systems. They become the creative directors of technology, designing infrastructure, combining information technologies to create the information networks which sustain businesses and organisations.

By pursuing ICT you won't be restricted to any one IT role in the business, but will have a holistic view of ICT use, able to take on many roles with a customer focus.

Taking a service and organisational approach to the implementation of ICT means that you're not going to be pigeon-holed or straight-jacketed by a set of programming skills or technical skills with a limited shelf life. Writing programs and answering the help desk phone may be done in India, but the organisation still needs staff who can put it altogether and understand and service the needs of the people in the business.

The ICT student must think globally as well as locally, seeing the Internet at the foundation of a global ubiquitous computer, understanding that the boundaries of the organisation don't limit the influence of ICT, realising that the delivery of an IT service extends well beyond the confines of the organisation.

The ICT student needs to understand computing as a maturing industry and be trained to know where to look for solutions to information, communication and technology problems; to combine technologies and components into an integrated whole which meets the organisation's unique needs.

An ICT degree will provide you with a breadth of experience to function effectively within the ICT function of an organisation. The ICT student has to be able to bat and bowl, to look backwards to the organisational context and forward into the technological future.

ICT is computing for the 21st century, sensitive to the potential and limits of technology, understanding that IT doesn't work without people and seeing IT as a service industry meeting people information needs inside and outside organisations and businesses.

So why have we developed a new ICT course? This guide describes the reasons for the development and delivery of an undergraduate course in Information and Communication Technology at De Montfort University. It explores the nature of ICT, its role in society and industry and discusses the changing role of ICT and relates that to the DMU ICT degree which both provides continuity with a familiar subject in schools and colleges and prepares you for a generic role of ICT provision and continuous support within any industrial environment.

We will look at the changing requirements for ICT skills in industry and show how the BSc ICT will meet those needs. We will argue that the changing nature of ICT in organisations results in a change in the repertoire of skills you will require for the 21st Century IT organisation. The BSc ICT will develop skills to shift from a constructionist focus on developing the IT programs and software to an analytical focus on assembling the resources necessary to deliver information and processes to meet the organisation's goals.

The DMU BSc ICT is an outward-looking degree, addressing the context of school ICT education and fulfilling the needs of industry for a new generation of ICT professionals suited to the changing economic, global and technical environment of the 21st Century. It is informed by both the nature of ICT teaching in schools and the changing role of ICT professionals within industry. The BSc ICT acts as the bridge across the gap between the understanding, knowledge and context of ICT developed in schools and the realities of ICT in industry.

We will firstly explain the changing nature of ICT as practiced in industry. We will then examine the distinctive nature of an ICT degree. This will lead to an overview of course content.

The Discipline of ICT

ICT concerns the development or procurement of information technology to fulfil useful roles in people's lives and in organisations. IT is about the application of ICT by people in various contexts – home, general society, work, and business – to achieve useful goals or outcomes. As such, ICT encompasses a whole variety of processes and technology. It involves an understanding of the processes behind the building of IT artefacts, but more importantly, an understanding of the organisational processes involved in their procurement, deployment, and effective use. The discipline of ICT encompasses both managerial and technical aspects. Managing ICT involves gathering and deploying the correct resources. As will be discussed further, in most organisations it involves delivering a continuous service in the organisation. This requires a service-oriented approach. Technically ICT involves understanding a wide variety of technology, both hardware and software. The focus is on the effective usage of ICT

The Changing Role of ICT in Organisations and Society

In recent years, particularly since the establishing of the Internet, the role of ICT in organisations and society has significantly changed. It has become ubiquitous, commoditised, global and collaborative.

Ubiquitous

ICT has become part of everyday life. An increasing percentage of the UK population has access to broadband Internet. Internet shopping has become the norm. Email is an established part of everyday life. Programming concepts are taught in schools. Primary school children learn to use ICT to achieve learning goals through using word processors, presentation packages, and teaching programs. The Internet becomes the preferred source of information. Furthermore computer applications cover most aspects of everyday life. Digital cameras and MP3 players dominate photography and music. Satellite navigation becomes common in cars. The application of ICT is then commonly understood and not the domain of the specialist. Computers are part of the organisational fabric. ICT requires deployment and managing in every organisation.

Commoditised

Since the '70s and '80s there has been an emphasis on the programming and construction of bespoke systems within organisations. This focus fed through to computer science education producing a focus on the construction of software. In the 21st century ICT is a mature industry in which both the artefacts and the services are commodities, bought and sold on a market. Organisations are less likely to develop software for even the most complex applications. For example, companies buy enterprise resource packages which enshrine the basic business processes and can be bought as packages. Specialist software houses produce niche applications for specific industries. The development of new business applications has become a minority industry. For a majority of organisations, the focus is on buying the appropriate packages and components to meet the organisation's ICT needs. Hence the BSc ICT focuses on skills in procurement, evaluation, implementation and support as the general skills required in most organisations. The important function within ICT is one of technically evaluating, mustering and deploying resources based on what is available in the market. The skill-set has shifted away from new product development. Support, integration, training and strategy occupy the attention of ICT professionals much more than analysis, design and programming. Where new information system applications are required, even development is more likely to be centred on the assembly of components.

Global

The rise of the Internet has changed the way companies communicate and has enabled global markets, global value chains and global technology. The use of the web creates a more outward looking organisation, focusing on links with customers and suppliers through web applications. The Internet begins to behave as a global supercomputer enabling ICT departments to draw on resources, ideas and applications worldwide. Even more significant for ICT and ICT education is the rise of offshore outsourcing of software development and call centre activities. Software products may be built in Russia, India or China and transferred over the Internet. The globalisation of software development dilutes the skills market and may reduce opportunities for programming jobs in the UK. If software is developed overseas, the skills required even in a UK software house shift towards specification, testing and contract management. Global issues will now affect where software is procured from and how it is supported. Hence the effect of globalisation is to expand the need of a rounded set of skills in the ICT department, recognising that some specialisms will be outsourced.

