

# **Computing Major at Coleraine**

**Student Handbook  
2010-11**

## **The Computing Major**

### **BSc Hons Computing with <minor subject> with DIS**

#### **Introduction**

Computing has had an enormous impact on society as great as in the last forty years, and now affects the daily lives, either directly or indirectly, of many millions of people throughout the world. The wide, and ever increasing, availability of computers to those without specialist knowledge places a growing mantle of responsibility on those with specialist knowledge to ensure the development of high quality, robust and usable hardware and software systems.

The Computing Major gives the student the opportunity to study this exciting area in combination with a range of minor subjects. The inclusion of an industrial placement year prepares candidates for working careers in computing and sets their academic studies into the context of the variety of computer applications.

All graduates from these programmes will have a high degree of skill in the development of quality software. The “core” of the programmes, essentially the first two years of study plus the final year project, will have prepared them for careers in software production in a variety of positions, including software houses, data processing and industrial computing.

## Programme Structure Diagram for Computing Major

### Year 1:

Semester 1:	Using the Web	Software Development 1	<i>Minor Subject</i>
Semester 2:	Web Information Systems	Software Development 2	<i>Minor Subject</i>

### Year 2:

Semester 1:	Web Applications Development	Professional Issues & Enterprise	Data Structures	<i>Minor Subject</i>
Semester 2:	Web Database Systems		Systems Applications	<i>Minor Subject</i>

### Year 3:

Semesters 1- 3:	Industrial Placement
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### Final Year:

Semester 1:	Software Project Management	<i>Computing Option 1</i>	<i>Minor Subject</i>
Semester 2:	Project	<i>Computing Option 2</i>	<i>Minor Subject</i>

## Final year options

*The list of options on offer may vary from year-to-year.*

Multimedia

Operational Research Methods

Machine Learning and Data Mining

Computer Networks

Advanced Database

## B 1.5 Programme Specification

**COURSE TITLE(S): Undergraduate Honours Subject: Computing (Major)**

**PLEASE NOTE:**

This specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he or she takes full advantage of the learning opportunities provided. More detailed information on the specific learning outcomes, content and the teaching, learning and assessment methods of each module can be found at [www.../in course/subject/student handbook](http://www.../in course/subject/student handbook)).

1	<b>AWARD INSTITUTION/BODY:</b>	UNIVERSITY OF ULSTER
2	<b>TEACHING INSTITUTION:</b>	UNIVERSITY OF ULSTER
3	<b>LOCATION:</b>	COLERAINE
4	<b>ACCREDITED BY:</b>	British Computer Society
5	<b>FINAL AWARD:</b>	Bachelor of Science (BSc) <i>taken in conjunction with an approved minor</i>
6	<b>MODE OF ATTENDANCE:</b>	FULL-TIME
7	<b>SPECIALISMS:</b>	Computing Science
8	<b>COURSE/UCAS CODE:</b>	<i>Various</i> G400
9	<b>DATE WRITTEN/REVISED:</b>	May 2008

**10 EDUCATIONAL AIMS OF THE COURSE**

The overall aim of the strand is to provide an education in computing to a level that prepares students for either immediate employment in the computing industry or entry to a postgraduate course in Computing on the Coleraine campus, within UU or beyond.

In particular, it seeks to:

- provide a rigorous study of the principles underlying modern computing applications
- develop expertise in the application and integration of a range of computing tools and facilities
- develop an ability to use, compare and evaluate a range of techniques and methods as used in the development of computing applications
- instil an understanding of the individual, social, organisational and economic implications of the application of computing
- develop an ability to carry out a programme of work with minimal supervision
- develop an ability to communicate effectively
- promote the knowledge and skills required by the computing industry
- provide appropriate experience of working in the computing industry through a work placement
- provide an opportunity to obtain an in-depth knowledge and understanding of selected areas of interest

**11 MAIN LEARNING OUTCOMES**

The following reference points were used to inform the development of the programme and its learning outcomes:

- the University's Vision and core strategic aims, teaching and learning strategy and policies
- current research or other advanced scholarship carried out by academic staff
- subject benchmark statement (Computing – March 2007) available at: <http://www.qaa.ac.uk/academicinfrastructure/benchmark/statements/computing07.pdf>
- requirements of professional (BCS) bodies
- national and University qualifications and credit frameworks

The strand provides opportunities for students to achieve and demonstrate the following learning. Successful students will be able to:

### **11- K KNOWLEDGE AND UNDERSTANDING OF SUBJECT**

- K1** identify and describe the key concepts, principles, and practices that underpin computing as an academic discipline and its relevance to everyday life
- K2** identify and describe a range of tools, practices and methodologies used in the specification, design, implementation, testing and evaluation of computer software systems
- K3** identify and describe a range of methods used to determine the extent to which a computer system is appropriate for its current deployment and future evolution
- K4** identify a range of professional, economic, social, environmental, moral and ethical issues involved in the sustainable exploitation of computer technology
- K5** identify and describe some developments in research in at least one area

#### **Teaching and Learning Methods:**

Teaching and learning will be through a mixture of lectures, seminars, laboratory classes (practical classes). Much of the teaching materials will be provided in electronic form, with WebCT providing a managed learning environment for the strand. The student will develop from being heavily guided towards the relevant material to become more independent as they progress towards self-learning across the programme. All modules are (at least) Web Dependent. Electronic assessment will be used where practical and appropriate.

#### **Assessment Methods:**

Assessment will take the form of a mixture of closed-book examinations, submission of laboratory books, coursework assignments, class tests and oral presentations.

