Visiting Student Modules
School of Computer Science and Statistics
Note: The School reserves the right to remove or add modules as required. Visiting students cannot participate on part (one semester/term) of a full year module. All students must complete the full module in order to receive the ECTS.

Trinity Module Name and course code	Credits (ECTS)	Duration and semester	Prerequisite Subjects	Course Description and Learning Outcomes	Assessment	Contact Hours (per week unless stated otherwise)	Contact Person
Mathematics CSU11001 (CS1003)	5	Michaelmas Term	None	This module aims to develop the students' skills and abilities in the mathematical methods necessary for solving practical problems. In the first semester students will encounter some of the key mathematical structures at the heart of computer science including the representation of data using matrices. They will gain a greater appreciation of the relationships between calculus and the graphs of functions, including the representation of functions using Taylor Series. During Semester 2 students will be introduced to discrete mathematics and mathematical logic along with their applications to computer science. In particular, the module will introduce set operations, discrete maths functions in Number Theory and Logic calculation. This part of the module is influenced by the approaches of Backhouse, Dijkstra and Gries	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Introduction to Computing I CSU11021 (CS1021)	5	Michaelmas Term	None	Specific topics addressed in this module include: Number systems, memory and data representation; Basic computer architecture (CPU, memory, registers, fetch-decode-execute loop); Assembly language and machine code; Binary arithmetic and bit-wise operations; Program flow control using branch instructions; Memory accesses (using load and store instructions).	Examination and Coursework	2 lectures; 1 tutorial; 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Electronics and Information Technology CSU11031 (CS1031)	5	Michaelmas Term	None	Part I: Electronics Part II: Information Technology	Examination	37 hours total (lectures, tutorials, labs)	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computers and Society CSU11081 (CS1081)	5	Michaelmas Term	None	IT and its **"**impact" on society; models for assessing technological "impact"; history of IT; ethics; writing, presenting and argumentation.	Coursework	3 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Software Applications 1 STU11001 (ST1001)	5	Michaelmas Term	None	The purpose of this course is to provide an introduction to the practical uses of computer applications particularly in the area of word processing, spreadsheets, presentation packages and web page design and development. This course is a computer laboratory based course. Students are given notes that encourage self paced learning. Interaction with the course instructor and peers is encouraged.	Continuous assessment	2 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Introduction to Statistics I STU12501 (ST1251)	5	Michaelmas Term	None	To introduce students to the elementary ideas of probability and the use of simple probability models.	Examination; Coursework	3 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Systems Programming I CSU22014 (CS2014)	5	Michaelmas Term	CS1010, CS1021, CS1022 Module Co-Requisite: CS2010	Module content includes: The C programming language, Pointers and dynamic memory allocation/de-allocation, Principles of structured programming, Abstract data types in structured programming, The UNIX operating system, UNIX programming tools, Programming style appreciation and criticism.	Coursework; Examination	2 lectures; 2 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Telecommunications II CSU23031 (CS2031)	5	Michaelmas Term	CS1025 and CS1031	A two part course - the first half of which is a telecommunications course examining the data link, network and transport layers of the OSI network model, and the second half focuses on the methods and techniques for efficient management (storage and retrieval) of data and information in a computer and on the world wide web.	Coursework; Examination	2 lectures; 1 tutorial; 2 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Information Management I CSU22041 (CS2041)	5	Michaelmas Term	Programming Language such as Java or C	This part of the course focuses on the methods and techniques for efficient management (storage, manipulation and retrieval) of data and information in a computer and on the worldwide web.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computer Engineering II CSU22E03 (CS2E03)	5	Michaelmas Term	None	Number systems, data representation and basic computer architecture; Migrating from C to C++; C++ classes, constructors, destructors, overloading, inheritance; Dynamic and stack based memory allocation (e.g. malloc, free, new and delete); File I/O; String, list, stack, queue and tree data structures; Algorithm complexity; Simple 2D graphics; Multi-core programming.	