School of Computer Science

Head of School   Professor R Morrison

Degree Programmes

Single Honours Degrees (BSc)   Computer Science
                                      Internet Computing

General MA degree: Arts and Vocational Information Technology

Joint Honours Degrees (BSc):   Computer Science and
                                      Chemistry, Geoscience, Logic & Philosophy of Science, Management,
                                      Management Science, Mathematics, Physics, Statistics.

Joint Honours Degrees (MA):   Integrated Information Technology and
                                      Ancient History, Art History, Classical Studies, Classics, Greek, Latin
                                      or Management.

Major Degree Programmes (BSc):   Computer Science with French ^{w} or German ^{w} or Linguistics

^{w} available also as 'with Integrated Year Abroad Degrees'

BSc Programme Prerequisites

Computer Science

Single Honours Degree: Passes at 11 or better in both CS2001 and CS2002

Chemistry and Computer Science: Passes at 11 or better in CH2101, **either** CH2102 **or** CH2103, CS2001
and   CS2002

Computer Science and Mathematics: Passes at 11 or better in both CS2001 and CS2002 and in
                                           (MT2001 or MT2101) and in one of MT2002, MT2003 or MT2005

Computer Science and Statistics: Passes at 11 or better in both CS2001 and CS2002 and in (MT2001 or
                                          MT2101) and MT2004

Other Joint Honours Degrees: Passes at 11 or better in both CS2001 and CS2002

Computer Science with French: Passes at 11 or better in both CS2001 and CS2002 and a pass in FR2011
and   a pass at 11 or better in FR2012

Computer Science with German: Passes at 11 or better in CS2001, CS2002 and GM2006 and a
pass in GM2005

Computer Science with Linguistics: Passes at 11 or better in CS2001 and CS2002, together with the prerequisites
                                            for Linguistics.

Internet Computing

Single Honours Degree: Passes at 11 or better in both CS2001 and CS2003.

MA Programme Prerequisites

General Degree:

Arts and Vocational Information Technology: entry to the Arts Faculty

BSc Programme Requirements

Computer Science

Single Honours Degree: 240 credits, of which at least 210 credits must be in 3000-level modules including:

          (i)   CS3001, CS3006, CS3014, CS3015, CS3022, CS3032, CS3041

Integrated Information Technology: 240 credits including IS3001 and IS3002, the remaining 120 credits being as required for Joint Honours in the other subject.

Modules

CS1002 Computer Science

Credits: 20.0   Semester: 1

Prerequisites: Higher/A level/AS level Mathematics, or, with the consent of the Head of School, Physics

Description: This module covers programming, problem-solving skills, and the principles of computer science, providing an introduction to all aspects of the Computer Science curriculum. Programming exercises include colour computer graphics, data structures and studies of program efficiency. Students who have not used a computer before should take IS1003 in addition to this module.

Class Hour: 10.00 am

Teaching: Four lectures, one tutorial and one two-and-a-half hour laboratory.

Assessment: Continuous Assessment = 34%, 2 Hour Examination = 66%

Re-Assessment: Continuous Assessment = 25%, 3 Hour Examination = 75%

CS1004 Internet Programming

Credits: 20.0   Semester: 2

Prerequisites: Experience in Object-Oriented programming in Java or CS1002.

Description: This module provides an introduction to concepts in networked computing: client-server architectures, addressing, routing, protocols, networking technologies and network topologies. It will provide an introduction to protocols with emphasis on Internet Protocols including TCP & TCP/IP, HTTP, SMTP, NNTP. Data and meta data formats including HTML, XML, MIME etc will be discussed. Authoring of Web pages including the use of Java Applets will be explored.

Class Hour: 10.00 am

Teaching: Four lectures, one tutorial and one two-and-a-half hour laboratory.