## **11-1 INTELLECTUAL QUALITIES**

- I1** apply the concepts, principles and practices that underpin computing as an academic discipline and its relevance to everyday life
- I2** analyse problems, identify requirements and propose and evaluate alternative solutions for computer software systems
- I3** determine the appropriateness of a computer system for its current deployment and future evolution
- I4** recognise the relevance of professional, legal, moral, social and ethical issues in their work
- I5** read and evaluate research papers in at least one knowledge area
- I6** organise ideas, proposals and designs using models and rational and reasoned arguments, for presentation to a range of audiences

### **Teaching and Learning Methods:**

Teaching and learning will be a mixture of lectures, seminars and laboratory classes (practical classes). Much of the teaching materials will be provided in electronic form, with WebCT Vista providing a managed learning environment for the strand. Electronic assessment will be used where practical and appropriate.

### **Assessment Methods:**

Assessment will take the form of a mixture of closed-book examinations, laboratory books, coursework assignments, class tests and oral presentations.

**11- P            PROFESSIONAL/PRACTICAL SKILLS**

- P1** select and use relevant sources of information to identify potential computing resources for a specific purpose
- P2** select and effectively deploy a range of tools for the modelling, construction and documentation of computer applications
- P3** specify, design and construct computer-based systems for a range of application areas
- P4** test and evaluate systems in terms of general quality attributes recognising potential trade-offs within the given problem
- P5** operate computing equipment effectively and safely recognising its logical and physical properties within a specific context
- P6** make appropriate professional judgements, taking due account of relevant professional, ethical and legal practices
- P7** select and use an appropriate mix of tools and aids in preparing and presenting reports and other material for a range of technical and non-technical audiences, such as management, computer users, and the academic community

**Teaching and Learning Methods:**

Practical skills will be developed and nurtured primarily in the supervised laboratory classes. Typically the emphasis will move from quite heavily guided laboratory work towards work that requires a greater individual contribution. Professionalism and professional practices will be encouraged at all stages with a year two module identified as a key element in ensuring students are formally aware of the issues prior to Placement. Much of the resources will be provided in electronic form with WebCT Vista providing a managed learning environment for the strand.

**Assessment Methods:**

Problem based coursework, use of laboratory resources, lab books, presentations, individual reports and contribution to group reports. Electronic assessment will be used where practical and appropriate.

**11 - T TRANSFERABLE SKILLS**

- T1** demonstrate effective information-retrieval skills
- T2** demonstrate appropriate numeracy and literacy skills in understanding and presenting cases involving a quantitative and qualitative dimension
- T3** make effective use of general IT facilities
- T4** work as a member of a team recognising the various roles within a team and alternative ways of organising a team
- T5** organise and manage their own learning and development in an efficient and effective manner
- T6** make use of a range of learning resources to guide their learning
- T7** appreciate the need for continuing professional development in recognition of the need for lifelong learning
- T8** communicate effectively using various media and for a variety of audiences

**Teaching and Learning Methods:**

These skills will be progressively developed across the strand primarily through the tutorials, seminars, practical sessions associated with each module. These will be supported by the activities associated with the Placement (including Placement preparation) and project work (including Project preparation and implementation).

**Assessment Methods:**

Reports, lab based assessment, use of software packages, groupwork, group projects, CV preparation, examination and coursework. Electronic assessment will be used where practical and appropriate.

### 11 PROGRAMME LEARNING OUTCOME MAP

**Please Note:** The matrix displays only the measurable programme outcomes and where these are developed and assessed within the modules offered in the programme.

#### YEAR 1

MODULE		OUTCOMES																									
TITLE	CODE	K1	K2	K3	K4	K5	I1	I2	I3	I4	I5	I6	P1	P2	P3	P4	P5	P6	P7	T1	T2	T3	T4	T5	T6	T7	T8
Using the Web	COM103	✓					✓						✓						✓	✓		✓	✓	✓			✓
Software Development I	COM135		✓	✓				✓	✓					✓	✓	✓						✓	✓			✓	
Web Information Systems	COM104		✓					✓							✓	✓						✓	✓	✓			✓
Software Development II	COM138		✓	✓				✓	✓					✓	✓	✓						✓	✓			✓	

#### YEAR 2

MODULE		OUTCOMES																									
TITLE	CODE	K1	K2	K3	K4	K5	I1	I2	I3	I4	I5	I6	P1	P2	P3	P4	P5	P6	P7	T1	T2	T3	T4	T5	T6	T7	T8
Professional Issues & Enterp	COM411				✓					✓								✓	✓	✓				✓		✓	
Data Structures	COM316	✓	✓		✓		✓	✓		✓				✓								✓	✓				
Web Applications Development	COM301		✓					✓							✓	✓			✓	✓	✓	✓		✓	✓		
Web Database Systems	COM302	✓					✓	✓						✓	✓					✓	✓	✓	✓	✓	✓		✓
Systems Applications	COM356	✓	✓				✓	✓	✓				✓				✓				✓		✓		✓		

**Final Year**

MODULE		OUTCOMES																										
TITLE	CODE	K1	K2	K3	K4	K5	I1	I2	I3	I4	I5	I6	P1	P2	P3	P4	P5	P6	P7	T1	T2	T3	T4	T5	T6	T7	T8	
Software Project Management	COM		✓		✓	✓		✓		✓			✓	✓				✓	✓		✓	✓		✓		✓	✓	
Project	COM570	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Multimedia	COM	✓	✓				✓		✓				✓	✓						✓	✓			✓	✓		✓	
Operational Research Methods	COM551	✓	✓			✓	✓	✓	✓		✓		✓	✓		✓			✓	✓	✓	✓			✓	✓		✓
Machine Learning & Data Mining	COM542	✓	✓	✓		✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓			✓	✓		✓
Digital Image Processing	COM536	✓				✓	✓								✓		✓		✓		✓	✓						
Computer Networks	COM548	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓				✓	✓	✓	✓	✓			✓	✓		
Advanced Database	COM572	✓	✓			✓	✓	✓			✓			✓												✓		
XML & Advanced Web Programming	COM		✓								✓			✓	✓						✓	✓			✓			

## 12 STRUCTURE AND REQUIREMENTS FOR THE AWARD

The major strand can be studied in full-time mode over a period of four academic years, in conjunction with an approved minor strand.

