Erasmus Mundus Masters in Dependable Software Systems

Programme Requirements

120 credits:

- CS5001 (if no equivalent module has been taken at a partner institution as part of the DESEM programme)
- CS5899
- at least 15 and at most 30 credits from CS5010, CS5021, CS5030
- up to 30 credits from CS4052, CS4402, subject to appropriate experience
- remaining credits from IS5101 - IS5150, CS5003 - CS5089, ID5059

For all Masters degrees there are exit awards available that allow suitably-qualified candidates to receive a Postgraduate Certificate or Postgraduate Diploma.

Compulsory modules:

CS5001 Object-Oriented Modelling, Design and Programming

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	Variable			
This module introduces and revises object-oriented modelling, design and implementation up to the level required to complete programming assignments within other MSc modules. Students complete a number of practical exercises in laboratory sessions.				
Programme module type:	Compulsory for Advanced Computer Science, Artificial Intelligence, Human Computer Interaction, Networks and Distributed Systems, Software Engineering and Erasmus Mundus Dependable Software Systems Postgraduate Programmes.			
Anti-requisite(s):	CS5002		**Required for:**	CS5011, CS5021, CS5031
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5899 Erasmus Mundus Dissertation in Dependable Software Systems				
SCOTCAT Credits:	45	SCQF Level 11	**Semester:**	Whole Year
Academic year:	2015/6 & 2016/7			
Availability restrictions:	Available only to students on Erasmus Mundus MSc in Dependable Software Systems.			
Planned timetable:	To be arranged.			
This module is an individually supervised dissertation, not exceeding 15,000 words, on a topic in computer science. Typically it comprises a literature review, extension of old or development of new ideas, their implementation and testing, summarised in a report, with the implementation based on sound theory and software engineering principles. Students will be required to give an assessed presentation of their work.				
Programme module type:	Compulsory for Erasmus Mundus in Dependable Software Systems MSc Postgraduate Programme at St Andrews.			
Learning and teaching methods and delivery:	**Weekly contact**: Meeting with supervisor.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

One or two of:

CS5010 Artificial Intelligence Principles				
SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module covers foundational knowledge of Artificial Intelligence (AI). The module gives an overview of AI and its philosophy. It covers fundamental principles in AI: logical reasoning, reasoning in the presence of uncertainty, and machine learning. It shows how search is used to solve a variety of problems in AI. Notions such as agency and uncertainty in AI are covered. Finally, the philosophy of AI in practice and the philosophical problems in AI are shown.				
Programme module type:	Compulsory for Artificial Intelligence Postgraduate Programme. Optional for all Postgraduate Programmes in the School of Computer Science			
Anti-requisite(s):	CS3105		**Required for:**	CS5011
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5021 Advanced Networks

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module looks forward to new concepts and topics in networking, and also reviews key abstractions including layered models, protocols and Internet architecture, and key concerns such as reliability, resource utilization and quality of service. Specific networking technologies are used to demonstrate monitoring, measurement and analysis of real traffic.				
Programme module type:	Compulsory for Networks and Distributed Systems Postgraduate Programme. Optional for other Postgraduate Programmes in the School of Computer Science			
Co-requisite(s):	CS5001		**Required for:**	CS5023, CS5029
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5030 Software Engineering Principles

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module examines the key concepts in small and large-scale software development. Project management is explored, along with the processes involved in developing system requirements, functionality and high-level descriptions necessary to guide the development of, and assess, a working system.				
Programme module type:	Compulsory for Software Engineering Postgraduate Programme. Optional for other Postgraduate Programmes in the School of Computer Science			
Required for:	as co-requisite for CS5031			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

Optional to take one or both of:

CS4052 Logic and Software Verification

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
Planned timetable:	To be arranged.			
Building on earlier coverage of elementary logic, this module motivates the need for formal methods and software verification approaches as model checking for guaranteeing the correctness of software systems. The module covers modelling, system property specification using temporal logics, and more applied approaches to software specification and verification through the use of model checkers. Model checkers such as SPIN and UPPAAL are used both in lectures and in practical work. Petri nets and program semantics are also explored. Software correctness is thus presented as a matter not of testing but of pre-execution verification through model checking.				
Programme module type:	Optional for Erasmus Mundus Dependable Software Systems Postgraduate Programme			
Pre-requisite(s):	CS3052			
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
	Scheduled learning: 28 hours		**Guided independent study:** 122 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%			
	As used by St Andrews: 2-hour Written Examination = 60%, Coursework = 40%			
Re-Assessment:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4402 Constraint Programming