Continuous assessment; Examination	3 Lectures; 1 tutorial; 1 lab	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Applied Probability 1 STU22004 (ST2004)	5	Michaelmas Term	Elementary mathematics including integration.	In this course, we take a problem-based approach that replaces mathematics with the use of random numbers in a spreadsheet, by following what is known as the Monte Carlo method. Students will rapidly acquire the facility to model complex random (or stochastic) systems. They will subsequently learn the language of probability which can sometimes by-pass the algorithms, or render them more efficient.	Examination; Coursework	Total Lecture hours: 27 Total Lab hours: 6 Total hours: 33	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Probability and Theoretical Statistics I STU23501 (ST2351)	5	Michaelmas Term	ST1351, ST1352	This module will describe the fundamentals of probability theory, from the basic axioms of probability to the most commonly used aspects and theorems of the theory.	Examination	2 lectures; 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Symbolic Programming STU33011 (CS3011)	5	Michaelmas Term	Some programming experience.	Basic introduction to Prolog including recursion, definite clause grammars, cuts and negation.	Coursework; Examination	2 lectures; 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Applied Linear Statistical Methods 1 STU34501	5	Michaelmas Term		The student will learn about the simple linear regression (SLR) model in detail. This will include derivation of least squares estimators and their properties, sampling distributions of the estimators in the case of Gaussian errors, and tests of significance. The student will also learn about ANOVA-decomposition of the error sum of squares. The matrix approach to linear regression will follow where multiple regression will be discussed. Various diagnostics of fit will be explored, with illustration of how these can be used in practice. Some modifications of the usual regression model will be discussed as well as model building through variable selection.	Examination & Coursework	3 hours per week, some of which will be tutorials	

Software Engineering CSU33012 (CS3012)	5	Michaelmas Term	None	This course provides students with a solid grounding in various aspects related to building large, important software systems.	Coursework	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Statistical Inference II STU34508 (ST3458)	5	Michaelmas Term		After taking this course the student will have a clear understanding of the mechanisms underlying many hypothesis tests and confidence intervals. The course will include a full treatment of estimation and properties of estimators, as well as a light introduction to statistical asymptotics.	Examination; Coursework	3 hours per week, some of which will be tutorials	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Introduction to Functional Programming CSU34016 (CS3016)	5	Michaelmas Term	None	On successful completion of this module students will be able to: • Develop programs in a high level functional language; • Analyse and structure program designs in terms of functional concepts; • Understand the concept of higher-order programming inherent in functional languages; • Improve software modularity and reusability by applying higher-order principles to refactor code; • Apply a number of functional programming techniques and tools to develop effective functional systems.	Coursework; Examination	Total hours: 33	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computer Architecture II CSU34021 (CS3021)	5	Michaelmas Term	Assembly language and C/C++ programming	This course examines modern microprocessor system architectures, with an emphasis on instruction level pipelining, caches, multiprocessor systems and virtual memory.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Information Management II CSU34041 (CS3041)	5	Michaelmas Term	None	The course will enable students design information models and implement these models in object/relational databases as well as in less structured content environments (e.g. on the Web, in content repositories). The course will also enable student analyse and evaluate approaches to information organisation, storage, transaction support and management.	Coursework; Examination	3 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Compiler Design I CSU33071 (CS3071)	5	Michaelmas Term	A basic understanding of machine architectures along with a thorough knowledge of programming in both assembly language and in high level programming languages such as C, C#, C++ or JAVA.	An introductory course based on attributed translation grammars. The main topics covered include finite state automata and lexical analysis, syntax and semantic analysis, recursive descent parsing, symbol-table management and simple object code generation techniques.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Forecasting STU33010 (ST3010)	5	Michaelmas Term	Basic Statistics and Mathematics	Applied Forecasting (AF) module runs for 12 weeks. Several methods of forecasting will be examined, including exponential smoothing and its Holt-Winters extension, auto-regression, moving average, and further regression based methods that take into account seasonal trends of lagged variables. The module will be practical, and will involve every student in extensive analysis of case study material for a variety of time series data.	Examination; Continuous assessment	2 lectures; 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