Assessment: Continuous Assessment = 34%, 2 Hour Examination = 66%

Re-Assessment: Continuous Assessment = 25%, 3 Hour Examination = 75%

IS1001 Information Technology

Credits: 20.0   Semester: 2

Anti-requisites: CS1001, CS1003, IS1003

Description: This module introduces students to the use of computers, providing skills in word processing, spreadsheets, graphics, desktop-publishing, multi-media, and using and contributing to the Internet and World Wide Web. Lectures cover the fundamentals of hardware and software, and management, security and ethical issues. No previous computing experience is necessary.

Class Hour: 10.00 am

Teaching: Four lectures, one tutorial and one two-and-a-half hour laboratory.

Assessment: Continuous Assessment = 50%, 2 Hour Examination = 50%

Re-Assessment: Continuous Assessment = 50%, 3 Hour Examination = 50%

IS1003 Scientific Information Technology

Credits: 20.0   Semester: 1

Prerequisites: Higher/A-level/AS level Mathematics

Anti-requisites: CS1001, IS1001, CS1003

Description: This module is suitable for science students and gives an introduction to the use of information technology in mathematics and the sciences. Topics include data analysis using the package MiniTab and mathematics using the package Maple, and basic IT skills such as word processing, spreadsheets and the Internet. No previous computing experience is necessary.

Class Hour: Each lecture is given twice, once at 10.00 am and once at 12.00 noon

Teaching: Four lectures, one tutorial and one two-and-a-half hour laboratory.

Assessment: Continuous Assessment = 50%, 2 Hour Examination = 50%

(ii)   Four or more other modules from CS3001 - CS3999

Computer Science and Mathematics: 240 credits, of which at least 105 credits must be from CS3001 - CS3999 and at least 105 credits must be from MT3501 - MT3999, including:

(i)   At least one of CS3001, CS3006

(ii)   At least one of CS3022, CS3032

(iii)   Either CS3041 or CS3042

(iv)   CS3016

(v)   At least two of MT3501 - MT3504

(vi)   At least one of MT3601 - MT3604

(vii)   MT3999

Computer Science and Statistics: 240 credits, of which at least 105 credits must be from CS3001 - CS3999 and at least 105 credits must be from MT3501 - MT3999, including:

(i)   At least one of CS3001, CS3006

(ii)   At least one of CS3022, CS3032

(iii)   Either CS3041 or CS3042

(iv)   CS3016

(v)   MT3501, MT3701, MT3702

(vi)   At least one of MT3703 - MT3706

(vii)   MT3999

Computer Science with French or German or Linguistics: 240 credits, of which 180 credits must be from CS3001 - CS3999, including:

(i)   At least one of CS3001, CS3006

(ii)   At least one of CS3022, CS3032

(iii)   CS3041 and CS3015

Any year abroad must be taken between the second and third years of study

Computer Science and any other subject: 240 credits, of which 120 credits must be from CS3001 - CS3999, including:

(i)   At least one of CS3001, CS3006

(ii)   At least one of CS3022, CS3032

(iii)   Either CS3041 or CS3042

(iv)   CS3016

Internet Computing

Single Honours Degree: 240 credits including:

(i)   CS3004, CS3005, CS3010, CS3014, CS3015, CS3020, CS3041, CS3050 (new module Component Technologies), CS3051 (New module Internet Theory),

(ii)   At least 3 of CS3012, CS3013, CS3052 (new module Human Computer Interaction), CS3053 (New module Agent based systems and information retrieval), CS3054 (New module Multi-media) and CS3055 (New module E-commerce, Economics & law)

(iii)   Further modules from the list of Honours modules in Computer Science up to a total of 240 credits.

MA Programme Requirements

General Degree:

Arts and Vocational Information Technology: 360 credits in total, including 120 credits in IS2001 and IS2002 and an additional 120 credits at Second level.

Joint Honours Degree:

information retrieval, web site authoring, multimedia, video and data conferencing, UNIX, technical writing, the client/server model, elementary software engineering, legal and ethical aspects of computing and applications of IT in the arts and social sciences.

