CS3050 Logic and Reasoning

SCOTCAT Credits:	15	SCQF level 9	**Semester**	1
Academic year:	2020-2021			
Planned timetable:	To be confirmed			
This module covers the foundations of logic that are relevant to computer scientists, with an emphasis on automatic reasoning and decidability. Topics include propositional and predicate calculus, various proof techniques, and Goedel's incompleteness theorem				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2101 or pass CS2001)			
Anti-requisite(s)	You cannot take this module if you take PY4612			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 25 hours		**Guided independent study:** 121 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module coordinator Email:	hons-coord-cs@st-andrews.ac.uk			
Module teaching staff:	Dr Susmit Sarkar			

CS3052 Computational Complexity

SCOTCAT Credits:	15	SCQF level 9	**Semester**	2
Academic year:	2020-2021			
Planned timetable:	To be arranged.			
This module introduces Turing machines, non-determinism and pushdown automata, followed by study of decidability, simulation and the Halting problem. It builds upon finite state machines, context-free grammars and big-O notation from second year. 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.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and pass CS3050 and (pass CS2101 or pass CS2001)			
Anti-requisite(s)	You cannot take this module if you take MT3852			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
	Scheduled learning: 28 hours		**Guided independent study:** 122 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS3099 Software Engineering Team Project

SCOTCAT Credits:	30	SCQF level 9	**Semester**	Full Year
Academic year:	2020-2021			
Availability restrictions:	Not available to General Degree Students			
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 apply these concepts and practices to a substantial software engineering project as part of a team. Each team specifies, plans, designs, implements, tests 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. 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.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2101 or pass CS2001)			
Anti-requisite(s)	You cannot take this module if you take CS5031			
Learning and teaching methods of delivery:	**Weekly contact**: 1 lecture (x 10 weeks) and 4 seminars			
	Scheduled learning: 34 hours		**Guided independent study:** 266 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: 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)			

CS3101 Databases

SCOTCAT Credits:	15	SCQF level 9	**Semester**	2
Academic year:	2020-2021			
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.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2101 or pass CS2001)			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
	Scheduled learning: 28 hours		**Guided independent study:** 122 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS3102 Data Communications and Networks

SCOTCAT Credits:	15	SCQF level 9	**Semester**	2
Academic year:	2020-2021			
Planned timetable:	To be arranged.			
This module covers the principles and practice of modern computer communications through studying network abstractions, protocols, architectures and technologies at all levels of the five-layer reference model.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and pass CS2003 and (pass CS2101 or pass CS2001)			
Anti-requisite(s)	You cannot take this module if you take CS5020			
Learning and teaching methods of delivery:	**Weekly contact**: 2 lectures (x 11 weeks) and fortnightly tutorial.			
	Scheduled learning: 28 hours		**Guided independent study:** 122 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS3104 Operating Systems

SCOTCAT Credits:	15	SCQF level 9	**Semester**	1
Academic year:	2020-2021			
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.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2101 or pass CS2001)			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS3105 Artificial Intelligence

SCOTCAT Credits:	15	SCQF level 9	**Semester**	1
Academic year:	2020-2021			
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.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2101 or pass CS2001)			
Anti-requisite(s)	You cannot take this module if you take CS5010			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS3106 Human Computer Interaction

SCOTCAT Credits:	15	SCQF level 9	**Semester**	2
Academic year:	2020-2021			
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.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2101 or pass CS2001)			
Anti-requisite(s)	You cannot take this module if you take CS5040			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 11 weeks lectures, 1hr x 11 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS3301 Component Technology

SCOTCAT Credits:	15	SCQF level 9	**Semester**	1
Academic year:	2020-2021			
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 and of service-oriented computing models such as SOAP and REST.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2101 or pass CS2001)			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS3302 Data Encoding

SCOTCAT Credits:	15	SCQF level 9	**Semester**	1
Academic year:	2020-2021			
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.				
Pre-requisite(s):	Before taking this module you must pass CS2002 and (pass CS2101 or pass CS2001)			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS3701 Data Science Industry Placement 1

SCOTCAT Credits:	60	SCQF level 9	**Semester**	2
Academic year:	2020-2021			
Availability restrictions:	Available only to students on BSc Data Science Graduate Apprenticeship.			
Planned timetable:	Not applicable			
This module provides the first extended period of work-based learning on the Data Science Graduate Apprenticeship programme. Apprentices spend four months on the employer's premises, and are expected to travel to clients or other employer offices as and when required. During the module, apprentices work on a range of projects, selected by the employer to give apprentices the opportunity to develop professional practice and to apply and integrate technical knowledge, skills and behaviours in an industrial working environment on their own and as part of a team. Projects are fully supervised at the employer; apprentice performance is assessed jointly by the immediate supervisor and a member of staff in the School of Computer Science.				
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**: Full-time on placement.			
	Scheduled learning: 0 hours		**Guided independent study:** 50 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 100%, Practical Examinations = 0%, Coursework = 0%			
	As used by St Andrews: 100% Coursework			
Re-assessment pattern:	Not applicable			
Module coordinator:	Dr D Balasubramaniam			
Module teaching staff:	Dr Dharini Balasubramaniam			