MLA Multivariate Linear Analysis STU33011 (ST3011)	5	Michaelmas Term	None	Classical multivariate techniques of discriminant analysis, principal component analysis, clustering and logistic regression are examined. There is a strong emphasis on the use and interpretation of these techniques. More modern techniques, some of which address the same issues, are covered in the SS module Data Mining.	Examination; Continuous assessment	2 lectures; 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Microprocessor Systems 1 CSU33D01 (CS3D1)	5	Michaelmas Term	None	Specific topics addressed in this module include: Number systems; Memory and data representation; Binary arithmetic and logical operations; Floating-point representations and arithmetic; Basic computer architecture; Assembly language and machine code; Flow control; Memory load/store operations and addressing modes.	Continuous assessment; Examination	3 Lectures; 1 tutorials; 2 labs	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Data Structures CSU33D05 (CS3D5a)	5	Michaelmas Term	None	1. Undertake software design and construction as members of teams of various sizes. 2. Learn how to choose, learn, and use new languages, tools, and techniques. 3. Gather requirements and develop a problem specification. 4. Examine problem specification and devise an object-oriented solution. 5. Plan implementation of the program taking into account time and team management. 6. Implement a program of reasonable complexity in the Java language. 7. Document the project using standard techniques. 8. Test the solution using standard techniques. 9. Present their work to their peers and their clients.	Coursework	Lectures/week: 0. Lab/week: 3. Tutorial/week: 1.	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

e-Business I CSU33BC1 (CS3BC1)	5	Michaelmas Term	None	This module aims to provide an understanding of modern, web based approaches for developing software applications, services and data structures for e-business applications. It addresses the standards, practical tools and techniques of web-based, e-business application development, including 3-tier application server architectures, web services, workflow and service composition, web content and meta-data using HTML and XML	Coursework; Examination (TBC)	3 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Fuzzy Logic and Control System CSU44001 (CS4001)	5	Michaelmas Term	None	**At the successful completion of the module the student will have the knowledge of:** The inherent imprecision and uncertainty in data and (scientific) concepts; The existence of fuzzy heuristics used in the control of 'real-world' system; The new paradigm of computing-with-words; **The knowledge will help the students to design and build:** Fuzzy-logic based systems; Fuzzy-control systems; Neuro-fuzzy learning systems.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Formal Verification CSU44004 (CS4004)	5	Michaelmas Term	TBC	Specification languages and logics; axiomatic program semantics, formal proof systems to verify software and system properties such as propositional, predicate and Hoare logic, proofs by mathematical, structural, and rule induction. correctness proofs of functional and imperative programs.	Coursework; Examination	Total 33 hours (lectures and tutorials)	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Topics in Functional Programming CSU44012 (CS4012)	5	Michaelmas Term	CS3016 Functional Programming	This course builds on CS3012 which introduced the fundamental concepts of functional programming. In CS4012 we will take an in-depth look at more advanced topics in functional programming and discuss some current research directions in the field.	Examination, coursework	Lecture hours: 22 Lab hours: 0 Tutorial hours: 11 Total hours: 33	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computer Graphics CSU44052 (CS4052)	5	Michaelmas Term	C or C++ programming, freshman mathematics.	Computer Graphics is an introductory level course covering aspects of: graphics hardware; modeling and object representation; 2D/3D systems and transformations; rendering (visibility, lighting, shading, shadows, texturing, ray tracing); animation (traditional keyframed, motion capture, physically based); and selected hot research topics in the field.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Human Factors CSU44051 (CS4051)	5	Michaelmas Term	None	The purpose of the module is to give students an understanding of usability problems in interactive system design, the reasons (cognitive and otherwise) underlying these problems and the methods which have been developed to address these issues within systems development.