Class Hour: Full time, Mondays to Fridays

Teaching: Lectures at 1.00 pm; tutorials, seminars and practicals at other times between 9.00 am and 5.00 pm

Assessment: Continuous Assessment = 100%

Re-Assessment: Practical and/or oral examination

IS2002 Second Level Information Technology Project

Credits: 60.0 Semester: 2

Prerequisite: IS2001

Anti-requisite: IS3002

Co-requisite: Available only as a component of the MA (General) in Arts and Vocational Information Technology

Description: A work-placement module, for a 'remote supervisor' in the University or a local enterprise, on an IT project of likely benefit to the remote supervisor.

Class Hour: Full time, Mondays to Fridays

Teaching: Supervision, technical guidance and day-to-day support provided by the School of Computer Science; some supervision provided by the remote supervisor.

Assessment: Project Report = 100%

Re-assessment: Practical and/or oral examination

The prerequisite for each of the following Honours modules is entry to the Honours Programme(s) for which they are specified, save where a specific prerequisite is given.

CS3001 Algorithm Design and Analysis

Credits: 15.0 Semester: 1

Availability: 2000-01

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3041 or CS3042

Description: This module aims to explain and illustrate a set of techniques for designing efficient algorithms, and for analysing their time and space complexities. The syllabus includes design paradigms: divide and conquer (and recurrence relations), dynamic programming, inductive design, arithmetic problems and matrix problems; fast Fourier transforms and applications to polynomial manipulation; selected graph and combinatorial algorithms.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3003 Computer Architecture

Credits: 15.0 Semester: To be arranged.

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3022 and CS3032

Description: This module aims to study the principles and technology of modern computer architectures, with particular emphasis on performance and acceleration. The syllabus consists of: (i) the CPU: pipelined, superscalar, multiprocessor and supercomputer architectures, coprocessors and ASICs, microprogramming; (ii) memory: instruction and data caches; (iii) interconnect architectures: topologies, buses; (iv) performance concepts: latency, bandwidth and analysis; (v) programming models: RISC, CISC, virtual addressing, high-level language support, multiprogramming and multiprocessor consistency; (vi) case studies.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Re-Assessment: Continuous Assessment = 50%, 3 Hour Examination = 50%

CS2001 Computer Algorithms and Data Structures

Credits:	30.0	Semester:	1

Prerequisite: CS1002

Description: This module is complementary to CS2002 and taken together they provide a broad base of the principles of computing and a training in practical skills. CS2001 introduces the fundamental algorithms, data structures and logic which are at the heart of modern software, and develops skills in programming and analysis.

Class Hour: 9.00 am

Teaching: Four lectures, one tutorial and a practical.

Assessment: Continuous Assessment = 34%, 3 Hour Examination = 66%

Re-Assessment: Continuous Assessment = 25%, 3 Hour Examination = 75%

CS2002 Computer Systems

Credits:	30.0	Semester:	2

Prerequisite: CS1002

Description: This module is complementary to CS2001 and taken together they provide a broad base of the principles of computing and a training in practical skills. CS2002 develops skills in programming in C and introduces computer architectures and operating systems, including process scheduling and memory management.

Class Hour: 9.00 am

Teaching: Four lectures, one tutorial and a practical.

Assessment: Continuous Assessment = 34%, 3 Hour Examination = 66%

Re-Assessment: Continuous Assessment = 25%, 3 Hour Examination = 75%

CS2003 Advanced Internet Programming

Credits:	30.0	Semester:	2

Availability: 2001-02

Prerequisite: CS1004

Description: This module explores the concepts and abstractions for Internet programming. Students are introduced to server side computing and client side computing. These issues are practically illustrated through programming in Java.

Class Hour: 11.00 am

Teaching: Four lectures, one tutorial and a practical.

