Computer Science optional modules:

CS4052 Logic and Software Verification

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	1
Academic year:	2018/9			
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.				
Pre-requisite(s):	Before taking this module you must pass CS3052			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 10 weeks) and fortnightly tutorial.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4102 Computer Graphics

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	2
Academic year:	2018/9			
Planned timetable:	To be arranged.			
This module covers the fundamental concepts of computer graphics, and develops the ability to apply the concepts to the generation of realistic, synthetic images of 3D objects and scenes. On completion of the module, students should be competent to undertake many tasks in computer graphics, and should have an understanding of the theory underlying many of the relevant techniques.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2001 or pass CS2101)			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4103 Distributed Systems

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	2
Academic year:	2018/9			
Planned timetable:	To be arranged.			
This module covers the fundamentals of distributed systems, with reference to system models, programming languages, algorithmic techniques, concurrency and correctness.				
Pre-requisite(s):	Before taking this module you must pass CS3102			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4201 Programming Language Design and Implementation

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	1
Academic year:	2018/9			
Planned timetable:	To be arranged.			
This module studies the design and implementation of programming languages. Topics include language design principles, abstract syntax, evaluation mechanisms, binding, type systems, polymorphism, data encapsulation, exceptions, formal definition of programming languages, compiling techniques, abstract machine design, run-time systems and garbage collection.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2001 or pass CS2101)			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 10 weeks) and fortnightly tutorial.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4202 Computer Architecture

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	1
Academic year:	2018/9			
Planned timetable:	To be arranged.			
This module studies the principles and technology of modern computer architectures, with particular emphasis on performance and acceleration. Topics include the CPU, memory, interconnect architectures, performance concepts and programming models.				
Pre-requisite(s):	Before taking this module you must pass CS3104			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 10 weeks) and fortnightly tutorial.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4203 Computer Security

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	1
Academic year:	2018/9			
Planned timetable:	To be arranged.			
This module introduces the basic concepts of computer security and cryptography, common attacks and defences against them, and relevant legal and policy frameworks.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2001 or pass CS2101)			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4204 Concurrency and Multi-Core Architectures

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	2
Academic year:	2018/9			
Planned timetable:	To be arranged.			
This module presents the key concepts of programming multi-core/many-core and other parallel architectures, ranging from the identification and use of parallel patterns; the use of structured parallelism to implement task and data parallelism; key implementation issues, including task identification, granularity, scheduling, threads, garbage collection, task placement, locality; performance monitoring and debugging.				
Pre-requisite(s):	Before taking this module you must pass CS3052 and pass CS3104			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4302 Signal Processing and Perception for Digital Media

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	1
Academic year:	2018/9			
Planned timetable:	To be arranged.			
The module will introduce students to the concepts of analogue and digital media and review current standards and technologies used in the production, transport and rendering of digital multimedia. Within the context of networked multimedia the concept of Quality-of-Service will be introduced and the issues involved in transporting time-sensitive data across computer networks will be explained. Specific examples drawn from Internet-based projects, protocols and standards will be used to illustrate these issues.				
Pre-requisite(s):	Before taking this module you must pass CS3102			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 10 weeks) and fortnightly tutorial.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4303 Video Games

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	1
Academic year:	2018/9			
Planned timetable:	To be arranged.			
This module builds on the general-purpose programming abilities acquired earlier, introducing games-specific techniques and material. Computer games are now a bigger industry than films, yet they are continuing to develop. While the budget for a new game may rival that of a Hollywood blockbuster, there is also a growing demand for lower octane coffee-break games that can be accessed for short periods in a browser, and for games that can be played on-the-go with a mobile device. Games programming skills are developed through lectures and laboratories, culminating in the creation of actual games.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2001 or pass CS2101)			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 10 weeks) and fortnightly tutorial.			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No Re-assessment available			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4402 Constraint Programming

SCOTCAT Credits:	15	SCQF Level 10	**Semester**	2
Academic year:	2018/9			
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 modern solver.

Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2001 or pass CS2101)
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)

CS5001 Object-Oriented Modelling, Design and Programming

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	Both
Academic year:	2018/9			
Availability restrictions:	This module is only available in Semester 2 to students enrolled on the 'with English Language' version of the programme. All other students must take the module in 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.

Anti-requisite(s)	You cannot take this module if you take CS5002
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, tutorials and practical classes.
Assessment pattern:	Coursework = 100%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5002 Programming Principles and Practice

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	Both
Academic year:	2018/9			
Availability restrictions:	This module is only available in Semester 2 to students enrolled on the 'with English Language' version of the programme. All other students must take the module in 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.