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computer Vision CSU44053 (CS4053)	5	Michaelmas Term	A working knowledge of C+/p>	Image preprocessing (such as image enhancement), segmentation of images (e.g. identifying people in a video sequence), representation of shape (so that we can start reasoning about the objects in an image), object recognition (as we'd like to know what we are looking at), 3D vision (i.e. understanding the world in 3 dimensions even though we only have 2 dimensional images), and more. There are just too many techniques to do them all so instead we focus on particular problems and look at the techniques which would be needed to solve those problems.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Entrepreneurship & High-Tech Venture Creation CSU44081 (CS4081)	5	Michaelmas Term	None	Entrepreneurship & High-Tech Venture Creation.	Class participation; Individual & Team assignment	3 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Advanced Computational Linguistics CSU44062 (CS4LL5)	5	Michaelmas Term	No pre-requisite: to implement and experiment with tools will need to be able to program in C+/p>	The aim is to give a grounding in so-called unsupervised machine learning techniques which are vital to many language-processing technologies including Machine Translation, Speech Recognition and Topic Modelling. Whilst studied in these contexts, the techniques themselves are used much more widely in data mining and machine vision for example.	Examination and coursework	Total: Lecture hours: 22 Lab hours: 6 Tutorial hours: 5	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Mathematics CSU11002 (CS1003)	5	Hilary Term	CSU11001	This module aims to develop the students' skills and abilities in the mathematical methods necessary for solving practical problems. In the first semester students will encounter some of the key mathematical structures at the heart of computer science including the representation of data using matrices. They will gain a greater appreciation of the relationships between calculus and the graphs of functions, including the representation of functions using Taylor Series. During Semester 2 students will be introduced to discrete mathematics and mathematical logic along with their applications to computer science. In particular, the module will introduce set operations, discrete maths functions in Number Theory and Logic calculation. This part of the module is influenced by the approaches of Backhouse, Dijkstra and Gries	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Programming Project I CSU11013 (CS1013)	5	Hilary Term	CS1010	CS1013 is a course which concentrates on development of practical programming ability through example-based lecturing coupled with intensive laboratory sessions. The emphasis throughout is on producing working programs, starting with interactive graphical applications and moving on to construction of a larger group project involving a data visualisation task.	Project	3 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Introduction to Computing II CSU11022 (CS1022)	5	Hilary Term	CS1021	This module continues directly from CS1021 (which is a prerequisite) and examines the structure and behaviour of computer systems in greater depth. In particular, this module introduces students to the implementation of simple data structures (stacks, multi-dimensional arrays, composite data types), subroutines, exceptions, interrupts and basic I/O at the machine level.	Coursework; Examination	2 lectures; 1 tutorial; 2 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computer Engineering I CSU11E03 (CS1E03)	5	Hilary Term	None	This module aims to equip students with the skills to design and develop simple imperative programs. It provides a solid grounding in algorithm design and programming techniques, in preparation for later courses that require programming.	Continuous assessment; Examination	3 lectures; 2 labs	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Statistical Analysis 1 STU11002 (ST1002)	5	Hilary Term	None	The aim of the course is to introduce the students to basic statistical concepts. There will be considerable emphasis on the use of a statistical package to analyse data.	Examination; Continuous assessment	2 lectures; 3 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Introduction to Statistics II STU12502 (ST1252)	5	Hilary Term	ST1251	To introduce students to the elementary ideas of statistical inference and the use of simple statistical methods in practical situations.	Examination; Coursework	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Software Engineering Project I CSU22013 (CS2013)	5	Hilary Term	None	Project teams will be created, to make a "software product" for a client within the Department. Guidance given on software design, work distribution and project planning but decisions are the responsibility of the team.	Coursework	2 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Concurrent Systems and Operating Systems CSU23016 (CS2016)	5	Hilary Term	Working knowledge of C/C+ and an understanding of Computer Organization.	