Stage 3 Optional Modules

CSC3121 Distributed Systems

• Module Leader: Dr P Ezhilchelvan
• Semester: 1.
• Credits: 10.
• Exam: 80%. Coursework: 20%. 2 pieces of coursework.
• Aims:
  To explain how concepts and techniques from computer networking, operating systems, and object-oriented programming can be combined to develop distributed systems. The course will cover the underlying theory of event ordering, logical and physical clocks, and then the practical aspects of distributed system structuring using the client-server approach.

CSC3122 Mobile Computer Systems Development

• Module Leader: Dr L Marshall
• Semester: 2.
• Credits: 10.
• Coursework: 100%. 3 pieces of coursework.
• Aims:
  At the end of the module students should be able to:
  • Develop software for at least one mobile platform.
  • Evaluate aspects of mobile platforms that they encounter.

CSC3123 Web Technologies

• Module Leader: Dr L Marshall
• Semester: 1.
• Credits: 10.
• Exam: 50%. Coursework: 50%. 2 pieces of coursework.
• Aims:
  To introduce students to the relevant technologies used to create modern, database-driven websites, and to enable them to start to construct such sites themselves.
  The module will provide an introduction to appropriate, current languages and their advanced features (e.g. PHP, Ruby), toolkits (e.g. Bootstrap, Foundation), template engines (e.g. Twig, Smarty), and server technologies (e.g. Apache, node.js). We will also explore advanced aspects of the HTTP protocol and issues of Client v Server implementation will be discussed.
CSC3124 System and Network Security

• Module Leader: Dr C Morisset
• Semester: 2.
• Credits: 10.
• Exam: 80%. Coursework: 20%. 1 piece of coursework.
• Aims:
  • To create awareness of the need for security in computer and communications systems, and to introduce some of the technical mechanisms by which security can be achieved.
  • By exploring topics such as the need for security, system and network security, cryptography, authentication and digital signatures, as well as the legal and political aspects of security, this module aims to create awareness of the need for security in computer and communications systems and to introduce some of the technical mechanisms by which security can be achieved.

CSC3221 Programming for Games

• Module Leader: Dr N Speirs
• Semester: 1.
• Credits: 10.
• Exam: 50%. Coursework: 50%. 2 pieces of coursework.
• Aims:
  • To introduce fundamental concepts underpinning computer games programming where optimisation is essential.

CSC3222 Gaming Simulations

• Module Leader: Dr W Blewitt
• Semester: 2.
• Credits: 10.
• Exam: 50%. Coursework: 50%. 2 pieces of coursework.
• Aims:
  • To provide students with the understanding of physics based 3D simulation.
  • To allow the students to make practical use of AI techniques for automated elements of 3D simulations.
  • To encourage students to explore recent advances in 3D simulation technologies.

CSC3223 Graphics for Games

• Module Leader: Dr G Ushaw
• Semester: 1.
• Credits: 10.
• Exam: 50%. Coursework: 50%. 2 pieces of coursework.
• Aims:
  • To introduce students to the main principles and algorithms underlying the implementation of computer graphics software.
  • To illustrate the application of such techniques.
  • To provide students with a basis for understanding the current computer graphics research literature.
CSC3224 Computer Games Development

• Module Leader: Dr W Blewitt
• Semester: 2.
• Credits: 10.
• Coursework: 100%. 2 pieces of coursework.
• Aims:
  • To introduce fundamental concepts underpinning computer games development.
  • To provide practical experience of the software engineering associated with computer games.

CSC3321 Understanding Programming Languages

• Module Leader: Prof C Jones
• Semester: 2.
• Credits: 10.
• Exam: 70%. Coursework: 30%. 1 piece of coursework.
• Aims:
  • Programming languages come and go - if you make a career in computing, there is no doubt that you will have to learn languages which do not even exist today. (In addition to literally thousands of general purpose languages, there are those tailored for specific application like virtual reality, text layout, robotics, ...Sadly, many languages embody one new idea (e.g. objects, remote execution) but are significantly "worse" than their predecessors in other respects.
  • The principal aim of this module is to communicate ways of understanding and documenting the key ideas in a language. The material should equip you to make sense of the many languages you will meet in your career. If you design new languages, they will benefit from you being able to manipulate the key concepts.