Collaborative

The development of ICT within an organisation is much more collaborative and involves the ICT department looking outwards to connections with suppliers and customers. Hence the requirements for the provision of ICT in an organisation cannot be parochial. Similarly, the development, deployment and support of ICT involves collaboration with a number of companies. Sometimes this will involve extensive outsourcing and hence a new focus on contract management. IT vendors now take a wider and more service-oriented view of business and the support of customers.

Hence the BSc ICT will provide you with a wide range of ICT teaching in terms of concepts and skills. The pure focus on software development, on the IT artefact that has characterised computing education in the past is giving ground to the more forward-looking, analytical focus that characterises the philosophy of the De Montfort BSc ICT degree.

Changes in Organisational Requirements

The changes in what ICT departments require from ICT graduates can be seen by examining a typical ICT organisation. A typical public sector ICT department might look like this:

- **Customer Services** operates a help desk for internal customers. It looks after the front office activities and directs requests to technical services.
- **Technical Services** maintains telephony and network systems. It also includes an end-user computing team which looks after PC problems and include network consultants. Within technical services, a separate systems support team looks after the AS/400 mainframes and Unix systems for Social Services and Education.
- **The Operations Team** supervises the production of reports and outputs from the mainframes and ensures 24 hours working of key production systems.
- **Development Services** maintains and enhances packages using MS-Access, Oracle, RPG and DB2-AS/400. Their main emphasis is on financial management, housing benefit and education systems.
- **Corporate Projects Team** includes two business analysts and IT trainers.
- **Strategic Support** manages the council's web sites as well as providing IT consultancy.
- **IT Contracts and Security** involves two people, one dealing with the data protection act and security, the other administering IT contracts.

The ICT role within businesses is a generic role rather than a specialist role. Rather than involving complex design, development and programming of systems, the role will start and end with the provision of ICT functions and services to the business. It is likely to involve the networking and support of the networking of the business, the provision of information services, the definition of information system requirements, the identification and justification of the business benefits, the procurement of ICT and the management of such projects, the management and policing of IT security. These generic roles require a wide range of skills both business and technically oriented. They require good technical knowledge of networks, databases and applications. They depend on communications skills involved in eliciting requirements, training users, operating help desks and negotiating and managing contracts. While an understanding of how computer programs work and what are the qualities of a good software application are important, the actual programming of any application is likely to be done by a supplier, possibly subcontracted to Sri Lanka, India or Russia. For most organisations, developing new systems using people skilled in software development is a minor part of the activity of the ICT department. Besides spending a large amount of their budget on IT support and service activities,

organisations spend over 40% of their IT budget on the integration of existing and bought in systems.

The practice of ICT runs alongside accountancy, marketing, sales and operations in most businesses. Indeed most businesses will have staff or a staff member carrying out an ICT coordination role. The BSc ICT recognises the need for an ICT person in every business along side the financial director, the sales director and the production manager.

In a 2005 Financial Times article (*'IT Sector faces managerial skills crisis'*, FT Thursday September 15, 2005) it was suggested that there was a shift in IT skills towards more of a business focus. Since the ICT department is no longer just a cost-cutting centre, but is playing a key role in opening up new markets and exploiting new businesses, a different set of skills is required. *'Basic IT jobs such as programming or helpdesk operations are going to lower cost countries such as India and China... Jobs are being taken offshore, but value added jobs are being retained and expanded at a high rate. It is happening in much the same way as a clothing company might move its sewing machine operators abroad but keep its design, cutting, planning and retail operations in the UK.'*

Professional organisations such as the British Computer Society and the IT Service Management Forum are recognising that there is a shift away from focusing purely on the technology aspects to a more rounded management, business, customer and service focus, and that this needs to be reflected in undergraduate computing education (IT Now, 2005: <http://archive.bcs.org/bcs/products/publishing/itnow/onlinearchive/nov05/> See p 24-25).

Colin Rudd, president of the Institute of Service Management, described the global demand for service management resources, skills and expertise as "phenomenal":

"The emphasis within IT units is moving away from focusing purely on the technology aspects of IT and focusing more on the management, business, customer and service aspects of IT service provision. The future of service management relies on the development of more rounded IT professionals with a broad range of technology-based skills, very much aligned to the moves within businesses as a whole,"

In higher education there is an increasing recognition of the interdisciplinarian nature of computing and ICT, no longer totally reliant on a mathematical and computation paradigm, but more influenced by business strategies. For example, at a recent workshop of the British Computer Society Sociotechnical Specialist group in November 2005, it was said that:

"No longer are computing students taught exclusively technical subjects; nowadays they need to learn also about the business strategies in which software systems play a role. Five years ago, just 15% of IT job adverts mentioned management skills; today, 40% do. Business and law students encounter new pressures to understand information-technology issues. Academic researchers are forging novel intellectual

links between computing and business. The time is ripe for an interdisciplinary network linking academics active in this field with one another and with counterparts in industry and in the public sector.”

This all adds up to a need for the focus of computing education to shift away from a foundation of systems development to the adoption of wider foundations, a wider curriculum and a wider skill set. In looking towards industry the BSc ICT curriculum demonstrates its commitment to meeting the need for skilled ICT graduates.

How the BSc ICT relates to ICT at schools,

The DMU BSc ICT will build on your existing ICT skills whether learnt in GSCE, or A Level. We will start with what you are familiar with.

The ICT you have learnt so far will provide you with some basic foundations, but you need to be prepared to challenge your assumptions about what ICT is about and what you need to learn. So much of ICT practice nowadays involves working with people and understanding the social role of ICT. You need to understand ICT as a service and as a set of services to be managed within the organisation. We build in the shift in thinking that's needed away from just programming – important though that is – to a wide variety of technical and management understanding required for a difficult role within organisations.

So the DMU BSc will provide a bridge, if you like, between your studies at school or college and where industry is going. Through connections with major companies, both IT users and providers, connections in the public sectors, and research which has an international reputation, we watch what's happening in industry and the home, and we won't be afraid to change curricula, develop new modules and teach new subjects as ICT changes. No one in ICT can afford to stand still.

We will build on a familiar discipline, while recognising the shortcomings of ICT teaching which can concentrate too much on the technical construction of the computer system. You will be able to build on ICT foundations and develop advanced interests across the broad range of areas within an ICT syllabus.