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
Planned timetable:	To be arranged.			
This module introduces constraint-based reasoning as a powerful mechanism for knowledge representation and inference. It provides a thorough grounding in the constraint satisfaction/constrained optimisation problem formalism, and covers both basic techniques for implementing constraint solvers and the use of advanced techniques with a commercial solver.				
Programme module type:	Either CS5012 or CS4402 is compulsory for the Artificial Intelligence Postgraduate Programme. Optional for Erasmus Mundus Dependable Software Systems Postgraduate Programme and other Postgraduate Programmes in the School			
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
	Scheduled learning: 28 hours		**Guided independent study:** 122 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%			
	As used by St Andrews: 2-hour Written Examination = 60%, Coursework = 40%			
Re-Assessment:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

Remaining credits from the following:

CS5001 Object-Oriented Modelling, Design and Programming				
SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	Variable			
This module introduces and revises object-oriented modelling, design and implementation up to the level required to complete programming assignments within other MSc modules. Students complete a number of practical exercises in laboratory sessions.				
Programme module type:	Compulsory for Advanced Computer Science, Artificial Intelligence, Human Computer Interaction, Networks and Distributed Systems, Software Engineering and Erasmus Mundus Dependable Software Systems Postgraduate Programmes. Either CS5001 or CS5002 is compulsory for Computing and Information Technology Postgraduate Programme.			
Anti-requisite(s):	CS5002	**Required for:**	CS5011, CS5021, CS5031	
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5002 Programming Principles and Practice				
SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	Variable			
This module introduces computational thinking and problem solving skills to students who have no or little previous programming experience. It covers general programming concepts used in the development of software applications, such as data structures, functions, choice, iteration, recursion and input/output. An easy-to-learn programming language is used to illustrate these concepts, and programming skills are reinforced through practical assignments.				
Programme module type:	Either CS5002 or CS5001 is compulsory for Computing and Information Technology Postgraduate Programme.			
Anti-requisite(s):	CS5001	**Required for:**	CS5003	
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5003 Masters Programming Projects				
SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	Variable			
This module reinforces key programming skills gained in CS5002, by means of a series of coursework assignments posed as small programming projects. These are designed to offer increasing depth and scope for creativity as the module progresses.				
Programme module type:	Compulsory for Computing and Information Technology Postgraduate Programme.			
Pre-requisite(s):	CS5002	**Anti-requisite(s):**	IS5108	
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5010 Artificial Intelligence Principles

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module covers foundational knowledge of Artificial Intelligence (AI). The module gives an overview of AI and its philosophy. It covers fundamental principles in AI: logical reasoning, reasoning in the presence of uncertainty, and machine learning. It shows how search is used to solve a variety of problems in AI. Notions such as agency and uncertainty in AI are covered. Finally, the philosophy of AI in practice and the philosophical problems in AI are shown.				
Programme module type:	Compulsory for Artificial Intelligence Postgraduate Programme. Optional for all Postgraduate Programmes in the School of Computer Science			
Anti-requisite(s):	CS3105		**Required for:**	CS5011
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5011 Artificial Intelligence Practice

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module covers practical design and implementation of Artificial Intelligence (AI). It provides grounding in AI technique, covering techniques in the areas of AI reasoning, planning, doing, and learning. Finally, it is shown how to implement AI ideas in software and how to evaluate such implementation.				
Programme module type:	Compulsory for Artificial Intelligence Postgraduate Programme. Optional for other Postgraduate Programmes in the School of Computer Science			
Co-requisite(s):	CS5001, CS5010		**Required for:**	CS5012, CS5019
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5012 Language and Computation

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	To be arranged.			
This module covers the major aspects of natural language processing and speech understanding, including computational syntax, computational semantics, discourse processing, machine translation and speech recognition.				
Programme module type:	Either CS5012 or CS4402 is compulsory for the Artificial Intelligence Postgraduate Programme. Optional for Postgraduate Programmes in the School of Computer Science			
Pre-requisite(s):	CS3052 or CS5010			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5021 Advanced Networks

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module looks forward to new concepts and topics in networking, and also reviews key abstractions including layered models, protocols and Internet architecture, and key concerns such as reliability, resource utilization and quality of service. Specific networking technologies are used to demonstrate monitoring, measurement and analysis of real traffic.				
Programme module type:	Compulsory for Networks and Distributed Systems Postgraduate Programme. Optional for other Postgraduate Programmes in the School of Computer Science			
Co-requisite(s):	CS5001		**Required for:**	CS5023, CS5029
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5023 Mobile and Wireless Networks