CS4052 Logic and Software Verification

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 60%, Practical Examinations = 0%, Coursework = 40%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4098 Minor Software Project				
SCOTCAT Credits:	15	SCQF level 10	**Semester**	Full Year
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module has the same content as CS4099, but with reduced scope appropriate for Joint Honours students.				
Pre-requisite(s):	Before taking this module you must pass CS3099			
Anti-requisite(s)	You cannot take this module if you take CS4099 or take CS4796			
Learning and teaching methods of delivery:	**Weekly contact**: Individual supervision			
	Scheduled learning: 68 hours		**Guided independent study:** 82 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: 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)			

CS4099 Major Software Project				
SCOTCAT Credits:	30	SCQF level 10	**Semester**	Full Year
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.				
Pre-requisite(s):	Before taking this module you must pass CS3099			
Anti-requisite(s)	You cannot take this module if you take CS4098 or take CS4796			
Learning and teaching methods of delivery:	**Weekly contact**: Individual supervision.			
	Scheduled learning: 68 hours		**Guided independent study:** 232 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: 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)			

CS4102 Computer Graphics

SCOTCAT Credits:	15	SCQF level 10	**Semester**	2
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4105 Advanced Communication Networks and Systems

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged			
Students will be exposed to advanced topics at the forefront of computer networks and digital communication systems.. The aim is to help students to understand, analyse, and critique state-of-the-art and emerging topics in communication systems such as the Internet, sensor networks, data centres, web applications, new/emerging architectures, and mobile/wireless systems. Topics covered on the course will include performance & measurement, operational aspects, deployment, systems development, security & privacy, evolution of technology.				
Pre-requisite(s):	Before taking this module you must pass CS3102			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 28 hours		**Guided independent study:** 120 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module coordinator:	Professor S N Bhatti			
Module coordinator Email:	snb6@st-andrews.ac.uk			
Module teaching staff:	Prof Saleem Bhatti			

CS4201 Programming Language Design and Implementation

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.				
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**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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**: 2hr x 11 weeks lectures, 1hr x 11 weeks discussion			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4302 Signal Processing: Sound, Image, Video

SCOTCAT Credits:	15	SCQF level 10	**Semester**	1
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
This module covers the fundamentals of signal processing and perception: investigating how sounds, images and videos can be processed and analysed alongside the fundamentals of how the human auditory and visual perception system functions (e.g., how your eyes and ears work with your brain). Concepts such as data encoding and compression are provided with practical application of understanding signals in terms of their frequency components, relating to their time and spatial components (e.g., audio frequency components or the spatial frequency of an image). Using a programming language regularly used in image and signal processing, students will gain practical skills in applying concepts to real-world problems, including using Fourier transforms, to calculate the frequency distribution in audio files, and undertake tasks such as reducing noise from signals. This module is useful for those wanting to move into the fields of computer vision or data analysis.				
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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**	2
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.			
	Scheduled learning: 26 hours		**Guided independent study:** 124 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Oral Examination = 100%			
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**	1
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
Module teaching staff:	TBC Module coordinator(s): Honours Coordinator - Computer Science (hons-coord-cs@st-andrews.ac.uk)			

CS4499 Computer Science (Special Subject)

SCOTCAT Credits:	15	SCQF level 10	**Semester**	Both
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.				
Pre-requisite(s):	Consent from the Head of School required.			
Learning and teaching methods of delivery:	**Weekly contact**: 1-hour supervision meeting.			
	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%			
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)			

CS4796 Joint Project (30cr)

SCOTCAT Credits:	30	SCQF level 10	**Semester**	Full Year
Academic year:	2020-2021			
Availability restrictions:	Available only to students in the Second year of the Honours Programme, who have completed the Letter of Agreement, downloadable from https://www.st-andrews.ac.uk/coursecatalogue). No student may do more than 60 credits in Dissertation or Project modules.			
Planned timetable:	To be arranged.			
The aim of the project is to develop and foster the skills of experimental design, appropriate research management and analysis. The topic and area of research should be chosen in consultation with the supervisors in order to determine that the student has access to sources as well as a clear plan of preparation.				
Pre-requisite(s):	Student must have a Letter of Agreement. Before taking this module you must pass CS3099			
Learning and teaching methods of delivery:	**Weekly contact**: As per Letter of Agreement.			
	Scheduled learning: 68 hours		**Guided independent study:** 232 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: 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)			