How the BSc ICT relates to traditional computing and computer science degrees

The De Montfort University BSc ICT is a multidisciplinary course drawing on a wide range of academic disciplines, aware of, and sensitive to the computational paradigm, but not bound by it.

Computer Science is becoming an increasingly specialist degree. Like a majority of current computing degrees, both on the technical and business side, computer science has a constructionist emphasis. Constructionist courses centre on the development of new systems and on the programming of software products. Their whole philosophy is founded on a classical systems lifecycle in which the steps of requirements definition, logical design, construction and testing, a philosophy which can be traced as far back as 1950 when the Bank of America developed an automatic cheque handling system. Indeed for many IT courses the culmination of the course is in the

development of an IT artefact as part of the project. The focus on the systems lifecycle in computer science, business information systems and even the few new ICT courses, is rarely questioned. Even the more business-oriented courses are thematically biased towards the analysis of new systems and the programming of these new systems, usually with Java or perhaps Visual Basic. Their focus is on the hardware and software and its manufacture, which is only part of the ICT discipline. They tend to assume the Greenfield development of a new application whereas in industry today, even where new information systems are built, a primary focus will be on integrating the new system with existing IT and business processes.

With the increasing specialism of computer science there will be less need for computer science degrees whose ancestry can be traced back to a time when mainframes needed specialist programmers and operators, and programming languages were new, complex and not graphically based. Such degrees reflect a specialist role, where computers were the domain of technical experts, and programming was a complex mathematical discipline. That environment is more of historical interest. There is now a need for an undergraduate degree which reflects the ubiquitous nature of computers, the presence of ICT in every office and home and the universal presence of the Internet. Such a changing environment needs to be supported by a new breed of degree represented by the De Montfort University BSc ICT.

The De Montfort University ICT degree fulfils a need for a computing based degree which is analytical rather than constructive. The focus is on understanding organisational technical and business problems and searching for solutions within a global ICT environment which are appropriate to the organisation. This requires a wide ranging set of generic skills in ICT which, while aware of the system development process, do not create the expectation that the development of new systems is the common approach to solving organisational ICT problems. The ICT degree teaches both business and technical skills of relevance to business and does not major on programming skills.

In summary the BSc ICT at De Montfort University connects with the schools and college understanding of ICT to create a continuity of academic focus; which takes a multidisciplinary rather than computational approach to ICT in organisations; which moves from a constructionist focus on building and testing new products to an analytical focus on understanding ICT needs, on procuring and commissioning products and services to meet those needs and on delivering a continuous supporting service.

You will be part of a new generation of ICT graduates with generic skills in ICT which are widely applicable across most organisations and which provide a basis for developing further specialist skills as required by particular organisations.

The BSc ICT has distinctive characteristics which differentiate it from a majority of current offerings within computing and computer science departments, including:

- Focus on the assembly of components to provide systems.
- Emphasis on making existing systems fit together.
- Emphasis on building on top of existing systems

- Holistic view of the entirety of the ICT role in businesses to deliver technical and system support for business (organisation, individual) processes to produce benefits – however these might be defined.
- Underlying philosophy of service focus rather than product focus.
- Move from constructivist to analytical approach.
- No programming from first principles. No Visual basic, no Java.
- Generation of all-rounder who can support and procure IT systems, but has a specialist interest and expertise.

Looking towards businesses

Businesses require ICT practitioners with technical awareness and technical abilities who can identify and pursue business benefits through advances in efficiency, the exploitation of new opportunities and the establishing of stable well-supported information and IT infrastructures. Most non-computer specialist businesses do not require specialist programmers and systems analysts, but all-rounders who can understand networking and applications and participate and manage projects to procure, implement and support infrastructure and applications which deliver for the business. The BSc ICT is concerned with bridging the business / technology gap. However, it should be noted that businesses are also interested in particular specialist skills, perhaps in networking or service support. To this end the final year (level 3) provides an opportunity for you to develop specialisms.

A majority of businesses are Small to Medium Sized businesses (SMEs) with 50 – 300 employees. The ICT needs and management of these organisations differs from large organisations. ICT within SMEs requires generic ICT managers who can communicate with suppliers. The BSc ICT at De Montfort will prepare you for possible roles in Small to Medium size businesses where the role of ICT director or coordinator stands alongside the marketers and the accountants. This is a generic and practical role which, while grounded in technical understanding, is business oriented.

In 5 years time, what ICT qualifications might an IT director be looking for?

IT directors will be looking for a good all-rounders and team workers who are flexible to move between technologies and roles. They will want them to have a strong foundational knowledge of how ICT works in an organisation. They will expect them to understand the basic processes and technology involved in both the development of new systems and the support of systems and provision of services. ICT graduates will need to know about procurement, evaluation and implementation.

IT directors will expect ICT graduates to be focussed on quality: both product quality associated with hardware and software and service quality associated with the delivery of IT services. Related to ICT graduates will be aware of the basic standards involved in IT services including ISO9000, BS7799 and ISO 20000.

ICT graduates will require a basic knowledge of the fundamental technology – networking, Internet technology, software, hardware such that they can evaluate systems. This basic understanding will enable them to rapidly pick up the specifics of the information technology and contribute to the service process. ICT graduates will have an understanding of the concepts of IT service management and familiarity with the workings of a help desk / call centre.

There must be a good understanding of e-commerce platforms including the front end interfaces and the database engines. ICT graduates may be required to be able to write and run SQL queries, and to develop XML.

Good ICT graduates must be able to meet with customers and express themselves well. They will have a professional attitude, some understanding of professional issues in an IT context and a mature grounding in security.

Course Structure

The De Montfort University BSc ICT is structured round three levels, each with a different purpose. Hence, in each of the following descriptions of the level, a philosophy concerning your expected achievements is discussed. However, you should note that De Montfort University reserves the right to change any of these modules and their content.

Level 1

Philosophy: Broadening the Horizons

Level 1 is about creating excitement and giving you an understanding of the wide application, the complexity and the relevance of ICT. It is about the development of an understanding of the applications of ICT, the business and social impact and how such technology comes about. Technical details of, for example, hardware and software, are learnt within the context of their use.