Anti-requisite(s)	You cannot take this module if you take CS5001
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, tutorials and practical classes.
Assessment pattern:	Coursework = 100%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5003 Masters Programming Projects

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
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.				
Pre-requisite(s):	Before taking this module you must pass CS5002			
Anti-requisite(s)	You cannot take this module if you take IS5108			
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

CS5010 Artificial Intelligence Principles

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
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.				
Pre-requisite(s):	Before taking this module you must (pass CS2001 or pass CS2101) and pass CS2002 - relates to ug programmes only			
Anti-requisite(s)	You cannot take this module if you take CS3105			
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

CS5011 Artificial Intelligence Practice

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
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.				
Pre-requisite(s):	Before taking this module you must pass CS3105 or pass CS5010			
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No Re-assessment available			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

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CS5012 Language and Computation

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
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.				
Pre-requisite(s):	Before taking this module you must pass CS5010 or pass CS3052			
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

CS5014 Machine Learning

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Availability restrictions:	There are 80 spaces available on this module. If necessary, a ballot will be held to select students for the module.			
Planned timetable:	To be arranged.			
Machine Learning enables computers to improve automatically with experience. A growing number of algorithms are being used to predict outcomes using patterns in collected data. This module covers the essential theory and algorithms, including mathematical foundations, and methodological approaches. It covers a variety of regression, classification and unsupervised approaches. It consists of lectures, and practical components with unassessed exercises and assessed practical coursework assignments with a final exam.				
Pre-requisite(s):	Postgraduate - before taking this module you must pass CS5001 and have achieved a grade of b or higher in higher or A-Level maths			
Anti-requisite(s)	You cannot take this module if you take ID5059			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks), 1 lab session (x 5 weeks).			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

CS5020 Principles of Computer Communication Systems

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Planned timetable:	To be arranged.			

This module aims to equip students with a deep knowledge of fundamental concepts and terminologies of computer communication systems (CCS). It will illustrate fundamental principles with reference to widely-used systems and technologies for CCS and enable students to use high level tools for networked systems configuration, exploration and management of CCS. Students will also be made aware of security and privacy principles and how they are used in CCS.

Pre-requisite(s):	Undergraduate - before taking this module you must pass CS2002 and (pass CS2001 or pass cs2101)
Anti-requisite(s)	You cannot take this module if you take CS3102
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks), 1 tutorial (x 6 weeks)
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5022 Practice in Computer Communication Systems

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Planned timetable:	To be arranged.			

This module aims to introduce students to the applications, protocols and architecture of Computer Communication Systems in terms of their practical realisation, operation, control and management. It will enable them to use standard programming languages and tools in order to build communication applications and protocols and to use standard analytical and statistical tools for examining the operation and performance of communication applications, protocols and systems.

Pre-requisite(s):	Undergraduate - before taking this module undergraduate students must pass CS3102
Co-requisite(s):	Postgraduate - you must also take CS5001 and take CS5020
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 10 weeks), 1 tutorial (x 4 weeks), lab session (x 4 weeks)
Assessment pattern:	Coursework = 100%
Re-assessment pattern:	No Re-assessment available
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5030 Software Engineering Principles

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
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.

Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5031 Software Engineering Practice

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
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.

Pre-requisite(s):	Undergraduate - before taking this module you must pass CS2002 and (pass CS2001 or pass cs2101)
Co-requisite(s):	Postgraduate - in the same year as taking this module you should take CS5030 and take CS5001
Learning and teaching methods of delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.
Assessment pattern:	Coursework = 100%
Re-assessment pattern:	No Re-assessment available
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5032 Critical Systems Engineering

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Planned timetable:	To be arranged.			

The aim of this module is to provide students with an understanding of the concepts and development techniques used for critical, socio-technical systems. When students have completed this module they will: understand the notion of system dependability and the key characteristics of dependable systems; understand the specialised software engineering techniques that may be used to ensure dependable system operation; have practical experience of applying some of these techniques in systems specification, design or implementation.

Pre-requisite(s):	Undergraduate - before taking this module you must pass CS3099
Learning and teaching methods of delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5033 Software Architecture

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
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.				
Co-requisite(s):	Postgraduate - you must also take CS5031			
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

CS5040 Human Computer Interaction Principles and Methods

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
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.				
Pre-requisite(s):	Undergraduate - before taking this module you must pass CS2002 and (pass CS2001 or pass cs2101)			
Anti-requisite(s)	You cannot take this module if you take CS3106			
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, practical classes and tutorials.			
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%			
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

CS5041 Interactive Software and Hardware

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
Availability restrictions:	The module is available to all students enrolled on the MSc in Human Computer Interaction Programme. A ballot for students on other MSc programmes and final year MSci students wishing to take the module may be necessary due to lab equipment constraints.			
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.				
Pre-requisite(s):	Undergraduate - before taking this module you must pass CS2002 and (pass CS2001 or pass cs2101)			
Co-requisite(s):	Postgraduate - you must also take CS5001			
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, practical classes and tutorials.			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No Re-assessment available			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

CS5042 User-Centred Interaction Design

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Availability restrictions:	The module is available to all students enrolled on the MSc in Human Computer Interaction Programme. A ballot for students on other MSc programmes and final year MSci students wishing to take the module may be necessary due to lab equipment constraints.			
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.				
Pre-requisite(s):	Undergraduate - before taking this module you must pass CS2002 and (pass CS2001 or pass cs2101)			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures, 3 practicals and 1 tutorial.			
Assessment pattern:	Coursework = 85%, Presentation = 15%			
Re-assessment pattern:	No Re-assessment available			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

CS5044 Information Visualisation

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	To be arranged.			