Assessment: Continuous Assessment = 34%, 2 Hour Examination = 66%

Re-Assessment: Continuous Assessment = 25%, 3 Hour Examination = 75%

IS2001 Second Level Information Technology

Credits:	60.0	Semester:	1

Prerequisites: Entry to MA (General) Programme in Arts and Vocational Information Technology

Anti-requisites: at   IS1001 (formerly CS1001) unless an extra 10 credits are passed or extra IT work is undertaken at the discretion of the Head of School, IS1003 (formerly CS1003), IS3001

Co-requisites: Available only as a component of the MA (General) in Arts and Vocational Information Technology

Description: This module is an intensive practically oriented introduction to information technology, covering computer and network basics, word processing, spreadsheets, databases, graphics, electronic publishing, the Internet,

Computer Science - 3000 Level modules

Description: This module aims to provide a foundation for understanding analogue information processing and how it relates to digital information processing and problems. The syllabus comprises: neural networks as providers of universal mappings and dynamic systems through training and generalisation; convexity theory; recurrent connections; the use of derivatives in network search and configuration; content-addressable memory; pattern association and classification; stochastic techniques and machines; travelling salesman problem revisited; network complexity issues; hardware implementation.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3010 Data Encoding

Credits: 15.0   Semester: To be arranged.

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3022 and CS3032

Description: This module aims to explain the techniques used to encode data, emphasising in turn the ideas of: security and secrecy, error correcting capabilities, data compression. The syllabus comprises: the weakness of early encryption schemes, the Data Encryption Standard, public key schemes including RSA; attacks on RSA by integer factorisation; Hamming distance, linear codes, parity check equations; Hamming codes, BCH codes; information and uncertainty, run encoding, Huffman encoding.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3011 Automated Reasoning

Credits: 15.0   Semester: To be arranged.

Availability: 2000-01

Prerequisite: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3001 and CS3006

Description: This module aims to introduce the ideas and main techniques of automated reasoning, both as an illustration of the problems of automating the solution of sometimes insoluble problems and for their application to the implementation of logic programming languages. The syllabus includes: brief review of material from CS2001. First-order structures, semantics of classical logic, soundness and completeness; sequent calculi; tableaux; resolution; model construction; rule invertibility; backtracking; termination; unification, Skolemisation and Herbrandisation; Herbrand's theorem; Horn formulae and programs; uniform proofs; algorithmic and heuristic methods; decidability and undecidability; feasibility and non-feasibility.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3012 Concurrency

Credits: 15.0   Semester: To be arranged.

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3022 and CS3032

Description: This module aims: (i) to study models of concurrent computation and their impact on programming; (ii) to study methods of specifying and reasoning about concurrent behaviour. The syllabus includes: the concept of process; programming models of communication; manifestations in existing languages and systems; synchronisation; models of concurrent computation; reasoning paradigms; behavioural properties of concurrent systems; implementation issues.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, Two Hour Examination = 80%

CS3004 Operating Systems

Credits: 15.0   Semester: To be arranged.

Availability: 2000-01

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3001 and CS3006

Description: This module aims (i) to examine in depth the changing role of the operating system; (ii) to study the concept and implementation of *process;* (iii) to study the OS/hardware interface with regard to storage and protection; (iv) to study the techniques developed to achieve safety and throughput in a multitasking system.   The syllabus includes: structured computer organisation; process definition and implementation; interprocess communication and synchronisation; review of scheduling; review of file systems; storage management.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, Two Hour Examination = 80%

CS3005 Databases

Credits: 15.0   Semester: To be arranged.

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3022 and CS3032

Description: This module aims (i) to study data models, indexing techniques and query processing; (ii) to study database systems including concurrency, transactions, distribution and recovery. The syllabus includes: data models; indexing, hashing and query processing; concurrency, transactions and recovery; security and integrity.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3006 Implementation of Programming Languages 1

Credits: 15.0   Semester: 1

Availability: 2000-01

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3041 or CS3042

Description: This module aims (i) to study a practical technique for compiling programming languages; (ii) to study the run-time environment of programming languages. The syllabus includes compiling techniques and run-time systems.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3009 Neural Networks

Credits: 15.0   Semester: To be arranged.