The first part of this module introduces students to concurrency and concurrent programming. The aim is to provide students with the ability to develop concurrent software systems using standard techniques and constructs. The second part of the module addresses various aspects of the design of modern operating systems.	Coursework; Examination	3 lectures; 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Microprocessor Systems CSU23021 (CS2021)	5	Hilary Term	CS1021/22 (Introduction to Computing), CS1026 (Digital Logic Design), CS1025 (Electrotechnology).	This module provides an introduction to the MC68008 microprocessor including clock and reset circuitry design, memory-map design, serial I/O design, system exceptions and interrupts as well as system monitor design and implementation. An introduction to hardware description languages, reconfigurable hardware systems and schematic design is also provided through the use of industry standard design tools.	Coursework; Examination	3 lectures; 1 tutorial; 3 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computer Architecture I CSU22022 (CS2022)	5	Hilary Term	None	The aims of the course are to learn register-transfer specification and design and learn the fundamentals of an instruction processor.	Coursework; Examination	2 lectures; 2 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Applied Probability 2 STU22005 (ST2005)	5	Hilary Term	ST1002, ST2004	This module will develop several important ideas in statistical analysis making use of some of the ideas introduced in ST2004. It acts as a bridge to the sophister years by introducing the fundamental ideas that are used in the more advanced statistics modules that will take place then.	Examination; Continuous assessment	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Systems Analysis and Design CSU22BC1 (CS2BC1)	5	Hilary Term	None	This module introduces students to the theory and practice of designing, creating and maintaining large software systems within demanding and changing business environments. Modern enterprises are critically reliant on information systems to support their business needs. The module covers the standard business and engineering processes, approaches and disciplines applied in industry today.	Coursework; Examination	4 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Statistical Analysis 3 STU33002 (ST3002)	5	Hilary Term	Engineering Mathematics III, Applied Statistics and Applied Probability.	Binomial, Poisson, Multinomial distributions, Model based methods, Graphical techniques.	Coursework; Examination	2 lectures; 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Research Methods STU33004 (ST3004)	5	Hilary Term	None	Upon completing this course, students should have an understanding of the nature of the research process, drawing upon primary and secondary data sources; be able to locate, analyse and interpret quantitative and qualitative data; and to present the findings.	Continuous assessment	3 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Information Systems STU33005 (CS3BC2/ST3005)	5	Hilary Term	A basic understanding of XML and SQL and of Java programming.	Students learn to apply techniques and technologies in support of electronic business and electronic commerce across a range of market sectors and functional areas. Business drivers and alternative models are explored from a management perspective. The business cycle and related issues such as marketing, security, ethical and legal considerations and payment processing options are explored in local, national and international contexts.	Coursework; Examination	3 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

APPLIED LINEAR STATISTICAL METHODS II STU34502 (ST3452)	5	Hilary Term	ST2351, ST2352	This is a rigorous development of probability theory from an axiomatic foundation, along with some more advanced topics. The topics covered are: Recap of linear regression, The exponential family of distributions, The generalised linear model, Specific examples: binomial, Poisson, logistic, Deviance, Applications and examples, Past exam questions.	Examination	33 hours lectures (total)	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Statistical Inference I STU34507 (ST3457)	5	Hilary Term	ST1351, ST1352, ST2351, ST2352	At the end of this module, students should be able to Explain what subjective probability is and how it can be motivated; Explain how Bayesian statistical inference is the result of adopting the subjective approach to probability; Contrast the Bayesian and frequentist approaches to statistical inference; Explain the meaning of a likelihood, parameter and probability model; Apply Bayes' Law to a given model and prior distribution to form a posterior distribution, and recognise the functional form of the common probability distributions; Identify a point estimate to take from knowledge of a loss function; Select an interval estimate from a posterior distribution; Summarise the different numerical analysis approaches to calculating the integrals involved in multi-dimensional posterior distributions or the calculation of marginal distributions from them; Describe the Monte Carlo approaches of rejection or importance sampling to approximate a given posterior distribution; Show how Monte Carlo methods can be used to estimate the normalising constant of a posterior distribution; Demonstrate methods of elicitation of prior distributions.	