Level 1 involves:

- Broadening horizons,
- Creating excitement,
- Creating social and global awareness,
- Watching future trends and following news,
- Promoting investigation and creativity,
- Connecting with real-world examples,
- Awakening interests and enthusiasms,
- Recognising future trends and creating sensitivities,
- Asking questions about nuts and bolts.

Structure

Level 1 revolves around 4 core 30 credit modules:

Information Systems Development

Information system development (ISD) looks at the development of a business information systems within the context of a typical systems development life cycle. It build on the systems development aspects of GSCE ICT to explore the management of a development project, the stages, requirements definition, design, and implementation of the design.

Fundamentals of E-Commerce Systems

This module the business and technology around e-commerce, which is the use of Internet technology by businesses. As such it increases the awareness of how businesses use the Internet. This module introduces the principle concepts in e-commerce, explaining the business processes, the technology and providing some vocabulary. Starting from everyday practical experience of using an E-commerce site to purchase goods, an understanding of the business and technical processes involved is developed. The module considers the business drivers behind e-commerce and a variety of possible models for e-commerce. It develops an understanding of how e-commerce is used by organisations in interactions with customers, with other businesses and with their employees. In addition the module explores the technology, including the software and standards that drives e-commerce implementations. The module can be viewed as a tour of the concepts and issues. The module starts with the student's experience of e-commerce - e.g. visiting a web site, buying something from a web site and explores the technology and business processes behind the observed phenomenon. Working models will be used and role play will feature where helpful. The module intertwines a business strand - why is e-commerce important?, what to do with it?; and with a technical strand - what do I do to deliver a business need? How is it done technically? It intersperses business and technical fundamentals. It provides concepts and structure without going into the details.

Electronic Production and Publishing

This module focuses on the treatment of the production of computer based media and systems as a film production task. Students are examined at the end of the module on the basis of website and multimedia presentations. The module involves both the use of HTML and a multimedia authoring product such as Dreamweaver. Significantly, the module introduces the concepts of usability engineering, including addressing user needs and user characteristics, carrying out task analysis, applying user-cented design and studying the characteristics of human- computer dialogues. Processual considerations are developed and techniques such as storyboarding are taught. It also considers the project management activities which support web and multimedia publishing. The module plays an important role in level 1 ICT in realising the creative potential of ICT, and exploiting that creative potential in products and services to meet needs and support activities in, for example, businesses, homes, schools and hospitals.

Social ICT

This module explores the context of computing, starting with your own experience and exploring issues, conflicts and social changes brought about by ICT. It introduces the social, political, economic and legal context of ICT. Given its broad nature and its rapidly changing context the content is carefully selected each year to support the realisation of learning outcomes. The module will provide you with an awareness of the social context of ICT and at the same time allow you to focus your particular interests in one or more area of this context for more detailed study. The module will provide you with skills that can be used to identify new social issues in the area of ICT and techniques that can be applied to assess their impact.

The purpose of the module is to create a foundational understanding of the relevance of ICT which will inspire you to pursue more detailed studies. It sets both local and national context looking at globalisation as well as local issues of changing business practice. It explores the economic dependences brought about by ICT. How does logistics work? What are the dependencies between retail and logistics. Why do Tesco and WalMart do so well? What are the education effects of computing? Does ICT help learning in schools? Does ICT influence crime? What are the moral issues behind ICT and policing? What are the issues around identity cards? What about the implementation? What are the flaws in chip and pin? How is ICT supporting bioinformatics? What are the ethical issues in medical computing?

At the end of level 1 you will have a broad understanding of the scope of ICT, the why and what, the how it works without going into the details. We think you'll be enthused in discovering a lot of unanswered questions, involvement in a massively influential subject, and an awareness of the deep and continually evolving technical complexity of the subject.

Level 2

Philosophy: Preparing for Business

Having established an enthusiasm for ICT at level 1, Level 2 builds the technical and business skills and understanding needed to perform ICT in a business environment. The focus of this year is on achieving goals in organisations through the evaluation, delivery and support of ICT which offers clear business value. Hence you must have a grasp not only of the technical infrastructure and applications but also of the business value and how to draw the business value out of the raw technology, since the business value cannot be derived without attention to people and processes.

When you're on placement you are likely to get involved in assisting on the help desk, organising support, learning to maintain networks, putting together servers or desktops for users, shops, server farms; evaluating and procuring software, liaising with suppliers and writing small database application to help with admin. Level 2 has to cover this. It does so by getting to grips with databases, providing an understanding of the basic technology and its implementation, for example how do you configure a server, learning how to be involved in the everyday operations of ICT, and providing an understanding of how to treat organisations and their ICT as systems which includes how to understand the strategies and policies that drive the organisation and

its ICT. Hence data, technology, operations, systems gives coherence to the level 2 of ICT.

Level 2 involves

- Understanding the organisation,
- Understanding the technical infrastructure,
- Understanding the role of ICT in organisations and businesses,
- Being able to evaluate ICT in the context of the goals of the organisation,
- Establishing appropriate technical skills;
- Creating excitement about what ICT can achieve in a particular situation,
- Assembling and tailoring information systems to meet business needs,
- Communicating with clients, contractors and suppliers.

Structure

Level 2 revolves around four 30 credit modules:

Database Design and Implementation (30 credits)

Contemporary organizations, whether in the commercial or not-for-profit sectors, rely on effective database management systems (DBMSs). With the evolution of web sites into database-driven information systems, integrating back office applications with a web interface, the acquisition of the skills of data modelling and database design and implementation are more essential than ever for the competent computer professional.

This module provides you with a thorough grounding in the essentials of data modelling, developing the skills of producing a data model from a business perspective to meet stated requirements using commercially realistic scenarios. It develops your ability to map the data model to a relational database management system (such as Oracle) using the SQL Data Definition Language. It develops skills in database querying and data retrieval using the SQL Data Manipulation Language. In addition, the module considers key aspects of DBMSs such as transaction management, access control and security.