Availability: 2000-01

Prerequisite: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3001 and CS3006

Computer Science - 3000 Level modules

Availability:	2000-01
Prerequisites:	CS2001 and (CS2002 or CS2003)
Co-requisites:	CS3001 and CS3006

Description: This module aims to introduce students to basic concepts in algebra and numerical analysis and their use in computer science. The syllabus is to be chosen from techniques for root finding, error and accuracy, computing in the integers and rationals, primality testing, computational linear algebra, interpolation and least square fitting, affine transformations and computer graphics, computational geometry.

Class Hour:	To be arranged.
Teaching:	Two lectures and one tutorial.
Assessment:	Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3018 Artificial Intelligence

Credits:	15.0	Semester:	To be arranged.
Availability:	2001-02		
Prerequisites:	CS2001 and (CS2002 or CS2003)		
Co-requisites:	CS3022 and CS3032		

Description: This module aims to provide understanding of the general features of the A.I. problem solving process, and in particular to explain the various forms of heuristic together with their implementation and case studies of real systems. The syllabus includes aspects of action and planning, learning, reasoning.

Class Hour:	To be arranged.
Teaching:	Two lectures and one tutorial.
Assessment:	Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3019 Complexity and Computability

Credits:	15.0	Semester:	To be arranged.
Availability:	2000-01		
Prerequisites:	CS2001 and (CS2002 or CS2003)		
Co-requisites:	CS3001 and CS3006		

Description: This module aims to introduce the ideas that (i) some problems may be impossible to solve by efficient algorithms, and (ii) some problems may be impossible to solve algorithmically at all. The syllabus comprises the complexity classes P, NP; formal models of computation, Cook's theorem; selected NP complete problems; heuristics for solving NP-complete problems; parallel algorithms and the class NC; halting problem.

Class Hour:	To be arranged.
Teaching:	Two lectures and one tutorial.
Assessment:	Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3020 Data Communications and Networks

Credits:	15.0	Semester:	To be arranged.
Availability:	2000-01		
Prerequisites:	CS2001 and (CS2002 or CS2003)		
Co-requisites:	CS3001 and CS3006		

Description: This module aims (i) to introduce the basics of data communications and computer networks, and (ii) to examine network protocols and architectures. The syllabus includes: data communications; transmission media; data encoding; transmission modes; error detection and correction; flow control; multiplexing; switching techniques; routing; networking; network topologies; protocols; layering; standardisation; LANS; WANS; internetworking; management; study of particular networks and protocols - FDDI, Ethernet, ISDN, TCP/IP, X25.

Class Hour:	To be arranged.
Teaching:	Two lectures and one tutorial.
Assessment:	Continuous Assessment = 20%, 2 Hour Examination = 80%

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3013 Principles of Distributed Computing

Credits: 15.0 Semester: To be arranged.

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3022 and CS3032

Description: This module aims to help students (i) to understand the fundamentals of concurrency and distribution with reference to architectures, systems, programming techniques and languages; (ii) to study modern distributed systems and parallel programming languages. The syllabus consists of: basics; architecture; systems; languages.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3014 Professional and Social Aspects of Computing

Credits: 15.0 Semester: Whole Year

Prerequisites: CS3041 or CS3042

Description: This module aims: (i) to enable students to gain a broad general knowledge of some current research areas in computer science and their application in industry and commerce, and the non-technical factors which may affect decision-making in these areas; (ii) to make students aware of the social implications and ethical problems which may face the users and builders of computer systems; (iii) to develop skills in collecting and communicating information, managing and leading debate and drawing conclusions. It will consist of threeparts: (i) a series of seminars will be given and students will be required to write short reports on a certain number of these and take part in a follow-up discussion; (ii) students will be required to write an essay on a current technological, business or social issue in computer science; (iii) students will be required to give an individual or team presentation on a social or professional issue in Computer Science, and lead and manage a follow-up discussion.

