School of Computer Science

Modules

Normally the pre-requisite(s) for each of the following Honours modules is entry to the Honours Programme(s) for which they are specified, as well as any additional specific pre-requisite(s) given.

General degree students wishing to enter 3000-level modules and non-graduating students wishing to enter 3000- or 4000-level modules must consult with the relevant Honours Adviser within the School before making their selection.

Computer Science (CS) Modules

CS3051 Software Engineering				
SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Planned timetable:	To be arranged.			

This module gives a broad overview of software engineering, presenting the fundamental aspects as a collaborative professional activity including its concerns and approaches. Students learn to apply a number of different software engineering methods and practices, and to match their choice of method to the problem at hand and the context in which a project is undertaken. The module provides the background for students to enter professional careers where they will be working on large-scale software projects in teams.

Programme module type:	Compulsory for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees with subjects other than Psychology, Computer Science M.Sci.
	Optional for Computer Science and Psychology B.Sc.
Pre-requisite(s):	(CS2001 or CS2101) and CS2002
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS3052 Computational Complexity

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	2
Planned timetable:	To be arranged.			

This module builds upon finite state machines, context-free grammars and big-O notation from 2nd year. Turing machines, non-determinism and pushdown automata are introduced, followed by studies on decidability, simulation and the Halting problem. The complexity classes P, NP, co-NP, NP-hard, etc., are described via analysis of SAT and graph isomorphism. Strengths and limitations of the abstract approach to complexity are discussed, followed by an in-depth introduction to practical complexity: flops, worst- and average-case analysis, approximate solutions, and case studies.

Programme module type:	Compulsory for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees with subjects other than Psychology, Computer Science M.Sci. Optional for Computer Science and Psychology B.Sc.

Pre-requisite(s):	(CS2001 or CS2101) and CS2002	**Anti-requisite(s):**	CS3103 and CS3201
Required for:	CS4052, CS4204		

Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.	
	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: Coursework = 40%, Written Examination = 60%

Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS3053 Research and Professional Issues in Computing

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	Whole Year
Planned timetable:	To be arranged.			

This module develops knowledge of social and professional issues in computer science, along with an understanding of research methodology and some current hot research topics. Guidance, practice and assessment are provided in the preparation and delivery of talks, critical reading of the literature, report and essay writing, including the preparation and presentation of a possible research project. There are team debates on social, ethical and professional issues.

Programme module type:	Compulsory for Computer Science B.Sc., Internet Computer Science B.Sc., Computer Science M.Sci. Optional for joint Computer Science degrees.

Pre-requisite(s):	(CS2001 or CS2101) and CS2002	**Anti-requisite(s):**	CS4051

Learning and teaching methods and delivery:	**Weekly contact**: 1 lecture, 1 seminar, 1 tutorial.	
	Scheduled learning: 66 hours	**Guided independent study:** 84 hours

Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Coursework = 100%

Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS3099 Software Team Project

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	Whole Year
Availability restrictions:	Not available to General Degree Students.			
Planned timetable:	To be arranged.			

This module allows students to take part in a substantial software engineering project as part of a team, using professional development techniques. Each team specifies, plans, designs, implements and documents a medium-sized software system, under the guidance of a member of staff. Cooperation within and between teams is essential in order to produce successful solutions.

Programme module type:	Compulsory for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees with subjects other than Psychology, Computer Science M.Sci. Optional for Computer Science and Psychology B.Sc.		
Pre-requisite(s):	(CS2001 or CS2101) and CS2002	**Required for:**	CS4099
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, supervisor meetings and demonstrations arranged as necessary.		
	Scheduled learning: 69 hours	**Guided independent study:** 81 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%		
	As used by St Andrews: Coursework = 100%		
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk		

CS3101 Databases

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	2
Planned timetable:	To be arranged.			

This module introduces data models and modeling techniques, relational design and normalisation. It also examines a range of issues in database implementation, including indexing, query processing, transactions and recovery.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.	
Pre-requisite(s):	(CS2001 or CS2101) and CS2002	
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.	
	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: Coursework = 40%, 2-hour Written Examination = 60%	
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk	

CS3102 Data Communications and Networks

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Planned timetable:	To be arranged.			

This module introduces the basics of data communications and computer networks, and examines network protocols and architectures.

Programme module type:	Compulsory for Internet Computer Science B.Sc.
	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.

Pre-requisite(s):	(CS2001 or CS2101), CS2002 and CS2003	**Required for:**	CS4103, CS4302

Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.	
	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:
	Coursework = 40%, Written Examination = 60%

Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS3104 Operating Systems

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Planned timetable:	To be arranged.			

This module examines the changing role of the operating system, the concept and implementation of process, the OS/hardware interface with regard to storage and protection, and the techniques developed to achieve safety and throughput in multitasking systems.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.

Pre-requisite(s):	CS2001 or CS2101) and CS2002	**Required for:**	CS4202, CS4204

Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.	
	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:
	Coursework = 40%, Written Examination = 60%

Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS3105 Artificial Intelligence

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	2
Planned timetable:	To be arranged.			