CSC3322 Real-Time and Cyber-Physical Systems

• Module Leader: Dr A Tully
• Semester: 2.
• Credits: 10.
• Exam: 80%. Coursework: 20%. 2 pieces of coursework.
• Aims:
  • To introduce students to the principles of real time and cyber-physical systems and to develop their skills in modelling and simulation of cyber-physical systems. Real time systems have to respond to external stimuli within a finite and predictable time period. Their correctness depends not only on the value of their outputs but on the time at which those outputs are produced. Cyber-physical systems consist of both discrete and continuous elements and exhibit emergent properties when brought together. This module will introduce the student to the principles of real time systems and develop their skills modelling and simulation of cyber-physical systems.

CSC3323 Software Verification Technologies

• Module Leader: Dr L Freitas
• Semester: 1.
• Credits: 10.
• Exam: 60%. Coursework: 40%. 2 pieces of coursework.
• Aims:
  • To train students with practical aspects of formal modelling and verification technology as parts of a well-founded set of tools and techniques within software engineering.
CSC3324 Understanding Concurrency

- Module Leader: Dr V Khomenko
- Credits: 10.
- Exam: 60%. Coursework: 40%. 1 assignment worth 20% and 10 weekly exercises signed off during the practical classes.
- Aims:
  - Sequential systems belong to the last millennium. Concurrent systems, on the other hand, are fast becoming ubiquitous technology of modern times, from multi-core processors to heterogeneous distributed computer networks to Web servers and services, to genetic regulatory networks, to biochemical models of living cells. All these seemingly different application areas are in fact underpinned by a unifying principle of computational processes interacting and communicating in order to achieve a common computational goal.
  - The principal aim of this module is to develop an understanding of this unifying principle and the ways in which concurrency can be modelled and harnessed to deliver correct, reliable and efficient designs. Fundamental concepts of concurrency as well as modelling techniques will be introduced using Petri nets (a graphical model extending finite state machines with concurrency). The key ideas will be further explored and reinforced through several examples of applications as well as practical work implemented using state-of-the-art modelling tools developed at Newcastle. The material should equip students with confidence based on a solid understanding of the complexity and inherent intricacies of concurrent designs, in order to successfully tackle the most advanced and challenging computing technologies which will emerge during a student’s career.

CSC3422 Website Construction and Management (Server-side)

- Module Leader: Mr M Collison
- Credits: 10.
- Exam: 60%. Coursework: 40%. 2 pieces of coursework.
- Aims:
  - This module provides an introduction to various aspects of web site management and creation. Students will learn how to set up and configure web server and database software, how to create and analyze web site log data and how to provide and maintain basic web site security. The use of web content programming environments and management and publishing systems will also be covered and students will have the opportunity to develop and build a web publishing environment using common, current, tools and systems.

CSC3423 Biologically-inspired Computing

- Module Leader: Dr J Bacardit
- Credits: 10.
- Exam: 50%. Coursework: 50%. 2 pieces of coursework.
- Aims:
  - To familiarise students with computational concepts and methods inspired by biological systems.
  - To introduce the concepts of algorithm design for biologically inspired computing.
  - To develop skills in biologically inspired algorithm design with an emphasis on solving real world problems.
  - To understand the most appropriate types of algorithms for different data analysis problems and to introduce some of the most appropriate implementation strategies.

CSC3424 Bioinformatics

- Module Leader: Dr J Bacardit
- Semester: 2.
- Credits: 10.
- Exam: 50%. Coursework: 50%. 1 piece of coursework.
- Aims:
  - To familiarise students with computational approaches to tackling biological data handling and analysis.
  - To introduce the concepts of algorithm design for molecular biology data.
  - To develop skills in algorithm design with an emphasis on solving biological problems.
  - To understand the most appropriate type of algorithms for differing analytical problems in molecular biology and to introduce some of the most appropriate implementation strategies.
CSC3621 Cryptography

• Module Leader: Dr T Gross
• Semester: 1.
• Credits: 10.
• Exam: 60%. Coursework: 40%. 3 pieces of coursework.
• Aims:
  • To introduce students to the theory and practice of block ciphers, cryptographic hash functions, public key cryptography and cryptographic protocols.