Examination	33 lecture hours (total)	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Software Design Analysis CSU33D06 (CS3D5b)	5	Hilary Term	None	1. Undertake software design and construction as members of teams of various sizes. 2. Learn how to choose, learn, and use new languages, tools, and techniques. 3. Gather requirements and develop a problem specification. 4. Examine problem specification and devise an object-oriented solution. 5. Plan implementation of the program taking into account time and team management. 6. Implement a program of reasonable complexity in the Java language. 7. Document the project using standard techniques. 8. Test the solution using standard techniques.	Coursework	Lectures/week: 0; Lab/week: 3; Tutorial/week: 1	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computer Networks CSU33D03 (CS3D3)	5	Hilary Term	None	This module introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks. It is based around the OSI Reference Model, which deals with the major issues in the bottom four (Physical, Data Link, Network and Transport) layers of the model. Students are also introduced to the areas of Network Security and Mobile Communications. This module provides the student with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in the area.	Continuous assessment; Examination	3 Lectures; 4 labs	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Artificial Intelligence I CSU33061 (CS3061)	5	Hilary Term	CS3011	An introduction to AI.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Advanced Telecommunications CSU34031 (CS3031)	5	Hilary Term	CS2031 – Telecommunications II	This option concentrates on building upon the students JF and SF years knowledge and introduces them to advanced topics in the area of data communications and telecoms.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Concurrent Systems I CSU33014 (CS3014)	5	Hilary Term	CS2014, CS2015. A good knowledge of C programming Module Co-requisite: CS3021	The architecture and programming of modern parallel computing systems. The particular emphasis of this part of the course is architecture, and different ways to achieve speedup of programs using parallelism.	Coursework; Examination	3 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Statistical Methods for Computer Science STU33009 (ST3009)	5	Hilary Term	None	The module provides an introduction to statistics and probability for computer scientists. The aim is to provide the basic grounding needed for machine learning and algorithm performance analysis.	Examination, coursework	Lecture: 2 hours per week. Labs: 1 hour per week. Total: 33 hours.	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Software Engineering Project II CSU33013 (CS3013)	5	Hilary Term	None	This course follows on from CS3012(Software Engineering) and aims to give students a deeper understanding of software engineering concepts and tools through practical application. This takes the form of a large "hands-on" group project that covers numerous aspects of building object-oriented software systems including problem analysis, usage of development environments, project management, team management, design, implementation, testing and documentation. Students will take a leadership role within these groups which are combined with students taking course CS2013.	Coursework	2 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Computational Mathematics CSU33081 (CS3081)	5	Hilary Term	None	The aim of the module is to teach, in sufficient detail for practical implementation, the mathematical concepts and methods appropriate to writing computer programs for science and engineering applications in general, and in particular: computer graphics, computer vision, image processing, robotics, physical simulation, and control.	Coursework; Examination	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Knowledge Representation and Automata CSU44060 (CS4060)	5	Hilary Term	Programming competence (e.g. CS3011)	Knowledge Representation, Description Logics, Finite-state methods, Reasoning about change	Examination; Coursework	Total 43 hours (22 lecture, 10 lab, 11 tutorial)	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Knowledge Engineering CSU44D02 (CS4D2B)	5	Hilary Term	None	On completion of this module the student will be able to: 1. Design and engineer a Database Management System (DBMS) with consideration given to hardware, information organization, hashing and indexing. 2. Understand the structure of, and apply advanced manipulation techniques to, XML documents. 3. Develop skills in managing knowledge using Ontological and Semantic Web technologies. 4. Design and develop Ontologies 5. Understand and Compare different Information Retrieval techniques, specifically those used on the web.	