This module provides an introduction to information visualisation. 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.

Pre-requisite(s):	Undergraduate - before taking this module you must pass CS2002 and (pass CS2001 or pass cs2101). Postgraduate - before taking this module you must pass CS5001 or pass CS5002
Learning and teaching methods of delivery:	**Weekly contact**: 3-hour lecture (x 11 weeks), 1-hour seminar (x 8 weeks)
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5052 Data-Intensive Systems

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	To be arranged.			

The era of big data is upon us - the volume, velocity and variety of enterprise and scientific data are growing at an exponential rate and will continue to do so for the foreseeable future. This module presents the programming paradigms, algorithmic techniques and design principles for large-scale distributed systems, such as those utilised by companies such as Google, Amazon and Facebook. This module is different in scope from CS4103 (distributed systems) as it focuses primarily on building and utilising large-scale clusters. The module will cover: distributed systems architecture, replication and fault tolerance, storage, coordination, scheduling algorithms, cluster computing, cloud computing, virtualisation, programming models (e.g., MapReduce), stream processing, decentralised systems (e.g., Chord), incentive-based systems (e.g., BitTorrent), and social computing (e.g., crowd sourcing techniques). This module will draw from the latest research in both academia and industry.

Pre-requisite(s):	Undergraduate students must have passed CS2002 and (cs2001 or cs2101). Postgraduate students must pass CS5001 before taking this module.
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks), 1 tutorial (x 5 weeks)
Assessment pattern:	2-hour Written Examination - 60%, Coursework = 40%
Re-assessment pattern:	2-hour Written Examination = 60%, Existing Coursework = 40%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

CS5055 Data Ethics and Privacy

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
Planned timetable:	To be arranged			
There is much interest in both academic research and the mass media about the potential effects of algorithmic decision-making and bias, with stories about manipulation of news feeds affecting elections, discriminatory adverts or search engine results, companies using big data to subvert regulators, and so forth. The aims of this module are to introduce students to the various ethical dilemmas that are arising in our data-driven society, with an emphasis on the ethics of using data science, data protection and privacy, and algorithmic governance.				
Learning and teaching methods of delivery:	**Weekly contact**: Weekly seminars (x 11 weeks), practical classes (x 2 weeks)			
Assessment pattern:	Coursework = 100%			
Re-assessment pattern:	No Re-assessment available.			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

IS5102 Database Management Systems

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
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.				
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

IS5103 Web Technologies

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	1
Academic year:	2018/9			
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.				
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.			
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			

IS5104 Information Security Management

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
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.

Anti-requisite(s)	You cannot take this module if you take CS4203
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.
Assessment pattern:	2-hour Written Examination = 40%, Coursework = 60%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

IS5106 Green Information Technology

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
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.

Learning and teaching methods of delivery:	**Weekly contact**: Lectures, seminars and tutorials
Assessment pattern:	2-hour Written Examination = 60%, Coursework = 40%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

IS5108 Information Technology Projects

SCOTCAT Credits:	15	SCQF Level 11	**Semester**	2
Academic year:	2018/9			
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.

Anti-requisite(s)	You cannot take this module if you take CS5003
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, tutorials and practical classes
Assessment pattern:	Coursework = 100%
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)

IS5110 Digital Heritage and Preservation

SCOTCAT Credits:	15	SCQF Level 11	Semester	2
Academic year:	2018/9			
Planned timetable:	To be arranged.			

This module will ground students in the principles and practice of digital methods for the promotion and preservation of natural and cultural heritage. It will investigate the value of material culture to communities as well as present and future threats. We will look at how technology, software and workflows combine to enable digital preservation. Advances in mobile and graphics technology are making digital promotion of heritage accessible and affordable. We will look at innovations in Virtual Museums Virtual Reality and Mobile computing to develop our understanding of the limitations and possibilities for the digital promotion of heritage.

Learning and teaching methods of delivery:	**Weekly contact**: 2 hours of lectures (x 11 weeks), 2-hour practical classes x 4 weeks), 1-hour tutorial classes (x 4 weeks)
Assessment pattern:	Coursework = 100%
Re-assessment pattern:	No re-assessment available
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)