Each academic year of the strand is arranged into 2 semesters - each semester is of 15 weeks duration.

The learning is divided into study units called modules.

All modules are described at Levels A, 4, 5 or 6.

With the exception of the Placement module, all modules have a credit value of 10, 15, 20 or 30 credit points. The Placement module has a credit value of 60 credit points.

The credit value of a module is in proportion to the effort required from the student with 1 credit point corresponding to 10 hours of student work effort. Hence (for example) a 20-point module corresponds to 200 hours of student work effort.

Student work effort for a module includes activities such as attending lectures, tutorials, seminars and practical classes; preparing for and performing coursework; preparing for and sitting examinations; independent and directed self-study and so on.

Progression from Semester 1 to Semester 2 is automatic.

To be eligible to proceed from one year of the programme to the next, a student needs to pass all modules.

The names of the modules within the strand, the levels at which they are studied, the credit ratings and awards that may be gained are shown in the following table:

### Level 4 Modules

Module Title	Credit		Module Status	Awards
	Level	Points		
Using the Web	4	20	Compulsory	-
Software Development I	4	20	Compulsory	-
Web Information Systems	4	20	Compulsory	-
Software Development II	4	20	Compulsory	-

**Level 5 Modules**

Module Title	Credit		Module Status	Awards
	Level	Points		
Professional Issues & Enterprise	5	10	Compulsory	-
Data Structures	5	15	Compulsory	-
Web Applications Development	5	20	Compulsory	-
Web Database Systems	5	20	Compulsory	-
Systems Applications	5	15	Compulsory	-

**Placement Module**

Module Title	Credit		Module Status	Awards
	Level	Points		
Placement module – Computing	5	60	Compulsory	DIS

**Level 6 Modules**

Module Title	Credit		Module Status	Awards
	Level	Points		
Software Project Management	6	10	Core	1/12 (Hons)
Project	6	30	Core	1/4 (Hons)
Multimedia	6	20	Option	1/6 (Hons)
Operational Research Methods	6	20	Option	1/6 (Hons)
Machine Learning & Data Mining	6	20	Option	1/6 (Hons)
Digital Image Processing	6	20	Option	1/6 (Hons)
Computer Networks	6	20	Option	1/6 (Hons)
Networks & Web Security	6	20	Option	1/6 (Hons)
Advanced Database	6	20	Option	1/6 (Hons)
XML & Advanced Web Programming	6	20	Option	1/6 (Hons)

### **13 SUPPORT FOR STUDENTS AND THEIR LEARNING**

Students and their learning are supported in a number of ways.

- A series of phased Induction sessions to provide timely advice on the key aspects of the strand provision.
- A Faculty Student Handbook to provide a guide to life as a student within the Faculty of Computing & Information Engineering.
- A Student Handbook to provide all the necessary information about the strand.
- Module Handbooks (electronic or otherwise) to describe the content of each module delivered in a particular year.
- A Subject Director who has responsibility for ensuring the smooth day-to-day operation of the strand.
- An Adviser of Studies is allocated to each student. Advisers of Studies are members of staff with the responsibility of assisting students in their personal and career development.
- Personal Development Planning
- A centralised Accommodation Service that helps new and existing students explore the range of accommodation options available.
- A centralised Careers Service is available to help students determine their future career and support their applications for employment.
- A centralised Information Services Department with responsibilities covering library, academic and administrative computing, digital communications, audio-visual services and reprographic services
- A centralised Student Support Department is available to students who have problems with non-academic aspects of student life.
- A Sport and Recreation Department
- An International Office
- A Students' Union
- A Chaplaincy

**14 CRITERIA FOR ADMISSION**

Applicants must satisfy the University's general entry requirements as set out in the prospectus or demonstrate their ability to undertake the strand through the accreditation of prior experiential learning (APEL). The initial offer standard may vary from year to year. See prospectus entry.

**15 EVALUATING AND IMPROVING THE QUALITY AND STANDARD OF TEACHING AND LEARNING**

Quality and standards are evaluated and improved through consideration of:

- External benchmark standards [identify QAA benchmark and PSRB benchmarks unless stated in section 11]
- Views of students as expressed through staff/student consultation, and the University student questionnaire on teaching and other questionnaires
- Views of graduates in the National Student Survey
- Views of employers
- Views of external examiners
- Student performance data and career progression
- University processes for initial approval, periodic re-approval and annual monitoring.

In addition, there are University/Faculty/School strategies for teaching and learning.

## 16 REGULATION OF STANDARDS

### Assessment rules

The pass mark for modules and individual assessments is 40%

Degree classification is based on an average that includes both major and minor subject modules. Performance levels are as follows:

1 <sup>st</sup> Class	An overall average of at least 70%
2 <sup>nd</sup> Class Upper Division	An overall average of at least 60% and less than 70%
2 <sup>nd</sup> Class Lower Division	An overall average of at least 50% and less than 60%
3 <sup>rd</sup> Class	An overall average of at least 40% and less than 50%

Honours classification derives 100% from level 6 modules. [See Regulations for precise details].

### External Examiners

There is one External Examiner for the strand.

External examiners are academic subject or professional experts appointed from outside the University. Their key functions are to contribute to the assurance of the standards of the award and the fair treatment of students. They are involved in the moderation and approval of assessments and the moderation of the marking undertaken by internal examiners.

## 17 INDICATORS OF QUALITY RELATING TO TEACHING AND LEARNING

Selected indicators of quality relating to Teaching and Learning include:

- 25% of teaching staff are members of the British Computer Society
- Computing was awarded a Grade 4 in the 2001 Research Assessment Exercise
- A Discipline Audit Trail for Computing was examined as part of the 2005 QAA Institutional Audit with a number of positive comments. The following summary extract is appropriate:

“Computing programmes in the three Schools are defined appropriately and satisfy the requirements of professional accreditation where relevant. A review of assessed work confirmed that the standards achieved by students are appropriate to the titles of the awards and their location in FHEQ. The quality and extent of the DSED impressed the audit team, as did the articulation by staff of their commitment to the continual development and refinement of their courses and their attendance to issues such as student retention in very positive and supportive ways. Students felt that staff were very approachable and helpful, and this contributed significantly to a positive student learning experience. The quality of learning opportunities is suitable for the programmes of study leading to the named awards.”