This module examines the general features of the A.I. problem solving process, and in particular the various forms of heuristic, together with their implementation and case studies of real systems.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.

Pre-requisite(s):	(CS2001 or CS2101) and CS2002	**Anti-requisite(s):**	CS4101

Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%

Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS3106 Human Computer Interaction

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Planned timetable:	To be arranged.			

This module covers the main aspects of Human Computer Interaction. Design guidelines, structured design methods and standards are studied, and practice is given in implementation and evaluation. Students gain experience of current interactive audio, visual and manipulative technologies.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.		
Pre-requisite(s):	(CS2001 or CS2101) and CS2002	**Anti-requisite(s):**	CS4104
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.		
	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: Coursework = 40%, Written Examination = 60%		
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk		

CS3301 Component Technology

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	2
Planned timetable:	To be arranged.			

This module provides students with understanding of current and emerging component technologies, focusing on the major themes of object-oriented and message-oriented middleware. The first theme examines the evolution of object-oriented programming into component models such as CORBA, COM, RMI and Java Beans. The second theme explores the emerging field of message-oriented middleware.

Programme module type:	Compulsory for Internet Computer Science B.Sc. Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.	
Pre-requisite(s):	(CS2001 or CS2101), CS2002 and CS2003	
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.	
	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: Coursework = 40%, Written Examination = 60%	
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk	

CS3302 Data Encoding

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Planned timetable:	To be arranged.			

This module explains the techniques used to encode data, emphasising the ideas of security and secrecy, error correcting capabilities, and data compression.

Programme module type:	Compulsory for Internet Computer Science B.Sc. Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
Pre-requisite(s):	(CS2001 or CS2101), CS2002 and CS2003		**Required for:**	CS4203
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.			
	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: Coursework = 40%, Written Examination = 60%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4052 Logic and Software Verification

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
Planned timetable:	To be arranged.			

Building on earlier coverage of elementary logic, this module covers the topics of formal proof, including induction, as applied to software specification, validation and verification. A proof assistant such as PVS or Coq is employed both in lectures and in practical work. Software correctness is thus presented as a matter not of testing but of pre-execution verification.

Programme module type:	Compulsory for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees with subjects other than Psychology, Computer Science M.Sci. Optional for Computer Science and Psychology B.Sc.			
Pre-requisite(s):	CS3052		**Anti-requisite(s):**	CS3202
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.			
	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: Coursework = 40%, Written Examination = 60%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4098 Minor Software Project

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	Whole Year
Planned timetable:	To be arranged.			

This module has the same content as CS4099, but with reduced scope appropriate for Joint Honours students.

Programme module type:	Compulsory for Joint Computer Science degrees.
Anti-requisite(s):	CS4099

Learning and teaching methods and delivery:	**Weekly contact**: Individual supervision	
	Scheduled learning: 69 hours	**Guided independent study:** 81 hours

Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Coursework = 100%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS4099 Major Software Project

SCOTCAT Credits:	30	SCQF Level 10	**Semester:**	Whole Year
Planned timetable:	To be arranged.			

This module allows students to undertake a substantial software engineering project using professional development techniques. Each student designs, specifies and constructs a medium-sized software system, or undertakes a formal development and proof of such a system, under the guidance of a member of staff. The syllabus is designed on an individual basis.

Programme module type:	Compulsory for Computer Science B.Sc., Internet Computer Science B.Sc., Computer Science M.Sci.		
Pre-requisite(s):	CS3099	**Anti-requisite(s):**	CS4098

Learning and teaching methods and delivery:	**Weekly contact**: Individual supervision.	
	Scheduled learning: 69 hours	**Guided independent study:** 231 hours

Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Coursework = 100%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS4098 Minor Software Project

CS4102 Computer Graphics

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
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.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS4103 Distributed Systems

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
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.

Programme module type:	Compulsory for Internet Computer Science B.Sc. Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Pre-requisite(s):	CS3102
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS4201 Programming Language Design and Implementation

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
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.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS4202 Computer Architecture

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
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.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Pre-requisite(s):	CS3104
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS4203 Computer Security

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
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.

Programme module type:	Compulsory for Internet Computer Science B.Sc.			
	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
Pre-requisite(s):	CS3302		**Anti-requisite(s):**	IS5104
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.			
	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: Coursework = 40%, Written Examination = 60%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4204 Concurrency and Multi-Core Architectures

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
Planned timetable:	To be arranged.			

Multi-core programming is a new paradigm in computer science that is likely to be dominant in the next decade; already, all the microprocessors in computers and game consoles are multiprocessor-based. This module presents the key concepts of concurrent programming, ranging from theoretical foundations to the analysis of patterns and performance issues in developing this class of programs and systems.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
Pre-requisite(s):	CS3052, CS3104		**Co-requisite(s):**	CS4202
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.			
	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: Coursework = 40%, Written Examination = 60%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

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CS4302 Multimedia

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1

Planned timetable:	To be arranged.

This module introduces the concepts of analogue and digital media, and analyses techniques for encoding, manipulating, compressing, and transmitting media based on text, audio, images, and moving images, as well as their connection with human perception. Within the context of networked multimedia, it presents issues and solutions involved in transporting time-sensitive data across computer networks.