Teaching: Individual supervision

Assessment: Continuous Assessment = 100%

CS3015 Single Honours Project in Computer Science

Credits: 30.0 Semester: Whole Year

Prerequisite: CS3041

Anti-requisite: CS3016

Description: This module aims to allow students to undertake a substantial software engineering project using professional development techniques. Each student will design, specify and construct a medium-sized software system or undertake 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.

Teaching: Individual supervision.

Assessment: Continuous Assessment = 100%

CS3016 Joint Honours Project in Computer Science

Credits: 15.0 Semester: Whole Year

Prerequisites: CS3041 or CS3042

Anti-requisite: CS3015

Description: This module aims to allow students to undertake a substantial software engineering project using professional development techniques. Each student will design, specify and construct a medium-sized software system or undertake 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.

Teaching: Individual supervision

Assessment: Continuous Assessment = 100%

CS3017 Algebra in Computer Science

Credits: 15.0 Semester: To be arranged.

Computer Science - 3000 Level modules

CS3021 Implementation of Programming Languages 2

Credits:	15.0	Semester:	To be arranged.

Availability: 2000-01

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3001 and CS3006

Description: This module aims (i) to study target dependent compilation, and (ii) to study the execution mechanisms for selected language paradigms. The syllabus includes: code generation; implementation of type systems; imperative programming; functional programming; object-oriented programming; logic programming; parallel programming.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3022 Principles of Programming Languages

Credits:	15.0	Semester:	1

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3041 or CS3042

Description: This module aims to study the design of programming languages. The syllabus includes: language design principles; language elements; binding; type systems; data encapsulation; exceptions; persistence; models of parallelism; formal definition of programming languages.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3023 Software Specification

Credits:	15.0	Semester:	To be arranged.

Availability: 2000-01

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3001 and CS3006

Description: This module aims to introduce students to techniques for building mathematical models of computer systems, investigating their properties and using them in the design and development of software. The syllabus comprises: traditional software engineering processes; justification for formal methods; safety critical applications; syntax and semantics of an appropriate specification language; reading, writing and analysing examples; verification and validation methods; program development from specifications; case studies and applications; automated tool support.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3032 Machines and Computation

Credits:	15.0	Semester:	1

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3041 or CS3042

Description: This module aims to give an understanding of the foundations of computation including the basic issues in language recognition, with applications in areas such as compiler design, and to introduce general models of computation (Turing machines and others) which illustrate the limits of the power of computers.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3033 Functional Programming

Credits:	15.0	Semester:	1

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3022 and CS3032

Description: This module aims to study declarative programming through the vehicle of a purely functional language and to study recent developments in functional language design. The syllabus includes: list processing; functions and recursion; type issues in a functional context; lazy evaluation and other evaluation orders, including parallel evaluation; partial evaluation; program transformation; modern approaches to handling state changes and input/output in a purely functional manner; the relationship of functional programming to lambda-calculus and other theoretical models.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3034 Computer Graphics

Credits:	15.0	Semester:	To be arranged.

Availability: 2001-02

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: CS3022 and CS3032

Description: The aims of the module are to provide understanding of the fundmental concepts of computer graphics and to develop 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.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3041 Software Engineering

Credits:	30.0	Semester:	Whole Year

Prerequisites: CS2001 and (CS2002 or CS2003)

Anti-requisite: CS3042

Description: This module introduces software engineering through lectures, a major group software project and other reports and exercises. We define software engineering and consider those attributes of software which distinguish a well-engineered system from a badly-engineered system, concentrating on the differences between large systems and small ones, and introduce some concepts of software design and good programming practice. We will concentrate in particular on object-oriented techniques and Java programming.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 50%, 2 Hour Examination = 50%

Computer Science - 3000 Level modules

CS3042 Software Engineering (Joint Honours)

Credits:	15.0	Semester:	Whole Year

Prerequisites: CS2001 and (CS2002 or CS2003)

Anti-requisite: CS3041

Description: This is a 15 credit version of CS3041.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 100%

CS3044 Self-Organising Systems

Credits:	15.0	Semester:	To be arranged.