Report at: <http://www.qaa.ac.uk/reviews/reports/instReports.asp?instID=H-0185>

## **Module Summary**

### **Year 1**

This year forms a common core which is designed to provide students with a firm foundation of theory and practice across the broad spectrum of computing. Students will be provided with a sufficient level of proficiency in computing so that they can make a positive contribution to the work of their placement year. They will also gain an understanding of the underlying theory of computing and its applications so that they can extract maximum benefit from their placement year:

#### **Software Development 1**

Students are introduced to key OO and software development concepts to re-enforce the idea that they must become an object user before they can design their own. Objects and their representation are discussed, concentrating on primitive data types and OO terms and techniques. This will be reinforced by practical use of existing pre-defined classes like JFrame, introducing the students to interactive interfaces. Software engineering principles and techniques will be interwoven with the topics and assessment exercises. The module extends interface applications within the area of Swing and all of the available predefined GUI components and mechanisms.

#### **Using The web**

This module introduces internet connectivity and applications. The focus is on the use of the Web by home and office users. The practical side of the module introduces the construction of Web sites using HTML and CSS.

#### **Web Information Systems**

This module examines the foundations for large, typically commercial, Web applications. The focus is on the provision of Web services by an organisation. The concept of an "information system" is presented and the various roles, responsibilities and communications within the system are examined. Usability and accessibility is recognised as a vital component of commercial Web applications, and ISO & W3 guidelines for effective interface design are presented.

#### **Software Development 2**

This module introduces selection and repetition mechanisms in Java. This enables the introduction of arrays as an extended intermediate storage structures and files as a permanent storage mechanism. The module extends their use of OO techniques and Java constructs into the hierarchy of super and sub classes and the area of inheritance. The module extends the area of interface applications within Swing introducing pre-defined GUI components and mechanisms available to them. All of these theories will be supported by gaining weekly practical experience in the labs.

### **Year 2**

This year builds on the basic and generic skills acquired in Year 1. Modules are designed to provide students with an introduction to advanced topics in computing thereby helping them to make an informed choice of specialist options in their final year.

**Web Applications Development**

The design and maintenance of Web sites has become one of the major growth areas in Computing in recent years, with most organizations now boasting at least some presence on the Web. This module provides a practical introduction to the tools and techniques required to construct and manage Web-based applications, for both internet and intranet.

**Professional Issues & Entrepreneurship**

Students on a vocational programme ought to have an understanding of the industry for which they are being prepared. They also need to be aware of their own potential, and be able present themselves appropriately to a prospective employer.

Skilled graduates will benefit from an enterprising attitude and an ability to identify and exploit innovations and opportunities. Professionals need to be aware of the full range of responsibilities that their status places upon them, and of the sources of support that are available to them in meeting these responsibilities. This module aims to address these needs in the context of the computing industry.

**Systems Applications**

This module gives students a detailed introduction to the functions and design options of modern operating systems and systems software. Particular emphasis is given to the issue of concurrency, and to the design and implementation of language processing software. Students will have the opportunity to develop and consolidate their software development skills, and to gain experience of using a Unix like operating system.

**Data Structures**

This module is designed to improve a student's programming skills. It introduces many of the most important techniques including the implementation and use of the common abstract data types. It includes an introduction to the C++ programming language.

**Web Database Systems**

This module recognises the need for flexible and efficient storage of information in Web applications. The underlying principles of database organisation are presented, and practical implementation in a Web environment provides a basis for the construction of large-scale online applications. Context is provided by a study of the requirements of e-business applications and identification of the opportunities for enhanced customer service by considering the data generated during the lifetime of the application.

**Year 3**

Year 3 will consist of a one year Professional Placement in a commercial or industrial environment. Students are placed in employment through the standard procedures of application and interview but all arrangements leading to interview and a contract of employment are undertaken by a member of academic staff, the Placement Co-ordinator. Performance on the placement will be assessed and students attaining a sufficient level of performance will be eligible to have their degree supplemented by the award of the Diploma in Industrial Studies (DIS). Students are placed in employment through the standard procedures of application and interview. Arrangements leading up to an interview and a contract of employment are

monitored by the Placement Tutor. The Placement Tutor is a member of the Computing Placement Coordination Team chaired by the Director of Work Based Learning for the Faculty. This group seeks to ensure close collaboration in the work of individual course placement tutors

#### **Year 4**

Year 4 capitalises on the maturity and professional experience of the students gained during the Professional Placement. Student choice is offered through a range of taught modules A major computing project is undertaken. Each student will also be assigned a project supervisor, who will guide them through the implementation of the chosen project.

#### **Software Project Management**

This module is concerned with the goals, activities, techniques and tools associated with the management of software projects to meet client requirements, within defined cost and time constraints. The syllabus material is covered through a mixture of lectures, seminars and tutorials, reinforced through an individual exercise.

#### **Project**

In this module, students, under the supervision of a member of staff, undertake an individual computing project using appropriate computer science and/or software engineering techniques. The project will build on knowledge and skills acquired previously on the course and will provide opportunity for the attainment of new knowledge and skills. The final deliverable is in the form of a written report, and the student will also be expected to give an oral presentation about their project and a demonstration of the implemented solution.

#### **Multimedia**

Recent advances in desktop computing systems, coupled with increased network bandwidth, have prompted the emergence of multimedia technology as a core area in Computing. This module deals with the capture, generation, storage, manipulation and presentation of all types of digital media.