Systems Thinking and Strategy (30 credits)

This module examines the strategic and systems side of ICT in organisations. It encompasses the strategic issues around the decision to implement ICT within an organisation and the systems issues involved in procuring effective ICT. It develops system thinking through an understanding of soft systems methodology. It will cover a wide variety of techniques in order to gain a real understanding of system problems which are messy, non-simple and difficult to define. The module is about looking at systems, and particularly ICT as a whole and understanding the social and technical problems associated with them. An understanding of the general concepts of systems is established and the steps in classical soft systems method are followed through. This involves looking at over-viewing of the client and problems, defining the

problem situation defined, developing a root definition, constructing conceptual models and deciding on what changes can be made to the organisation's systems which are both feasible and desirable. The module considers other approaches to systems thinking including critical systems thinking. The aim of the module is to develop your ability to think holistically and consider problems and their ICT solutions in the context of the entire organisation and its social and economic concerns.

Management of ICT: Information Systems Procurement and Support (30 credits)

The Management of ICT within an organisation requires attention is a wide variety of activities focuses on both technical and people resources. The goal of ICT management is to deliver and sustain ICT service and products within an organisation to meet the organisational needs for information processing. This module explores the wide variety of issues and technologies encountered by ICT managers within user organisations. The module covers structural, processual and contextual areas concerning ICT within organisations. The recurring theme is one of the professional support of ICT functions. Having completed this module, you will be in a position to take on a placement role within an ICT department and provide a variety of ICT services to the organisation.

This module covers the basic ICT business and support material to enable you to understand the processes and activities students will encounter within ICT functions in businesses should they do a placement.

The module also lays the foundations for further study of the strategic role of IT services at Level 3 in Information Systems Strategy and Services.

Applied ICT (30 Credits)

The practice of ICT in an organisation involves a wide range of technical understanding and implementation and diagnostic skills. This module provides a basic skill set, underpinned with the appropriate theoretical frameworks, to enable a student to undertake a useful role in an organisation's ICT department. The module overviews the typical IT infrastructure in an organisation, provides a grounding in networking concepts and studies the process of network implementation. It further studies the nature of client/server architecture and its implementation, addressing implementation issues with a range of servers including database and email servers. Problems with application implementation are considered, particularly integration and data migration. The module looks at IT security and introduces object-oriented concepts and component-based development. Internet based systems applications using PHP are studied and the module concludes with a brief introduction to open source.

Placement Year

You will be expected to take a placement. Level 2 studies make sure you will be effective in a placement. Placements create context for Level 3 studies. A placement

gives you technical and professional confidence and will be a transforming experience. You will find that everything you've learnt at Level 2 will fall into place. You will gain maturity and a depth of understanding of organisations and ICT. The placement helps in getting a job afterwards and is seen as a rewarding experience.

You will be helped to find a company to work for. Our placement unit has three full time staff working with students and employers to create a rewarding and defining placement experience.

Placements may involve a variety of work. For example, students may work on new IT projects and IT support. You may be expected to work in user departments, as system administrators, or in a variety of end user roles in any function, because you will have the ICT knowledge and the wider education to relate systems to applications.

ICT students will be valuable not just in IT departments, but in a range of department like administration, purchasing, sales and marketing.

You will be encouraged to think about and state your preferences early in Year 2. Module choices, personal aptitudes like communication skills and team working skills will be considered as part of the placement process.

You will be encouraged to prepare a Personal Development Plan for the placement, and then maintain it. PDPs are already a part of de Montfort's Personal Tutoring programme.

ICT students on placement are supervised by ICT teachers, who are in the best position to build up relationships both with students and with employers.

Level 3

Philosophy: Developing Specialisms within a generic ICT framework.

By level 3, a strong skill-set and a good understanding of the scope and contexts of ICT have been established. Level 3 provides an opportunity to specialise in a cluster of modules, together with a focus on a tailored project which reflects that specialisation. The definition of your project will be key to establishing a specialism. The focus of all modules is on current practice and industry relevance.

Level 3 involves

- Building areas of specialist expertise on the generic foundations of ICT knowledge,
- Creating an awareness of current trends, and advances in both academic and commercial computing,
- Developing a sensitivity to the opportunities offered by to organisations by new ICT developments,
- Connecting with research groups within the School of Computing,

- Developing the ability to challenge procedures and practice in ICT departments and develop new ideas.
- Gaining skills, attitudes and values in ethical and service-based ICT professionalism

Specialist Clusters

The available modules are divided into four clusters (again, please note that these modules are subject to change. We are creating new networking modules and new module titles are likely to be available when you reach level 3):

Networking

CSCI3401 Broadband Networks
CSCI3409 Commercial Communication Systems

Software

CSCI3407 Component-Based Systems
CSCI3491 Service-Oriented and Agent-Based Computing 30 credit
CSCI3492 Biologically-Inspired Computing 30 credit
CSCI3493 Principles and Practice of Open Source 30 credit

Ethics

INFO3424 Computer Ethics and Social Responsibility
INFO 3406 Privacy and Data Protection

Information Management

INFO3427 E-Commerce Systems Integration
INFO3425 Systems Building Methods and Management
INFO3426 Information Systems Strategy and Services
INFO3407 Innovation and Technology
INFO3419 Information Security Management
INFO3421 Knowledge Management

The specialty of ICT is established through a tailored project, a computer ethics module and an IT services module. In addition, you select a technical specialism which might be, for example, networking, systems integration, open source, service and agent-oriented computing or information security and knowledge management.

Example modules, which express the ethical and service philosophy of the course, and illustrate the cutting-edge content are briefly discussed below.

Computer Ethics and Social Responsibility (30 credit)

The computer ethics module, Computer Ethics and Social Responsibility is a requirement for all level 3 school of computing students. It sets the foundations for a

lifetime of service in IT, it establishes the ethos of the school, it draws on the strong international research foundations and aligns with the requirements of professional associations such as IMIS and BCS.