Availability: To be arranged.

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: Either (CS3001 and CS3006) or (CS3022 and CS3032)

Description: This module aims to provide understanding of the general features of Artificial Life and Artificial Society through cellular and distributed self-organising computation. In particular, the various computational forms of Artificial Life are explained ranging from the micro-cellular to ecosystems. The Artificial Society section draws upon intelligent and self-organising multi-agent systems, game theory and the Internet.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

CS3045 Computer Science (Special Subject)

Credits:	15.0	Semester:	Either

Prerequisites: Entry to the Single Honours Computer Science Degree programme and the consent of the Head of School

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

Class Hour: To be arranged.

Teaching: Tutorials, guided reading, essays, presentations and supervised practicals.

Assessment: Continuous Assessment = 100%

CS3046 Evolutionary Programming

Credits:	15.0	Semester:	To be arranged.

Availability: To be arranged.

Prerequisites: CS2001 and (CS2002 or CS2003)

Co-requisites: Either (CS3001 and CS3006) or (CS3022 and CS3032)

Description: The aim of the module is to give an appreciation of the principles and practice of evolutionary and stochastic programming techniques. Techniques included: simulated annealing, genetic algorithms, genetic programming, learning. Theories explored: Probabilistic algorithms, design principles, examples. Applications from: optimisation, fitting, classification, intractability. Empirical issues: experimental design, performance measurement, comparative analysis.

Class Hour: To be arranged.

Teaching: Two lectures and one tutorial.

Assessment: Continuous Assessment = 20%, 2 Hour Examination = 80%

IS3001 Third Level Information Technology

Credits: 60.0 Semester: 1

Prerequisites: Entry to the third year of an MA Programme with Integrated Information Technology, with the other subject defining the "Home School"

Anti-requisites: IS1001 (formerly CS1001), unless an extra 10 credits are passed or further IT work is undertaken at the discretion of the Head of School; IS1003 (formerly CS1003), IS2001

Co-requisites: Available only as a component of an MA (Hons) programme in X and Integrated Information Technology (where X is one of certain specified subjects)

Description: This module is an intensive practically oriented introduction to information technology, covering computer and network basics, word processing, spreadsheets, databases, graphics, electronic publishing, the Internet, information retrieval, web site authoring, multimedia, video and data conferencing, UNIX, technical writing, the client/server model, elementary software engineering, legal and ethical aspects of computing and applications of IT in the arts and social sciences in general. 5 credits worth of additional subject-specific material must be covered by arrangement with the Home School.

Class Hour: Full time, Mondays to Fridays

Teaching: Lectures at 1.00 pm; tutorials, seminars and practicals at other times between 9.00 am and 5.00 pm

Assessment: Continuous Assessment = 100%

Re-assessment: Practical and/or oral examination

IS3002 Third Level Information Technology Project

Credits: 60.0 Semester: 2, save with Head of School's permission

Prerequisite: IS3001

Anti-requisite: IS2002

Co-requisites: Available only as a component of an MA (Hons) Programme in X and Integrated Information Technology, the other subject X defining the "Home School"

Description: A work-placement module, for a 'remote supervisor' in the Home School, elsewhere in the University or in a local enterprise, on an IT project of likely benefit to the remote supervisor. The topic must be approved by the Heads of the Home School and of the School of Computer Science.

Class Hour: Full time, Mondays to Fridays

Teaching: Supervision, technical guidance and day-to-day support provided by the School of Computer Science; some supervision provided by the remote supervisor. In case the remote supervisor is not in the candidate's Home School, additional monitoring from the Home School will be arranged.

Assessment: Project Report = 100%

Re-assessment: Practical and/or oral examination