#### **Machine Learning and Data Mining**

Machine Learning - endowing systems with the ability to learn how to undertake a task as distinct from their being programmed to do it - is now a major research activity in Artificial Intelligence. The intelligent systems of the future - from office software, networks and the web, to cars and household appliances - will need this learning ability to truly understand and support their users. In this module the notion of Machine Learning is introduced. Techniques from two major paradigms (symbolic and neural) are studied. Several application areas of Machine Learning are explored in particular Data Mining. Deployment of Machine learning systems on the Web is discussed. Students will experiment using a Data Mining package.

#### **Advanced Database**

There are a number of important emerging application areas for which relational database systems are not well suited. These applications deal with data that can be nested, compound or multimedia in format and may also involve temporal data and long-duration transactions. A new generation of database paradigms has been developed to deal with these challenges. The module provides students with a thorough understanding of the theory and practice of advanced database systems.

**Computer Networks**

This module will provide all students with a detailed knowledge of the core concepts in advanced computer network technology. Issues such as communication, wired and wireless networks, standards, protocols and network security will be examined and the students will be given an understanding issues associated with efficient transmission in both wired and wireless environments.

**Intelligent Systems**

This module examines the role of artificial intelligence techniques in intelligent systems applications ranging from customer help-desk support to medical and legal decision making. Emphasis is placed on mixed-initiative problem solving and the role of explanation as a means of building user trust and confidence in intelligent systems. Students will also develop practical skills in the application of artificial intelligence techniques such as search, planning, and case-based reasoning in a variety of problem-solving contexts.

**XML and Advanced Web Programming**

In recent years, XML and associated technologies have played an increasingly central role in leading-edge Web development. This module introduces XML as the basis for advanced development techniques using AJAX and Web services. In addition, an introduction to agile Web development is presented, with implementation using Ruby On Rails.

**Operational Research Methods**

The module describes the theory and practice of Operational Research. It covers deterministic methods such as Linear, and Integer Programming and probabilistic methods such as Markov Chains, Queueing Theory and Simulation. The use of Modelling to analyse and evaluate Computer Systems is emphasised. Some heuristic methods which have been developed by the Artificial Intelligence community are also discussed.

**Natural Language Processing**

The ability to learn and use language is a uniquely human attribute and it is difficult to conceive of human language as being separate from thought. This may explain why natural language processing (NLP) – the building of computer systems that can learn and use a natural language – has been a core part of the artificial intelligence (AI) endeavour since the early days of the discipline. This module provides an advanced introduction to natural language processing, suitable for final year undergraduate students with an interest in artificial intelligence.

## **Placement and Career Opportunities**

Students spend Year 3 in relevant and supervised employment referred to as industrial placement. The first two years of the BSc Programme are designed to provide the students with the knowledge and expertise they will need to extract maximum benefit from the placement experience.

### **Preparation for Placement/Employment**

In addition to exploring the various aspects of the placement year and its relationship with other elements of the BSc programme, students are prepared for the application and selection procedures associated with placement and ultimately, employment. This includes advice on researching the market, completion of application forms, and preparation for interview. Much of this preparation takes place in the Professional Issues module in Year 2. However, all Year 1 and 2 modules contribute to the desired portfolio of skills and in particular, the teamwork aspects will help to develop important inter-personal and group skills that are of increasing importance within the commercial environment.

There is a wide range of placement opportunities in Northern Ireland, Great Britain and the Republic of Ireland, and from time to time some placements overseas. We will find several employers willing to consider you for placement. Selection is by competitive interview by the employer concerned. They will pay your interview expenses. There is no maintenance grant or loan during the placement year; instead you will receive a proper salary. The placement lasts for about 48 weeks. Students have reported in glowing terms on the value of the placement experience, and their placement employers have offered several eventual permanent positions. Similarly placement employers have reported very favourably on our students.

For the student, placement should ideally provide appropriate training and work based in a well organised design team. It must provide a genuine opportunity for the student to develop towards professional competence. The Faculty of Engineering has built up contacts with many employing organisations that are in a position to provide suitable placements. While the precise nature of placements will vary from employer to employer, it is intended that students are initially given close supervision and guidance and are progressively given more responsibility as the placement proceeds. Before the end of placement students should be contributing as a full employee of the company. During placement each student is supervised by an industrial supervisor from the employing company and an academic supervisor from the Faculty of Engineering.

Normally, each student will receive at least two visits from an academic supervisor. However, special arrangements such as telephone, e-mail or video conferencing may be used to contact those students who are placed in geographically distant locations. These media may also be used to supplement the formal academic visits to other students if necessary.

The experience gained and the associated personal development are subsequently drawn on during the final year of the BSc Programme. In some cases the final year project may stem directly from projects that have been identified during the placement year. Successful completion of the industrial placement is recognised by the award of the Diploma in Industrial Studies.

Placements also help to provide graduates with the qualities that employers require. The visits of academic supervisors to students on placement provide an ideal opportunity to obtain a view of the programme from an industrial perspective. The links with industry, which placement promotes, also help the Course Committee to keep abreast of changing industrial requirements and often lead to other joint ventures such as custom-built training programmes, teaching company schemes and other collaborative research.

Placement offers an opportunity to use and enhance the skills developed during the first two years of the Programme in a work-based context. Each student's placement experience will be different depending on the employer but each placement is vetted by the University to ensure it offers a worthwhile experience. Within the Faculty, there have been many instances of students taking up a full-time post with their placement employer after graduation.

In addition to developing multimedia skills, placement often provides opportunities for students to acquire other transferable skills such as working as part of a team, interacting with clients, business awareness etc. Key skills are qualities of graduates that are greatly desired by today's employers. They include the ability to work as part of a team, write written reports or give oral presentations. Opportunities are provided throughout the programme to develop these important qualities, in particular through group assignment work included in several modules and the opportunities offered through placement. Often assignments will include marking criteria that assess a student's ability in one or more key skills, for example, by awarding a mark for the effectiveness of a group as part of a group project.