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	To be arranged.			
This module examines how computing and communication are used to allow mobile systems to function in heterogeneous environments, with variations in available network resources and diverse/intermittent network connectivity. A key outcome of the module is for students to be able to critically assess the capabilities and constraints of mobile systems.				
Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science			
Pre-requisite(s):	CS3102 or CS5021			
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5030 Software Engineering Principles

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module examines the key concepts in small and large-scale software development. Project management is explored, along with the processes involved in developing system requirements, functionality and high-level descriptions necessary to guide the development of, and assess, a working system.				
Programme module type:	Compulsory for Software Engineering Postgraduate Programme. Optional for other Postgraduate Programmes in the School of Computer Science			
Required for:	as co-requisite for CS5031			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5031 Software Engineering Practice

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module introduces advanced software engineering methods supporting the development of complex, composite software systems with an emphasis on software configuration management, reuse and test-driven development practices. It examines software reuse at different levels of scale, from software libraries and components to service-oriented architectures and discusses how reuse presents both challenges and opportunities for the development of quality software. A key process in today's software engineering practice is testing; the module introduces testing methods that complement the different scales of reuse-oriented development, from unit-level testing to integration testing and system-level testing. Students work on a project to design, implement and test a complex, distributed application to put the content of the lectures into practice. Reference is made to the content of the co-requisite Software Engineering Principles module where appropriate, so that students learn how the practices studied fit into a larger software engineering lifecycle.				
Programme module type:	Compulsory for Software Engineering Postgraduate Programme. Optional for other Postgraduate Programmes in the School of Computer Science			
Co-requisite(s):	CS5001, CS5030		**Required for:**	CS5032, CS5033, CS5039
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5032 Critical Systems Engineering

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	To be arranged.			
This module provides students with an understanding of the concepts and development techniques used for critical, socio-technical systems. On completion they will understand the notion of system dependability, the key characteristics of dependable systems, and the specialised software engineering techniques that may be used to ensure dependable system operation. Students also gain practical experience of applying some of these techniques in systems specification, design or implementation.				
Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science			
Pre-requisite(s):	CS3051 or CS5031			
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5033 Software Architecture

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	To be arranged.			
This module introduces students to the concept of software architecture, as an aid to software design, reuse and evolution. When students have completed this module, they will: have knowledge of the key elements of software architectures; recognise architectural styles of existing software systems; be able to describe the software architecture of a non-trivial system accurately; be able to construct systems that satisfy an architectural description; understand how software architecture aids design, reuse and evolution of software.				
Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science			
Pre-requisite(s):	CS3051 or CS5031			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5040 Human Computer Interaction Principles and Methods

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module provides a grounded introduction to the principles of human computer interaction in the context of evaluation paradigms. Material includes: history of interfaces and interaction; the human (vision, perception, memory, hearing); the computer (from existing to next generation ubiquitous computing systems); paradigms of interaction; evaluation paradigms in HCI; guidelines and heuristics; experimental design and hypothesis testing in HCI; quantitative evaluation methods in HCI; qualitative evaluation methods in HCI.				
Programme module type:	Compulsory for MSc Human Computer Interaction Postgraduate Programme. Optional for other Postgraduate Programmes in the School of Computer Science			
Anti-requisite(s):	CS3106		**Required for:**	CS5042, CS5044
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, practical classes and tutorials.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5041 Interactive Software and Hardware

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Availability restrictions:	The module is available to all students enrolled on the MSc Human Computer Interaction Programme. A quota for other students may be necessary due to lab equipment constraints, in which case preference will be given to other MSc students.			
Planned timetable:	To be arranged.			
This module develops prototype-building skills for a wide range of interactive technologies. Students learn how to create interactive hardware and software using technologies such as tangible programming kits, mobile devices, microprocessor kits and depth cameras. There is a strong emphasis on practical assignments.				
Programme module type:	Compulsory for MSc Human Computer Interaction Postgraduate Programme. Optional for other Postgraduate Programmes in the School of Computer Science			
Pre-requisite(s):	CS5001			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, practical classes and tutorials.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5042 User-Centred Interaction Design

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Availability restrictions:	The module is available to all students enrolled on the MSc Human Computer Interaction Programme. A quota for other students may be necessary due to lab equipment constraints, in which case preference will be given to other MSc students.			
Planned timetable:	To be arranged.			
This module studies methodologies in interaction design that are at the core of current practice for user interface engineering and application development. Students work towards creating designs of interactive systems that are based on human, group and organisation needs rather than on technical constraints. The module does not involve a great deal of programming.				
Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science			
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures, 3 practicals and 1 tutorial.			
Assessment pattern:	Coursework = 85%, Presentation = 15%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5044 Information Visualisation and Visual Analytics

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	To be arranged.			