Programme module type:	Compulsory for Internet Computer Science B.Sc.
	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Pre-requisite(s):	CS3102
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS4303 Video Games

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1

Planned timetable:	To be arranged.

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. This module builds on the general-purpose programming abilities acquired earlier, introducing games-specific techniques and material. These are developed as practical skills through lectures and laboratories, culminating in the creation of actual games.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%
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:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures per week, fortnightly tutorial and practical classes.
	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: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk

CS4499 Computer Science (Special Subject)

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	Either
Planned timetable:	To be arranged.			

This module is a guided reading module on any aspect of Computer Science not covered by other available modules, intended only for students in the School of Computer Science for whom exceptional timetable arrangements (such as a semester or year of absence) unduly restrict the availability of modules.

Programme module type:	Optional for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Pre-requisite(s):	Entry to an Honours programme in the School of Computer Science, and the consent of the Head of School
Learning and teaching methods and delivery:	**Weekly contact**: Tutorials, guided reading, essays, presentations and practical classes.
	Scheduled learning: 11 hours **Guided independent study:** 139 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Coursework = 100%
Module Co-ordinator:	hons-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. A basic understanding of an AI programming language is provided. Finally, it is shown how to implement AI ideas in software and how to evaluate such implementation.

Programme module type:	Compulsory for Artificial Intelligence Taught Postgraduate Programme. Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Required for:	CS5012, CS5019
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.
	Scheduled learning: 25 hours / **Guided independent study:** 125 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Coursework = 100%
Module Co-ordinator:	cs5000.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:	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Pre-requisite(s):	CS5011
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.
	Scheduled learning: 25 hours / **Guided independent study:** 125 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%
	As used by St Andrews: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	cs5000.coord@cs.st-andrews.ac.uk

CS5021 Advanced Networks

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

This module covers layered architectures, protocol concepts, data link protocols, reliability, resource utilisation, Internet architecture, network tools, and security threats.

Programme module type:	Compulsory for Networks and Distributed Systems Taught Postgraduate Programme. Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Required for:	CS5023, CS5029
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.
	Scheduled learning: 25 hours **Guided independent study:** 125 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Coursework = 100%
Module Co-ordinator:	cs5000.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 Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Pre-requisite(s):	CS5021
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.
	Scheduled learning: 25 hours **Guided independent study:** 125 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%
	As used by St Andrews: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	cs5000.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:	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Required for:	CS5032, CS5033, CS5039
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.
	Scheduled learning: 25 hours **Guided independent study:** 125 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%
	As used by St Andrews: Coursework = 100%
Module Co-ordinator:	cs5000.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 Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Pre-requisite(s):	CS5031
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures, seminars, tutorials and practical classes.
	Scheduled learning: 25 hours **Guided independent study:** 125 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%
	As used by St Andrews: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	cs5000.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 Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Pre-requisite(s):	CS5031
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.
	Scheduled learning: 25 hours **Guided independent study:** 125 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%
	As used by St Andrews: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	cs5000.coord@cs.st-andrews.ac.uk

CS5041 User-Centred Interaction Design

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

Desktop and mobile computing are evolving as advanced interactive technologies change our view of applications, services, gaming and computing. This module focuses on interaction between one or more humans and one or more computational machines. It studies both the mechanism side and the human side, with a focus on a class of devices beyond the desktop. The module examines the design, evaluation and implementation of interactive technologies and computing systems for human use.

Programme module type:	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.
Learning and teaching methods and delivery:	**Weekly contact**: Weekly lectures and practical classes.
	Scheduled learning: 25 hours **Guided independent study:** 125 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%
	As used by St Andrews: Coursework = 40%, Written Examination = 60%
Module Co-ordinator:	cs5000.coord@cs.st-andrews.ac.uk

CS5199 Individual Masters Project

SCOTCAT Credits:	60	SCQF Level 11	**Semester:**	1
Academic year:	2013/4			
Planned timetable:	Full-time for one semester.			

This module allows students to undertake a major software engineering or research project, under the guidance of an individual supervisor. The project builds on experience gained in CS4099, although the topic must differ significantly from the 4000-level project.

Programme module type:	Compulsory for M.Sci. Honours Computer Science	
Pre-requisite(s):	CS4099, Entry to M.Sci. Honours Computer Science	**Anti-requisite(s):**
Co-requisite(s):		**Required for:**
Learning and teaching methods and delivery:	**Weekly contact**: Individual supervision.	
	Scheduled learning: 45 hours	**Guided independent study:** 555 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%	
	As used by St Andrews: Coursework = 100%	
Module Co-ordinator:	cs5000.coord@cs.st-andrews.ac.uk	

ID5059 Knowledge Discovery and Datamining

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

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 M.Sci. in Computer Science	
Anti-requisite(s):	MT5759	
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, seminars, tutorials and practical classes.	
	Scheduled learning: 35 hours	**Guided independent study:** 115 hours
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%	
	As used by St Andrews: Coursework = 40%, Written Examination = 60%	
Module Co-ordinator:	Dr C R Donovan and Dr T Kelsey	