### **The Placement Tutor**

The BSc Programme has a member of academic staff known as the Placement Tutor who is responsible for:

- Establishing and maintaining good relations with placement providers;
- Finding new placements as required;
- Preparing students for the placement experience;
- Administering the process whereby students are placed;
- Collating the assessment returns at the end of the placement year;
- Making recommendation regarding each student's overall performance and progress.
- The Programme Placement Tutor is a member of a Faculty of Engineering Placement Group chaired by a Faculty Placement Co-ordinator. This group seeks to ensure close collaboration in the work of various Programme placement tutors.

### **Career Opportunities**

All graduates from this Programme will have a high degree of skill in the development of quality software. The "core" of the Programme, essentially the first two years of study plus the final year project, will have prepared them for careers in software production in a variety of positions, including software houses, data processing and industrial computing.

Further study routes are also possible through MRes, MPhil and PhD Programmes for those wishing to conduct detailed research into specific aspects of Information Technology. Careers advice is formally provided by the Careers Service. See <http://www.ulst.ac.uk/careers/> for more information.

### **Prizes and Awards**

The University offers annually a number of prizes and awards for competition among students. These are awarded by the Board of Examiners to the most successful students on their programmes. On this Programme, the following prizes can be competed for.

- McCrea Leebody Science Awards
- Alumni Fund Awards for Academic Excellence
- British Computer Society Medal

**DATES OF ATTENDANCE/EXAMINATIONS/VACATIONS: 2010-11****Semester 1 (Autumn)**

Monday 20 September 2010	Teaching begins
Friday 10 December	Teaching ends
Monday 13 December	Christmas Vacation begins
Friday 24 December 2010 – Monday 3 January 2011	University Closed (Christmas)
Tue 4 January	Christmas Vacation ends
Wednesday 5 – Saturday 15 January	Examination Period
Friday 21 January	Autumn Semester ends

**Semester 2 (Spring)**

Monday 24 January 2011	Teaching begins
Wednesday 17 March	University Closed (St Patrick's Day)
Monday 18 April	Easter Vacation begins
Monday 25 to Friday 29 April	University closed
Friday 29 April Easter	Vacation ends
Monday 2 May	University Closed (May Day)
Monday 10 – Saturday 21 May	Examination period (with possible extension to 24 May if required)
Friday 27 May	Spring semester ends

**Semester 1 (Autumn)**

Wednesday 17 August – Thursday 25 August 2011	Supplementary Examinations
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## Programme Management

		Telephone	Room	Email
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Prof	Dave Bustard	24366/24440	D067B	dw.bustard@ulster.ac.uk
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<b>Technician</b>				
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**18 TABLE OF MODULES****Modules at Level 4****Computing Major**

Yr	Sem	Level	Module Title	Code	Credit Value	Status	Assessment Methods (%)		Contribution to overall mark of FINAL Award
							Exam	CW	
1	1	4	Using the Web	COM C1	20	Compulsory	50	50	-
1	1	4	Software Development I	COM158C1	20	Compulsory	50	50	-
1	2	4	Web Information Systems	COM C2	20	Compulsory	50	50	-
1	2	4	Software Development II	COM164C2	20	Compulsory	50	50	-

**Modules at Level 5**

**Computing Major**

Yr	Sem	Level	Module Title	Code	Credit Value	Status	Assessment Methods (%)		Contribution to overall mark of Exit Award
							Exam	CW	
2	1 & 2	5	Professional Issues & Enterprise	COM411C4	10	Core	0	100	1/12 (AB)
2	1	5	Data Structures	COM328C1	15	Compulsory	75	25	1/8 (AB)
2	1	5	Web Applications Development	COMxxxC1	20	Compulsory	0	100	1/6 (AB)
2	2	5	Web Database Systems	COMxxxC2	20	Compulsory	50	50	1/6 (AB)
2	2	5	Systems Applications	COM356C2	15	Compulsory	75	25	1/8 (AB)
3	4	5	DIS/DAS Placement: Computing	COM367C4	60	Compulsory	0	100	DIS

**Modules at Level 6**

**Computing Major**

Yr	Sem	Level	Module Title	Code	Credit Value	Status	Assessment Methods (%)		Contribution to overall mark of the Final Award
							Exam	CW	
3 / 4	1	6	Software Project Management	COMxxxC1	10	Core	50	50	1/12
3 / 4	1 & 2	6	Project	COM570C4	30	Core	0	100	1/4
3 / 4	1 & 2	6	Multimedia	COMxxxC1	20	Option	75	25	1/6
3 / 4	1	6	Operational Research Methods	COM551C1	20	Option	75	25	1/6
3 / 4	1	6	Machine Learning & Data Mining	COM542C1	20	Option	75	25	1/6

**Modules at Level 6**

**(continued)**

**Computing Major**

Yr	Sem	Level	Module Title	Code	Credit Value	Status	Assessment Methods (%)		Contribution to overall mark of the Final Award
							Exam	CW	
3 / 4	2	6	Computer Networks	COM548C2	20	Option	75	25	1/6
3 / 4	2	6	Advanced Database	COM572C2	20	Option	75	25	1/6
3 / 4	2	6	Intelligent Systems	COM524C2	20	Option	75	25	1/6
3 / 4	2	6	XML & Advanced Web Programming	COMxxxC2	20	Option	50	50	1/6
3 / 4	2	6	Natural Language Processing	COMxxxC2	20	Option	75	25	1/6

**B 3-2 Course Regulations (Modular Honours Degrees)****UNIVERSITY OF ULSTER****COURSE REGULATIONS****1 COURSE TITLE COURSE CODE**

BSc (Hons) Computing with <Minor Subject> with DIS/DAS

**Current approved minor subject list:**

Accounting, American Studies, Business, Education, English, Environmental Science, European Studies, Film Studies, French, Geography, German, History, Irish, Journalism, Marketing, Media Studies, Photo Imaging, Psychology, Retail Studies, Spanish.