This module provides an introduction to information visualisation and visual analytics. It focuses on the question of how to utilise visual representations to make information accessible for exploration and analysis. The module covers basic principles of visualisation design and interaction principles. It introduces a range of visualisation techniques and tools, and discusses how these can be effectively applied in various scenarios for communication, exploration and analysis, and how to evaluate information visualisations in different contexts.

Skills in designing, developing, and evaluating information visualisations are reinforced through practical assignments. There are no pre-requisites for this module but students should have basic programming skills (e.g. in Java or JavaScript).

Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science
Learning and teaching methods and delivery:	**Weekly contact**: 3-hour lecture (x 11 weeks), 1-hour seminar (x 8 weeks)
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk

IS5102 Database Management Systems

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			

This module introduces the core principles and techniques required in the design and implementation of database systems. With a focus on relational database management systems, topics include database design theory; E-R modelling; data definition and manipulation languages; database security and administration. There is a significant practical element to the module, which will require students to build and manipulate a database.

Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk

IS5103 Web Technologies

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			

This module introduces the principles and techniques involved in the design and implementation of web applications. A web application is a collection of web pages that interact with the user, with each other, and with various resources on a web server, including databases. There is a significant practical element to the module, which will require students to build and manipulate dynamic web pages.

Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk

IS5104 Information Security Management

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Planned timetable:	To be arranged.			
This module reviews key theoretical and practical aspects of Information Security Management. The module content covers higher-level technical and theoretical issues as well as management issues such as organisational, planning, certification, auditing and governance. From the student's perspective the module introduces students to a topical field of business and IT concern via varied learning styles and in depth consideration of current issues, standards and scenarios. The module uses both block learning and individual self-learning.				
Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science			
Anti-requisite(s):	CS4203			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

IS5105 Network Systems Management

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	To be arranged.			
This module looks at the history of computer networks, examines how computer networks function, and surveys emerging and future networking technologies. Networked computer systems are pervasive in every walk of life. Today's mobile phones are more powerful computing devices than the mainframes of thirty years ago. Few organizations could function without computer networks. It gives insights into computer networking from the perspectives of developers, managers and users. Students taking this module will gain a core understanding of networking principles and protocols for wired and wireless networking. They will learn about the main aspects of network systems management, including network monitoring and configuration management, network service management, and firewall management.				
Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

IS5106 Green Information Technology

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	To be arranged.			
This module introduces students to a variety of topics and technologies in the area of Green IT and Sustainable IT. Students investigate the way in which technology contributes towards global emissions as well as its potential to enable a positive sustainable future. This includes the responsibilities and actions of IT users, as well as service providers. The module covers key factors driving Green IT from a technical, political, financial, social and legal perspective, and includes the IT life cycle, approaches to product design and the provision of IT services. Students gain understanding and insight into current issues related to sustainable IT usage and future development.				
Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars and tutorials			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

IS5108 Information Technology Projects

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	To be arranged.			
This module reinforces information technology and project management skills gained during semester 1, by means of a selection of coursework assignments posed as information technology projects. These are designed to offer increasing depth and scope for creativity as the module progresses.				
Programme module type:	Optional for all Postgraduate Programmes in the School of Computer Science			
Anti-requisite(s):	CS5003			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, tutorials and practical classes			
Assessment pattern:	Coursework = 100%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

ID5059 Knowledge Discovery and Datamining

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Planned timetable:	11.00 am Mon (odd weeks), Wed and Fri			
Contemporary data collection can be automated and on a massive scale e.g. credit card transaction databases. Large databases potentially carry a wealth of important information that could inform business strategy, identify criminal activities, characterise network faults etc. These large scale problems may preclude the standard carefully constructed statistical models, necessitating highly automated approaches. This module covers many of the methods found under the banner of "Datamining", building from a theoretical perspective but ultimately teaching practical application. Topics covered include: historical/philosophical perspectives, model selection algorithms and optimality measures, tree methods, bagging and boosting, neural nets, and classification in general. Practical applications build sought-after skills in the commercial packages SAS and SPSS.				
Programme module type:	Optional for all Postgraduate Programmes. Compulsory for Applied Statistics and Datamining Postgraduate Programme.			
Anti-requisite(s):	MT5759			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			