Information Systems Strategy and Services (30 Credit)

The information systems strategy and services module prepares students to work effectively in a service-oriented environment, instilling a service view of IT and setting the foundations of expertise in IT service management. It takes a service view of information systems in which the IS departments role concerns the provision of services and support for the information technology (IT) function. The module explores the application of service management concepts to the delivery and quality management. It examines operational issues surrounding the management of resources and computer capacity, the provision of help desk services and the management of IT assets. It considers the development of new services, the management of end-user computing and the development of IT service culture. An introduction to the disciplines required for BS15000 / ISO20000 IT service standards is provided. The subject area is considered in the context of a business environment where many IT services are provided by third parties and managed through contracts. The strategic role of systems and service in the organisation is developed by exploring the alignment of information systems and the organisational strategy. An understanding of the strategy of an organisation leads to the development of a portfolio of systems and services which matches the objectives of the organisation and delivers competitive advantage. Frameworks and approaches to developing such an understanding of the strategic role of information systems are considered.

Service-Oriented and Agent-Based Computing (30 credit)

Quote from the First International Conference on Service-Oriented Computing:

“Today we are experiencing a major paradigm shift in the way that software applications are designed, architected, delivered and consumed. Service Oriented Computing (SOC) is the new emerging paradigm for distributed computing and e-business processing that has evolved from object-oriented and component computing to enable building agile networks of collaborating business applications distributed within and across organizational boundaries.

Services are autonomous platform-independent computational elements that can be described, published, discovered, orchestrated and programmed using XML artifacts for the purpose of developing massively distributed interoperable applications.

The application of the service-oriented computing model to Web resources to provide a loosely coupled model for distributed processing is manifested by Web services.

Services are more than just software components; their platform neutral and self-describing nature and particularly their ability to enable business processes.”

IT companies such as IBM are getting into service-oriented computing in a big way, as the following Extract from IT Week in September 2005 illustrates:

IBM has announced a slew of products to help firms build and deploy applications using service-oriented architectures (SOAs). Experts say SOAs build on the ideas behind web services so that apps can be automatically provisioned and scaled depending on needs.

Analyst firm Gartner recently predicted that 80 percent of IT projects will use SOAs to accomplish their goals by 2008

Tom Rosamilia, IBM vice-president of application and integration middleware R&D, said, "We have seen a growing interest in SOAs recently. Today we're announcing a comprehensive set of capabilities through products that address the whole gamut of SOA. Customers won't necessarily want all of this now, but we think it's better to buy from a vendor that can give you all of this now, or give you some now and the rest eventually."

This module will explore the concepts of service-oriented computing and provide a practical framework for implementing it. It will examine its prevalence in industry and explore possible directions service-oriented computing may take.

Biologically Inspired Computing (30 Credit)

Increasingly computer scientists are looking to biology for frameworks and concepts which will enable advances in how computers are programmed and maintained. Biology has developed effective solutions to tough engineering challenges through millions of years of evolution. Computer scientists can learn a great deal by observing nature and adopting biological approaches to problem solving. Biological systems tend to be decentralized, adaptive and environmentally aware, and as a result they have survivability, scalability and flexibility properties well beyond the best human-engineered systems.

This module will identify some core biological concepts and show how they are applied across a range of computer applications to develop new computing paradigms and new approaches to ICT problems. It will also explore classic applications of biology in computing including genetic algorithms, genetic programming and neural networks.

Principles and Practice of Open Source (30 credit)

Open source is a significant new trend in commercial software. This module lays the foundations of open source. Definitions of open source are examined. A study its made of Linux, its development and implementation. What are the mechanisms by which Open source operating system have been developed. How is configuration management carried out? What does an organisation have to do to install it. How can, for example, hospitals club together to implement open source patient administration systems? Business models are explored. The module goes beyond Linux, exploring Open source applications including e-commerce software for web sites and shopping

sites. Case studies are pursued to enable the students to get a full grip of the principles and enough technical acumen to assemble a basic open source web site.

The ICT Project

The project is a compulsory module at Level 3. A typical ICT final year project does not involve the development of an information system as a core activity. Where there is a software artefact it acts to illustrate the principles ideas the you have researched, the conclusions which have been reached, and the critical analysis the student has undertaken as part of the project. The project will usually focus on the delivery of ICT within organisations and the problems associated with the evaluation, implementation and support of that ICT.

Example of ICT Projects are given below:

Project Definition : Enterprise Resource Management Systems

1. What characterises ERPs? What is their structure? What is the goal of an ERP?
2. What benefits do ERPs offer?
3. How can ERPs be implemented?
4. Find some case studies concerning ERP implementation and usage in the literature and, if possible, in the field.
5. Analyse the case studies. What are the similarities in implementation methods and problems?
6. Identify the available proprietary ERP systems – include SAP, Baan,, People soft. What are their characteristics?
7. Create an approach to evaluating them.
8. Based on a university carry out a ‘dummy’ evaluation.
9. Provide management advice on the advisability of adopting an ERP and the main issues and problems faced.

Project Definition: Tailoring ITIL for SMEs.

1. ITIL provides a set of prescriptive standards for best practice in the delivery of IT services. It is targeted at larger organisations and there are questions concerning how ITIL can be applied in smaller organisations with small or no IT services department.
2. The first step is to understand what ITIL is and how its works. Describe the structure and content of ITIL. What does it do? How does an organisation implement ITIL? What are the assumptions it makes? About staff? About resources? What cultural assumptions does it make?
3. What are the differences between the large organisation into which ITIL fits and the SME or small organisation? In terms of resources, IT expertise, IT support? Investigate literature and textbooks too establish a picture of how IT is used in small organisations.
4. What characteristics of ITIL make it unsuitable for small organisations.
5. Select a SME or small organisation and investigate its IT usage and support.

6. On the basis on (a) your understanding of ITIL, (b) your study of IT within a real SME and (c) your investigation of IT in SMEs based on the literature, develop a process definition for ITIL implementation within a small organisation.
7. Explain carefully how you have developed the ITIL steps for an SME and explain your justification for each step.
8. Part of your work should be presented as a guide to the implementation of (mini?) ITIL for SMEs.

E-Skills UK

E-Skills UK is a government organisation, launched in April 2003, as a sector skills council which acts as the voice of IT employers. Its purpose is to ensure that employees can get staff with the IT skills they need. E-Skills UK looks at the way IT is changing and through a business council, identified the skill set it considers relevant to the needs of IT. The E-skill council has contributed to a definition of the IT skills needed called the Skills Framework for the Information Age (SFIA)

E-skills recognises the need for broader, changing IT skills within the IT profession and the general workforce. It recognises that the skill set is changing, and that there is a lack of good IT graduates. Their mandate includes increasing the general skill level as well as producing IT professionals. The IT workforce still needs significant numbers of graduates, although their skill set may be different. The BSc ICT at De Montfort University has been designed with the E-Skills council and the SFIA in mind.