*This is the current list of approved Combinations as at 1 May 2009*

**2 MODE OF ATTENDANCE** Full-time

**3 DURATION** **FULL-TIME SANDWICH:** Normally 4 years (6 semesters of study and placement year)

**FULL-TIME INTERCALARY:** Normally 4 years (8 semesters of study including year of study abroad)

**4 LOCATION** Coleraine

**5 FACULTY** Computing & Engineering

**6 ADMISSION REQUIREMENTS**

Applicants must:

- (a) satisfy the University's general entry requirements; or
- (b) provide evidence of their ability to undertake the programme through the accreditation of prior experiential learning.

NOTE: Regulations state that to satisfy minimum General Entry Requirements applicants must:

- (a) provide evidence of competence in written and spoken English (GCSE grade C or equivalent) and, where specified within individual course or subject entry requirements, in numeracy (GCSE grade C or equivalent); and

- (b) have attained passes in five different subjects, of which two should be at GCE 'A' level, and three at GCSE level (grades A, B or C); or
- have attained passes in four different subjects, of which three should be at GCE 'A' level and one at GCSE level (grades A, B or C); or
- have alternative approved qualifications.

## **7 EXEMPTIONS**

- 7.1 Studies pursued and examinations passed in respect of other qualifications awarded by the University or by another university or other educational institution, or evidence from the accreditation of prior experiential learning, may be accepted as exempting candidates from part of an approved programme provided that they register as students of the University for modules amounting to at least the final third of the credit value of the award at the highest level.

## **8 PLACEMENT/STUDY ABROAD**

Year 3 of the Course is spent on placement (DIS) or study abroad (DAS). For the award of Diploma in Industrial Studies or Diploma in Area Studies, the period of full-time work experience must last at least 25 weeks. During the placement year students are expected to adhere to the normal attendance practices of their place of employment. An industrial supervisor from the employing company and an academic supervisor from the Faculty are assigned to each student.

Assessment of placement is on the basis of 5 elements:

1. Visits (30%)
2. Technical Report (10%)
3. Log Book (10%)
4. Final Report (30%)
5. Employer Assessment (20%)

To be eligible for the award of Diploma in Industrial Studies the candidate must obtain a mark of at least 50% and complete the Course.

A candidate who achieves a mark of 70% or more, and completes the Course is eligible for the award of Diploma in Industrial Studies with Commendation.

Candidates who do not obtain a mark of at least 50% but who obtain at least 40% will be deemed to have completed the placement satisfactorily but will be ineligible for the award of Diploma in Industrial Studies.

### ***Progression***

In order to progress to the fourth year of the Course a candidate must obtain a pass mark of at least 40% for placement and complete any outstanding Year 2 modules.

### ***Exemption***

Exemption from placement will be awarded only in the most exceptional circumstances. To be so exempted a candidate must satisfy the Board of Examiners that he/she has acquired work experience equivalent to placement. A candidate must submit an application for exemption that includes a report (approximately 2,000 words) outlining the extent and level of the work experience already obtained, together with a report from his/her employer(s). A sub-committee consisting of the Subject Director and the Placement Tutor will assess the application. They will then make a recommendation to the Board of Examiners. An interview with the candidate may form part of the assessment process.

A candidate who is exempted from placement will not be eligible for the award of Diploma in Industrial Studies. Such candidates will be permitted to progress into the final year of the programme.

### ***Special Circumstances***

The Board of Examiners may in the case of candidates who are prevented by illness or other sufficient cause from taking the whole or part of the assessment, or whose results are substantially affected by illness or other sufficient cause, permit the candidate to take, complete or repeat the assessment at an approved subsequent date.

A student who is unable to obtain placement or who does not complete placement satisfactorily:

- (a) may be eligible to apply to transfer to an equivalent course without a placement element (admission to which would be at the discretion of the Course or Subject Committee of the equivalent course) or
- (b) may obtain a leave of absence to continue seeking a suitable placement

## **9 ATTENDANCE REQUIREMENTS**

- 9.1 Students are expected to attend all classes associated with the programme and be punctual and regular in attendance.
- 9.2 A student who has not been in attendance for more than three days through illness or other cause must notify immediately the Subject Director. The student shall state the reasons for the absence and whether it is likely to be prolonged. Where the absence is for a period of more than five working days, and is caused by illness which may affect their studies, the student shall provide appropriate medical certification in accordance with the General Regulations for Students.
- 9.3 Students who are absent without good cause for a substantial proportion of classes may be required to discontinue studies, in accordance with the General Regulations for Students.

## **10 RULES GOVERNING STUDENT CHOICE**

- 10.1 Students enrolled for a Single Honours degree undertake an integrated programme of study primarily in Computing. Students enrolled for a Major/Minor Honours degree undertake a programme of study with a two-thirds/one-third balance between two subjects. Students enrolled for a Joint Honours degree undertake a programme of study of equal weight in two subjects. Students enrolled for a Combined Honours degree undertake a programme of study in three subjects of equal weight. Greater choice may be available at levels A/1.
- 10.2 Modules in this subject are offered as indicated in the table at section 19. Modules for other subjects are detailed in the relevant subject handbook. Revisions may be made in accordance with the University's quality assurance procedures. Module availability may vary.

## **11 EXAMINATION AND ASSESSMENT**

- 11.1 The performance of candidates shall be assessed by the Subject Board of Examiners in accordance with the Regulations Governing Examinations in Programmes of Study.
- 11.2 Candidates shall be assessed in the modules for which they have enrolled in each year of study. At the discretion of the Board of Examiners candidates may be required to attend a viva voce examination.
- 11.3 Within each module candidates shall be assessed by coursework, examination and a combination of coursework and examination in accordance with the attached table.
- 11.4 The pass mark shall be 40%. Where a module is assessed by a combination of coursework and examination a minimum mark of 35% shall be achieved in each element.
- 11.5 The pass mark for the placement year is 50%; a mark of 40% is sufficient for progression to the next stage of the programme.