CS5010 Artificial Intelligence Principles

SCOTCAT Credits:	15	SCQF level 11	**Semester**	1
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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):	UG: Before taking this module you must pass CS2002 and (CS2001 or CS2101)			
Anti-requisite(s)	You cannot take this module if you take CS3105			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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**	2
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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			
Co-requisite(s):	You must also take CS5001 and take CS5010			
Learning and teaching methods of 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%			
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)			

CS5012 Language and Computation

SCOTCAT Credits:	15	SCQF level 11	**Semester**	2
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	There are 100 spaces available on this module. Priority will be given to students on MSc Artificial Intelligence programme when spaces are allocated. If necessary, a ballot will be held for other eligible students wishing to take 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.				
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).			
	Scheduled learning: 27 hours		**Guided independent study:** 127 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 26 hours		**Guided independent study:** 121 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 40%			
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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.				
Pre-requisite(s):	Undergraduate - Undergraduate - Before taking this module you must pass CS2002 and (pass CS2001 or pass CS2101)			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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 - UNDERGRADUATE - BEFORE TAKING THIS MODULE YOU MUST PASS CS2002 AND (PASS CS2001 OR PASS CS2101). Postgraduate: You must also take CS5001 and CS5030			
Anti-requisite(s)	You cannot take this module if you take CS3099			
Learning and teaching methods of 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%			
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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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.				
Learning and teaching methods of 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: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
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**: 2hr x 10 weeks lectures, 1hr x 10 weeks discussion			
	Scheduled learning: 41 hours		**Guided independent study:** 109 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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**	2
Academic year:	2020-2021			
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 coding environments for creative visuals, tangible programming kits and microprocessor kits. There is a strong emphasis on practical assignments.				
Learning and teaching methods of delivery:	**Weekly contact**: Lectures, practical classes and tutorials.			
	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%			
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**	1
Academic year:	2020-2021			
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 delivery 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 Students - Before taking this module you must pass CS2002 and (pass CS2001 or pass CS2101)			
Learning and teaching methods of delivery:	**Weekly contact**: 3hr x 10 weeks classes			
	Scheduled learning: 0 hours		**Guided independent study:** 120 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Coursework Assignment			
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:	2020-2021			
Availability restrictions:	There are 100 spaces available on this module. Priority will be given to students on MSc Human Computer Interaction programme when spaces are allocated. If necessary, a ballot will be held for other eligible students wishing to take the module.			
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). PGT: CS5001 or CS5002			
Learning and teaching methods of delivery:	**Weekly contact**: 2hr x 11 weeks lectures, 1hr x 11 weeks discussion			
	Scheduled learning: 41 hours		**Guided independent study:** 109 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students			
Planned timetable:	To be arranged.			
CS5052 is an advanced research-focused module, which 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. It has a strong systems research flavour, which includes areas such as operating systems, databases, distributed systems, and networking. This module is usually delivered in a seminar format requiring active participation and contributions from students.				
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)			
	Scheduled learning: 31 hours		**Guided independent study:** 116 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Continual Assessment = 60%, 48-hour Assessment = 40%			
Re-assessment pattern:	Existing Continual Assessment = 60%, 48-hour Assessment = 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:	2020-2021			
Availability restrictions:	40 places in each semester allocated by ballot.			
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)			
	Scheduled learning: 32 hours		**Guided independent study:** 120 hours	
Assessment pattern:	**As defined by QAA:** Written Examinations = 0%, Practical Examinations = 0%, Coursework = 100%			
	As used by St Andrews: Coursework = 100%			
Re-assessment pattern:	Oral Examination = 100%			
Module coordinator:	Dr J D Thomson			
Module teaching staff:	TBC Module coordinator(s): Director of Postgraduate Teaching - Computer Science (dopgt-cs@st-andrews.ac.uk)			
Additional information from Schools:	This module runs in both semesters with a cap with effect from 2019/20.There is reassessment in the form of an oral examination.			

CS5199 Individual Masters Project

SCOTCAT Credits:	60	SCQF level 11	**Semester**	Both
Academic year:	2020-2021			
Availability restrictions:	Not automatically available to General Degree students. Only available to students in the final year of a MSci Computer Science programme			
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 previous years.				
Pre-requisite(s):	BEFORE TAKING THIS MODULE YOU SHOULD PASS CS3099 and be enrolled on the MSci Honours Computer Science			
Learning and teaching methods of 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%			
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)			