E-skills has four objectives which the BSc ICT at De Montfort will contribute to.

Objective 1. Make IT careers more attractive

School leavers are currently put off IT, seeing it as a male dominated industry full of computer nerds who are interested in machines, not people. IT is predominately about people and helping people to use what is established technology. The BSc ICT puts this across and has a strong people emphasis from day 1. You will not be overwhelmed by programming but you will focus on the purpose of technology.

E-skills further has an emphasis on changing female attitudes to IT. At De Montfort University we are pioneers in encouraging women to take up IT. We realise the need for people-oriented IT professionals. The internationally recognised Women's Access to IT initiative at DMU has introduced hundreds of women to IT over the past fifteen years.

Objective 2. Prepare the Future Workforce

DMU's BSc ICT prepares a ICT workforce for the 21st century since it is service-centric, not application-centric and is more sensitive to the changing roles of ICT professionals.

Objective 3: Developing the existing workforce.

E-skills is working at this objective through an e-skills passport and the e-business academy. The BSc ICT will offer a part-time route if you would rather remain in full time work while studying.

Objective 4 Improve the Infrastructure

E-skills is interested in a ubiquitous training infrastructure which ensures all IT professionals and users have some recognised IT training. The focus of BSc ICT is on improving the IT training infrastructure by bridging the gap between schools ICT and business ICT.

Resources at De Montfort University to support the BSc ICT

There are 12 PC labs containing 20 Pentium 4 machines, with a further 15 in the Study lab. Plus 4 Linux labs with 20 Pentium 4 machines in each. All labs have either 17" 19" or 24" TFT screens.

A comprehensive manual on using the School of Computing's IT resources can be found at:

<http://www.cse.dmu.ac.uk/GettingStartedOnPC.html>

There is a constant emphasis on updating the technology with laboratories and classrooms to remain competitive in comparison with other universities and to maintain a technical advance over the infrastructure offered by schools and colleges.

SNITs (Special Needs in IT) PC are available in all labs that can accommodate them (all PC labs bar 6.79, 5.55 and Linux labs). A PC & software bundle supplied by ISAS for persons with disabilities. Specialist software includes JAWS, Dragon Naturally Speaking and Kerzweil. We also have a selection of peripherals, these include 50 key large key keyboards, high contrast keyboards, right/left handed vertical mice.

Library

The library resources at De Montfort are excellent. The Kimberlin Library, situated at Leicester City campus, covers a wide range of subject areas and is the largest of De Montfort University's Library Services Department. The Department's mission is to support the teaching, learning and research activities of the University by providing a wide range of facilities. The Library's activities are linked to the needs of both staff and students and are allied to a philosophy of effectively utilising the latest developments in information technology.

There are 400 computers providing access to OPAC, Microsoft Office facilities, CD-ROMs, and the Internet. There are two IT Help Desks and resources such as colour printing, scanners, cd-writers, usb sockets, and zip drives. Computing facilities are provided for visually impaired and dyslexic users.

The library offers a learning environment for the majority of study activities, such as long and short-term lending, inter-library loans, reference and reader advisor services. The library ensures that it provides a focus for the independent learner by providing self-help guides for study skills, using the various databases and collections, and the subject-resource guide – Finding Information - Computing. Staff are available to offer assistance on the best methods of information retrieval.

User education is well developed. All new students are offered an induction to the library and specialist Information Skills courses can be provided by contacting the Subject Librarian before timetabling the following year lectures.

The library has a very good electronic journal resource which students within the School of Computing are taught to use. The journal resources are of particular importance in final year modules where learning becomes more investigative and students are encouraged to look beyond textbooks and to expect that modules will be driven more by research and current thinking than textbooks..

Why De Montfort University's BSc ICT meets industry needs

In developing an innovative and leading edge degree, the team entered into discussion with industry experts. We are always in contact with industrial partners, who often come and talk to our students. Other contact is derived from attending industrial conferences and consultancy work.

Discussions at national conferences of IT practitioners, including the TLIG Advisory Services Symposium of the Universities and Colleges Information Services Association Biannual conference at Staffordshire University in July 2005, and the first meeting of the HE special interest group of the itSMF at the University of Birmingham in November 2005, suggested that the philosophy of the BSC ICT and the type of content aligned with the industry view of what is required from graduates. Indeed, there is general industry awareness that a shift in the nature of undergraduate computing education is urgently required.

The following is a selection of comments from industrial contacts:

“I think what you propose is much closer to reality in the workplace today. In-house development is diminishing and integration is becoming key. My observation on this though would be that purchased/integrated solutions rarely meet all user requirements so there is usually a need for prioritisation, persuasion and negotiation.” ICT manager, Local government

“My comments are that generally this looks like a really good proposition, and one that, as an employer, I would be interested to see on a CV. While the fashion veers between IT specialist and hybrids, the interpersonal and commercial skills are of increasing use when related to technology adoption... The need for specific languages is reducing, and IT staff, in particular, need to be much more aware of data quality, business logics and integration issues, than of code. Graduands [must be] aware of the full range of Information Systems, the compliance and governance context (perhaps a Sarbanes-Oxley overview, data protection, freedom of information), and the need for business process improvement is vital these days.” IT Director, HE Institution

'We sense that issues like service delivery and service management, business analysis and planning, project management etc are the in-demand skills of the future', Skills Development Officer, Chambers of Commerce

“Great that DMU has recognised the shift in the I.T. industry which has taken place over recent years. Most companies have shifted from an internal development Dept. to a strategy of 'Buy not Build' talking to lots of people from different organisations. that ...the demand for the traditional I.T. specialist programmer/developer has shifted to people that can understand the flexibility of the system, the process it supports and can communicate to the business users in a way that it can be exploited therefore, we now actively recruit people which can design and document business processes as well as those skills around service delivery, service management, business analysis, project management, planning etc.