CSC3622 Reliability and Fault Tolerance

• Module Leader: Prof A Romanovsky (with teaching also by Prof T Anderson)
• Semester: 2.
• Credits: 10.
• Exam: 80%. Coursework: 20%. 1 piece of coursework.
• Aims:
  • The module provides an overview of the concepts of reliability and develops a systems approach to the design, evaluation and implementation of fault tolerance techniques in computer systems, exemplified by case studies of recent and present-day systems. Topics covered in the syllabus include: the need for reliability, system dependability concepts and terminology; fault tolerance principles; error detection and recovery; software and hardware fault tolerance; case studies from Space Shuttle, Mars and Delta-4.

CSC3721 Introduction to Human- Computer Interaction

• Module Leader: Dr M Balaam
• Semester: 1.
• Credits: 10.
• Coursework: 100%. 4 pieces of coursework.
• Aims:
  • To give a basic introduction to concepts of Human-Computer Interaction (HCI)
  • To introduce students to relevant HCI theory and history
  • To introduce students to the principles of user-centred design
  • To give students an understanding of the role of human factors in systems design
  • To provide students with an understanding of relevant interface evaluation techniques

CSC3722 Advanced Interaction Design

• Module Leader: Dr A Kharrufa
• Semester: 2.
• Credits: 10.
• Coursework: 100%. 3 pieces of coursework.
• Aims:
  • To give students an advanced understanding of Interaction Design practice.
  • To give students an understanding of relevant Design history and theory.
  • To give students an advanced skill-set in practices of Interaction Design.
  • To give students hands-on experience in prototyping interactive technologies (from lo-fi to high-fi techniques including the use of relevant development toolkits).
  • To give students experience of and to develop skills in working in collaborative design teams.
CSC3723 Ubiquitous Computing

- Module Leader: Dr M Balaam
- Credits: 10.
- Coursework: 100%. 5 pieces of coursework.
- Aims:
  - Provides a theoretical and practical understanding of advanced topics in ubiquitous computing. This module extends the basic notion of human-computer interaction and considers the principles, technologies, design and evaluation of computing when it is embedded into the everyday environment. The module will aim to provide students with an historical account of ubiquitous computing and the concepts and technologies that have driven development in this area, such as natural interaction, location-awareness and context-awareness. In addition, students will develop practical skills and experiences in building interactions with a number of cutting-edge ubicomp technologies and techniques, including interactive surfaces, tangibles and wearables.

NCL3007 Career Development for final year students

- Module Leader: Ms G Leach
- Credits: 20.
- Exam: 50%. Coursework: 50%. 2 pieces of coursework.
- Aims:
  - To develop students who can independently self-manage, proactively interact and ethically apply their knowledge and skills in a work-related context.
  - The Career Development module offers students the opportunity to undertake work-related learning in a variety of different environments, both on and off the University campus. In all cases, students will enhance their employability (see www.ncl.ac.uk/nclplus) and personal enterprise skills as well as contributing towards meeting the aims of the host organisation.

SUG3500 Creativity and Market Research in Science and Engineering

- Module Leader: Ms K Wray
- Credits: 10.
- Coursework: 100%. 3 pieces of coursework.
- Aims:
  - The module will adopt a person centred approach to developing skills for enterprise, enhancing employability and potentially developing enterprising new ventures, by creating an environment and capacity for students to develop their own business ideas. The module will consider how various skills and competencies included in the Newcastle University Graduate Skills Framework can be developed through the application of a variety of approaches to market research. Students will undertake detailed market research and compile a report to demonstrate the viability of their business idea.
  - The faculty and schools will be involved in contributing sector specific knowledge, identifying industry problems and issues and professional practice. This will link the module to the Societal Challenge themes.
  - Aims: students will undertake detailed market research and compile a report to demonstrate the viability of their business idea.
  - With the focus on research into the viability of business ideas, the module will integrate perfectly with the existing Rise Up new venture creation process, should people want to progress further research or trading with their idea.