## **12 SUBMISSION OF COURSEWORK**

- 12.1 Coursework shall be submitted by the dates specified by the Subject Committee.
- 12.2 Students may seek prior consent from the Subject Committee to submit coursework after the official deadline; such requests must be accompanied by a satisfactory explanation and in the case of illness by a medical certificate. This application shall be made to the Subject Director.
- 12.3 Coursework submitted without consent after the deadline shall not normally be accepted.

### 13 PROGRESS

- 13.1 Subject to 14 and 15 hereof, candidates are required to pass all modules in each year of study in order to proceed to the next year. Progress from semester 1 to semester 2 is automatic.

### 14 CONSEQUENCES OF FAILURE

- 14.1 Candidates who fail to satisfy the Campus Progress & Award Board of Examiners in assessment may be permitted at the discretion of the Board to re-present themselves as specified in 15.2 for one or more supplementary examination and repeat such coursework or other assessment requirements as shall be prescribed by the Board. Such candidates may be exempted at the discretion of the Board from the normal attendance requirements. Where candidates are required to repeat coursework or to take a supplementary examination the original mark in the failed coursework component or examination shall be replaced by a mark of 40% or the repeat mark whichever is the lower for the purpose of calculating the module result except in the DIS/DAS year where the maximum mark allowed shall be 50%.
- 14.2 In each year other than the final year the consequences of failure shall normally be as follows:

#### Failure at the First Attempt

Failure in modules with an overall value up to and including <b>60 credit points</b>	Repeat specified examinations and/or coursework in the failed modules (examinations August)
Failure in modules with an overall value of between <b>70 or 80 credit points</b>	Repeat specified examinations and/or coursework in the failed first semester module(s) (examinations January) and of specified examinations and/or coursework in the second semester modules (examinations May) with or without attendance OR withdraw from the programme
Failure in modules with an overall value of <b>more than 80 credit points</b>	Withdraw from the programme
Failure by candidates in year 2 of sandwich programmes	Exceptionally second year students on sandwich programmes may be permitted to commence the placement period, pending a requirement to represent themselves for supplementary written examinations or to repeat coursework

**Failure at the Second Attempt**

Failure in modules with an overall value **up to and including 20 credit points**

Provided that the module(s) are not prerequisite(s) which must be passed, proceed to next year and repeat once only specified examination(s) and/or coursework in the failed module(s) at the next examination period (January or May)

Failure in modules with an overall value **up to and including 40 credit points** (except as above)

Repeat once only specified examination(s) and/or coursework in the failed module(s) at the next examination period (January or May or August if semester already repeated) with or without attendance (progress to next year not permitted)

Failure in modules with an overall value of **more than 40 credit points**

Withdraw from the programme or discontinue studies at the University

**Consequences of failure in placement (DIS)**

Failure at the First Attempt

Repeat once only all or part of placement

Failure at the Second Attempt

Withdraw from the programme

**Consequences of failure in intercalary year (DAS)**

Failure at the First Attempt

Repeat *once only* the study period in whole or in part OR take specified examinations and/or coursework. (Maximum mark not to exceed 50%.)

Failure at the Second Attempt

Withdraw from the programme OR repeat *once only* specified examinations and/or coursework. (Maximum mark not to exceed 50%.)

### 14.3 Failure in the Final Year (Honours degree)

In the final year the consequences of failure shall normally be as follows:

Failure in modules with an overall value <b>up to and including 20 credit points.</b>	Repeat specified examination(s) and/or coursework in the failed module(s) in consideration for Honours classification (examinations August)
Failure in modules with an overall value of <b>30 or 40 credit points.</b>	Repeat specified examination(s) and/or coursework in the failed module(s) (one attempt only) in consideration for the award of an unclassified Honours classification (examinations August)
Failure in modules with an overall value of <b>more than 40 credit points.</b>	Withdraw from the programme or discontinue studies at the University.

## 15 CLASSIFICATION OF FINAL RESULT

15.1 The table at section 19 indicates the contribution of each module to the final award. The weighting of each module's contribution to the overall mark shall be determined by its credit value.

### 15.2 Classification of Final Result (Honours degree)

The following percentages shall be used to determine candidates' overall gradings

Class I	At least 70%
Class II (division i) (Ili)	At least 60% and less than 70%
Class II (division ii) (IIii)	At least 50% and less than 60%
Class III	At least 40% and less than 50%

### 15.3 Award of Diploma in Industrial Studies or Diploma in Area Studies

The following shall be the minimum percentages used in determining the overall gradings of candidates in the Diploma.

Pass with Commendation	70%
Pass	50%

## 16 ILLNESS AND OTHER EXTENUATING CIRCUMSTANCES

### 16.1 In any year other than final year.

The Board of Examiners may in the case of candidates who are prevented by illness or other sufficient cause from taking or completing the whole or part of the assessment during the programme, or whose results are substantially affected by illness or other sufficient cause, permit the candidates to complete, take, or repeat the assessment in one or more modules at an approved subsequent date.

### 16.2 Final year (Honours Degree):

The Board of Examiners may in the case of candidates who are prevented by illness or other sufficient cause from taking or completing the whole or part of the final stage assessment or whose results are substantially affected by illness or other sufficient cause:

- (a) permit the candidate to complete, take, or repeat as candidates for the Honours degree, the assessment in one or more modules at an approved subsequent date **or**
- (b) deem the candidate to have passed and recommend the award of an Aegrotat Honours Degree.

16.3 Before an Aegrotat award is recommended a candidate must have indicated that he or she is willing to accept the award.

## 17 REVISIONS TO REGULATIONS

These regulations may be revised during the student's period of registration in accordance with the procedures approved by Senate.

### **Subject Specific Resources**

A CD, containing useful software for installation on students home computers, can be purchased in the students Union shop.

Individual module co-ordinators will advise on any key texts which must be purchased for each module.

Students are charged for printing. Print cards are available for purchase from a card dispenser in the printroom.