Many of our projects are either upgrade projects of existing systems or projects researching the market place to select alternative packages by issuing a Request for information, Invitation to Tender and selection process. Supplier Management is a key skill which we are now developing in order to leverage value from our suppliers, we treat and manage our suppliers differently depending on if they are a strategic partner or supplier.

The in house technical skills around very much around infrastructure support and development, Database admin ., system integration using middleware products which have been purchased or website design and development.

DMU has recognised and respond to the needs of the I.T. Dept. of the 21st Century.” IT Business Relationship Manager, Building Society Retail Banking Operation.

"..[The degree states that the goal of ICT is].to deliver information and processes to meet the organisation's goal" - this is fundamental and most current graduates cannot think this way so this would be very valuable.” Information and Communication Services Direction, Housing Association

“The shape of the IT Department has undergone a fundamental shift. The forward thinking 21st Century internal IT Department should no longer be focused on

recruiting a team of application developers and the line management structures required to support internal IT development work. There has been a huge outflow of this type of work over recent years to specialised systems integration providers who can benefit from economies of scale & global sourcing to bring down the costs associated with bespoke application development. These organisations now use low cost, high quality application development resources located in India, South America, the Far East etc. Alongside this there has also been a dramatic shift in the use of package based systems as opposed to bespoke development even in some of the more traditional vertical markets such as Telecoms, Financial Services, Healthcare, Public Services etc where major bespoke development and armies of in-house development resources were the norm.

The in-house IT Department is now shrinking down to a core of highly skilled, IT savvy business managers and industry specific business analysts who are able to successfully bridge the gap between business issues & technology based solutions. At the heart of this is a need to focus on the following disciplines:

- Service Management
- Supplier Management
- Project Management
- Business Analysis
- Management of Change
- IT Strategy
- Portfolio Management
- Business case development
- Benefits management

The internal IT Department is now becoming the Service Integrator, bringing together an understanding of the technology needs of the business and providing for this through a range of commercial relationships with external service providers....your proposed BSc course begins to address the paradigm shift which has now occurred.”
Principal Consultant, IT Services Company.

All the evidence from industry suggests that there has been a shift in the nature of work in IT departments and the skills needed away from construction towards analysis.

Research Groups in the School of Computing

De Montfort University is the leading new university for research. As such, research features strongly in the School of Computing. Your ICT studies at De Montfort will bring you in contact with a variety of researchers conducting leading-edge research into computing and ICT. Researcher involvement is particularly strong in the final year where many of the module options are generated by researcher’s interests. Four groups have contributed directly to the ICT degree, their involvement is described next.

The Centre for Computing and Social Responsibility

The Centre for Computing and Social Responsibility at De Montfort University is internationally recognised for its applied research expertise. It is a leader in research and education in the ethical and social issues related to information and communication technologies. CCSR is the only UK-based centre of its kind and has provided a focus for this type of research since 1995. CCSR has created a World Wide Web site which is now recognised as the leading portal in this field. It receives over 2 million visits each year from people worldwide.

Ethics and social responsibility awareness is included in all ICT programmes. This theme is addressed in technical modules as well as through specialised modules. CCSR develops and delivers specialist advanced modules based on ongoing research; and co-ordinates and supports the lower lever teaching of this theme to all ICT undergraduates by faculty members as well as offering advice to other education providers.

The CCSR developed the content of Social ICT, Computer Ethics and Professional Responsibility, and Privacy and Data Protection

Website: <http://www.ccsr.cse.dmu.ac.uk/>

IT Service Management Research Group

The IT Service Management Research Group applies concepts from service management research to the management of IT and information provision within organisations. Research areas covered include IT strategy within the public sector and government, cultural issues in the adoption of IT, Organisational culture and workflow management systems, IT help desk management, and the application of chaos theory to IT service management. Recent published work has applied chaos theory to IS strategy and investigated the adoption of IT in developing countries. The centre cooperated with the itSMF. Articles are regularly written for the journal of the itSMF and talks are given at the forum's annual conference. Research concerning scripting, end-user computing, executive information systems and IT service strategy is incorporated into undergraduate modules.

The research group developed the content for Information Systems Services and Strategy, Innovation and Technology, Fundamentals of E-Commerce, Systems Thinking and Strategy, Management of ICT, Knowledge Management and E-Commerce Systems Integration.

Website: http://www.cse.dmu.ac.uk/cism/service_management.html

Centre for Computational Intelligence

The Centre for Computational Intelligence exists to develop fundamental theoretical solutions to real world problems using a variety of computational intelligence paradigms. The national and international significance of this mission is as follows:

- To be one of the leading national and international sources of expertise on fuzzy logic, mobile robotics and medical systems

- To play a key role in enabling the University to develop an international reputation for leading edge computational intelligence research

Current research includes knowledge representation and reasoning as applied to mobile robotics and autonomous agents, emotion and perception-based reasoning and multi-agent systems.

The Centre contributed to the development of Biologically Inspired Computing and Service-Oriented and Agent-Based Computing.

Website: <http://www.cci.cse.dmu.ac.uk/cci/>

Software Technology Research Laboratory

The Software Technology Research Laboratory (STRL) at De Montfort University has been set up to study, analyse and advance formal approaches to the specification, design and re-engineering of mixed computing systems with emphasis being placed on those which are used in (distributed) real-time safety critical applications.

The research activities in the STRL are organised along the theoretical-to-applied axis, focusing on 6 main themes: Critical Systems, System Evolution, Programming Languages and Systems, Requirement Engineering, High Performance Computing and Grid Technology, and Service-oriented Computing.

The STRL developed Service-Oriented and Agent-Based Computing, Principles and Practice of Open Source and Component-Based Development

Website: <http://www.cse.dmu.ac.uk/STRL/index.html>

Further reading

Follow some of the following websites to investigate how ICT is developing in organisations:

IT Service Management Forum: www.itsmf.com

British Computer Society: www.bcs.org

National Framework for IT in the health service: www.connectingforhealth.nhs.uk

IBM: www.ibm.co.uk

Contacts

If you have any further questions please contact Dr Neil McBride, Course Director on 0116 207 8500.