Examination	2 Lectures; 1 Tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Digital Logic Design CSU11026 (CS1026)	10	Full Year Module Michaelmas & Hilary Terms	None	Switching algebra; Boolean functions; minimisation; arithmetic and other logic; asynchronous sequential logic; latches; gated latches. Flip-flops; synchronous sequential logic; finite state machines; algorithmic state machines; control paths; data paths; counters & sequencers.	Coursework; Examination	2 lectures; 1 tutorial; 2 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Introduction to Programming CSU11010 (CS1010)	10	Full Year Module Michaelmas & Hilary Terms	None	This module provides an introductory course in computer programming. The modules take a practical approach to teaching the fundamental concepts of computer programming with a strong emphasis on tutorial and laboratory work and are an important vehicle for developing student's analytical and problem-solving skills. The modules aim to give students an understanding of how computers can be employed to solve real-world problems. Specifically, the modules introduce students to the object-oriented approach to program design and teach them how to write programs in an object-oriented language (in this case Java).	Coursework; Examination	2 lectures; 1 tutorial; 4 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Algorithms & Data Structures CSU22010 (CS2010)	10	Full Year Module Michaelmas & Hilary Terms	An introductory course on programming; CS1010	This is a practical course that provides students with a solid grounding in programming using object orientation. Object Orientation, Design By Contract, Algorithms and Abstract Data Types.	Coursework; Examination	2 lectures; 1 tutorial; 3 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Intermediate Programming and Natural Language CSU22063 (CS2LL3)	10	Full Year Module Michaelmas & Hilary Terms	None, though some prior experience of programming a definite advantage, and is something participants from the CSLL degree will have from their first year Java course.	C++, parsing, finite state techniques, statistical linguistics.	Coursework; Examination	2 lectures; 1 tutorial; 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Software Applications 2 STU22001 (ST2001)	10	Full Year Module Michaelmas & Hilary Terms	ST1001	The purpose of this course is to give students experience in advanced computer applications. This will include the advanced applications of Excel. The course will introduce students to database technology using Microsoft Access. Students will use Visual Basic for Applications (MS Office 2010). This course is a computer laboratory based course. Students are given notes that encourage self-paced learning. Interaction with the course instructor and peers is encouraged.	Examination; Coursework	2 laboratory hours	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Management Science Methods STU22006 (ST2006)	10	Full Year Module Michaelmas & Hilary Terms	ST1004	Semester 1 - Formulate and solve Linear and Goal Programming problems using the Simplex Method, Perform Sensitivity Analysis on the output from a Linear and Goal Programming problem, Formulate and solve Transportation, Transhipment and Assignment problems, Formulate a 0 – 1 Linear Programming problem and solve using the Cutting Plane and Branch and Bound Methods, Analyse networks for the Chinese Postman and Travelling Salesman Problems, Other relevant mathematical models Semester 2 - Specific topics addressed in this module include: Entities, attributes and variables; Events; Resources; Queues;Steady-state models and transients; Software for simulation; Statistical analysis of output;	Examination; Continuous assessment	2 lectures; 1 tutorial	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics
Software Applications 3 STU33001 (ST3001)	10	Full Year Module Michaelmas & Hilary Terms	ST1001 – Software Applications I and ST2001 – Software Applications II	This course will introduce students to Visual Basic programming and students will use Visual Basic 2012 to learn how to build small software applications. The course will also give students experience in client server database technologies. This course will be based on various databases such as MySQL and Microsoft Access. The course will introduce students to writing database queries using SQL. HTML and PHP will be used to develop user front ends to these databases. This course is a computer laboratory based course. Students are given notes that encourage self-paced learning. Interaction with the course instructor and peers is encouraged.	Coursework; Examination	2 lectures	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics

Strategic Information Systems STU45006 (ST4500)	10	Full Year Module Michaelmas & Hilary Terms	Information Systems and Technology or equivalent	To present students with an overview of the business and social impacts of current developments in information systems (IS) and ICT. To equip students to think critically about these impacts and their implications for business and society today and in the future.	Coursework	4-6 lectures, 1 laboratory hour	Dr Inmaculada Arnedillo-Sánchez , School of Computer Science & Statistics