School of Computer Science

Computer Science (CS) Modules

CS3051 Software Engineering

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Academic year:	2013/4			
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 and practical experience 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 with BPS Recognition, Computer Science M.Sci. Optional for Computer Science and Psychology with BPS Recognition 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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS3052 Computational Complexity

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	2
Academic year:	2013/4			
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 with BPS Recognition, Computer Science M.Sci. Optional for Computer Science and Psychology with BPS Recognition 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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS3098 Minor Software Team Project

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	Whole Year
Academic year:	2013/4			
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. This module has a similar structure to CS3099, but with reduced scope appropriate for Joint Honours students.				
Programme module type:	Compulsory for Computer Science Joint Honours Degrees with subjects other than Psychology with BPS Recognition. Optional for Computer Science and Psychology with BPS Recognition B.Sc.			
Pre-requisite(s):	(CS2001 or CS2101) and CS2002		**Anti-requisite(s):**	CS3099
Required for:	CS4098			
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			

CS3099 Software Team Project

SCOTCAT Credits:	30	SCQF Level 9	**Semester:**	Whole Year
Academic year:	2013/4			
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., Computer Science M.Sci.			
Pre-requisite(s):	(CS2001 or CS2101) and CS2002		**Anti-requisite(s):**	CS3098
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:** 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			

CS3101 Databases

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	2
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%,			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS3102 Data Communications and Networks

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS3104 Operating Systems

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS3105 Artificial Intelligence

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	2
Academic year:	2013/4			
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			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS3106 Human Computer Interaction

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Academic year:	2013/4			
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			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS3301 Component Technology

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	2
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS3302 Data Encoding

SCOTCAT Credits:	15	SCQF Level 9	**Semester:**	1
Academic year:	2013/4			
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			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4052 Logic and Software Verification

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
Academic year:	2013/4			
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:	Compulsory for Computer Science B.Sc., Internet Computer Science B.Sc., Joint Computer Science degrees with subjects other than Psychology with BPS Recognition, Computer Science M.Sci. Optional for Computer Science and Psychology with BPS Recognition B.Sc.			
Pre-requisite(s):	CS3052			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4098 Minor Software Project

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	Whole Year
Academic year:	2013/4			
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.			
Pre-requisite(s):	CS3098		**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
Academic year:	2013/4			
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			

CS4102 Computer Graphics

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4103 Distributed Systems

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4201 Programming Language Design and Implementation

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4202 Computer Architecture

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4203 Computer Security

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
Academic year:	2013/4			
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.			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4204 Concurrency and Multi-Core Architectures

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
Academic year:	2013/4			
Availability restrictions:				
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.				
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			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4302 Multimedia

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4303 Video Games

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1
Academic year:	2013/4			
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.				
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 = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4402 Constraint Programming

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	2
Academic year:	2013/4			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	hons-coord-cs@st-andrews.ac.uk			

CS4499 Computer Science (Special Subject)

SCOTCAT Credits:	15	SCQF Level 10	**Semester:**	1 or 2
Academic year:	2013/4			
Availability restrictions:				
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):	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			

CS5010 Artificial Intelligence Principles

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Academic year:	2013/4			
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 reasoning, planning, doing, and learning. It shows how search is used to solve a variety of problems in AI. The fundamentals of symbolic AI, machine learning, neural networks, and robotics are shown, together with their relation to cognitive science. 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:	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
Anti-requisite(s):	CS3105			
Required for:	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: 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
Academic year:	2013/4			
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:	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
Pre-requisite(s):	CS3105			
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:	masters-coord-cs@st-andrews.ac.uk			

CS5012 Language and Computation

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Academic year:	2013/4			
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):	CS3052 or CS5010			
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: 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
Academic year:	2013/4			
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:	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 = 40%, Practical Examinations = 0%, Coursework = 60%			
	As used by St Andrews: 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
Academic year:	2013/4			
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):	CS3102 or 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: 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
Academic year:	2013/4			
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:	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
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: 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
Academic year:	2013/4			
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:	masters-coord-cs@st-andrews.ac.uk			

CS5032 Critical Systems Engineering

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Academic year:	2013/4			
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):	CS3051 or 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: 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
Academic year:	2013/4			
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):	CS3051 or 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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5040 Human Computer Interaction Principles

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	1
Academic year:	2013/4			
Planned timetable:	To be arranged.			
This module provides a broad introduction to the study of interaction between humans and computational machines. Material includes: the history of interfaces and interaction; ubiquitous computing; human vision, perception, memory and hearing; paradigms of interaction; universal design and design rules; new HCI paradigms beyond the desktop; socio-organisational issues in HCI.				
Programme module type:	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
Anti-requisite(s):	CS3106	**Required for:**	CS5042, CS5043	
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, practical classes and tutorials.			
	Scheduled learning: 41 hours		**Guided independent study:** 109 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%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5041 Human Computer Interaction Practice

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Academic year:	2013/4			
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:	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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5042 User-Centred Interaction Design

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Academic year:	2013/4			
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 Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
Pre-requisite(s):	(CS5040 or CS3106) and CS5041			
Learning and teaching methods and delivery:	**Weekly contact**: 2 lectures, 3 practicals and 1 tutorial.			
	Scheduled learning: 77 hours		**Guided independent study:** 73 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 10%, Coursework = 90%			
	As used by St Andrews: Coursework = 90%, Presentation = 10%			
Module Co-ordinator:	masters-coord-cs@st-andrews.ac.uk			

CS5043 Evaluation Methods in Human Computer Interaction

SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Academic year:	2013/4			
Planned timetable:	To be arranged.			
This module provides an introduction to quantitative and qualitative methods for evaluating interactive systems and digital artefacts. It covers experimental design, hypothesis testing and field studies. Skills in applying evaluation methods are reinforced through practical assignments.				
Programme module type:	Optional for Computer Science B.Sc., Joint Computer Science degrees, Computer Science M.Sci.			
Pre-requisite(s):	(CS5040 or CS3106) and CS5041			
Learning and teaching methods and delivery:	**Weekly contact**: Lectures, practical classes and tutorials.			
	Scheduled learning: 41 hours		**Guided independent study:** 109 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%			
Module Co-ordinator:	masters-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			
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:	hons-coord-cs@st-andrews.ac.uk			
Lecturer(s)/Tutor(s):	TBA			

Interdisciplinary (ID) Modules

ID5059 Knowledge Discovery and Datamining				
SCOTCAT Credits:	15	SCQF Level 11	**Semester:**	2
Academic year:	2013/4			
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 M.Sci. in Computer Science Optional for Advanced Computer Science, Artificial Intelligence, Networks and Distributed Systems, Software Engineering and Erasmus Mundus Dependable Software Systems M.Sc. Programmes. Compulsory for Applied Statistics and Datamining Taught Postgraduate Programme. Optional for Statistics Taught Postgraduate Programme.			
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: 2-hour Written Examination = 60%, Coursework = 40%			
Module Co-ordinator:	Dr C R Donovan and Dr T Kelsey			