

HARROW SCHOOL OF COMPUTER SCIENCE

Recognised as a centre of excellence for advanced IT, Harrow School of Computer Science offers an extensive portfolio of courses covering artificial intelligence, advanced human-computer interfaces, creative multimedia, computer games, business applications, computer networks and communications and network security. All courses strive to create a new type of computing specialist who, as a technological entrepreneur, can understand and contribute to emerging technologies and your markets. Courses therefore demand creative individuals with the determination to succeed.

As well as the facilities on campus, you will also benefit from 25 computer laboratories equipped with more than 600 Windows/Unix workstations, five dedicated network development and testing rooms, a fully equipped advanced multimedia laboratory with state-of-the-art Graphic workstations which support full video streaming, video and audio editing and video-conferencing.

The School has a very strong international reputation supported through its academic and research collaborations in a number of countries including Bulgaria (Technical University of Sofia), China (with collaborations in Guanzhou, Shanghai, Deliang, Harbin, Hubei and Hong Kong), Germany, Greece, Holland, India, Italy, Macau (Macau Polytechnic Institution), Nigeria and Poland.

Recognising the importance of computing in almost every other academic discipline and business application, the School works closely with fellow academic schools to meet the demands of the industry in new and exciting areas such as cognitive science and applied neuroscience, business computing and e-business, computer games and animation, IT security and Internet multimedia communications.

The School hosts a number of active research groups working at the forefront of computing in areas such as cognitive science and perception, human-computer interaction, computational linguistics, computer networks and multimedia communications, distributed and high performance systems, educational technologies, machine learning, healthcare and business computing, image processing and machine vision, and new Internet technologies. Research activities attract national and European funding as well as industrial consultancy contracts.

Modules

Harrow School of Computer Science offers modules in the areas of Artificial Intelligence and Interactive Multimedia, Computer and Network Systems, and Information and Software Systems. Please note that because of the specific nature of these subjects, you must be prepared to demonstrate previous knowledge in the subject before they can undertake certain modules and pay great attention to any pre-requisites.

Please note that the University of Westminster is unable to guarantee the availability of the modules in this catalogue. All modules are subject to change, but are as accurate as possible at the time of going to print.

Pre-requisites

As explained earlier in the module catalogue, please be aware that some modules at Level 5 and Level 6 may have a pre-requisite requirement for you to have already completed specific modules or equivalents at a lower level. This is true of the Harrow School of Computer Science, however, few pre-requisites are listed below. The reason for this is that the specialist nature of all Level 4, Level 5 and Level 6 modules at the School requires all applicants to be approved by a relevant academic regardless of student self-approval of relevant experience. To facilitate this, **all applicants are advised to submit a profile statement providing evidence of such relevant experience in the subject area to accompany your academic transcript.**

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

Module Code	Title	Semester	Level	Credits
2AIT403	AI Fundamentals	2	4	15
2COG402	Cultural Anthropology	2	4	15
2MME402	Introduction to Interactive Multimedia	2	4	15
2AIT503	Expert Systems	2	5	15
2AIT505	Knowledge Representation	2	5	15
2AIT510	Image Processing	2	5	15
2AIT516	Object-oriented Design for AI Applications	2	5	15
2MME501	Multimedia Development Tools	2	5	15
2MME506	Digital Animation	2	5	15
2MME516	Applied Sound and Music Production	2	5	15
2AIT608	Machine Learning and Data Mining	2	6	15
2AIT610	Intelligent Agents	2	6	15
2AIT614	Computer Games and Artificial Life	2	6	15
2AIT615	Evolutionary and Adaptive Computing	2	6	15
2COG612	Studies in Consciousness	2	6	15
2MME602	Advanced Human Computer Interaction Techniques	2	6	15
2MME616	Advanced Applied Sound and Music Technology	2	6	15

DEPARTMENT OF COMPUTER NETWORK SYSTEMS

Module Code	Title	Semester	Level	Credits
2CST401	Computer Organisation 2	2	4	15
2CST402	Digital Electronics	2	4	15
2CST451	Introduction to Networks and Communication	2	4	15
2CST503	Design Solutions	2	5	15
2CST504	Operating Systems Structure	2	5	15
2CST552	Java for Networks	2	5	15
2CST554	Network Operations	2	5	15
2CST555	Threats and Countermeasures	2	5	15
2CST556	Cryptography	2	5	15
2INS509	Project Management 1	2	5	15
2INS511	Systems Analysis 2	2	5	15
2INS513	Databases Systems Development	2	5	15
2CST651	Network Planning and Implementation	2	6	15
2CST653	Network Security Systems	2	6	15
2CST654	Network Simulation	2	6	15
2CST664	Multimedia Data Communications	2	6	15
2INS613	Database Management	2	6	15

DEPARTMENT OF INFORMATION AND SOFTWARE SYSTEMS

Module Code	Title	Semester	Level	Credits
2INS611	Computer Security 2	2	6	15
2INS615	Internet Server Solutions	2	6	15
2INS616	Information Systems Development	2	6	15

	with Web Technologies			
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DEPARTMENT OF BUSINESS COMPUTING

Module Code	Title	Semester	Level	Credits
2COS404	Information Fundamentals	2	4	15
2INS401	Databases Introduction	2	4	15
2INS508	E-Commerce and Intranet Systems	2	5	15
2INS608	Computer Security	2	6	15

DEPARTMENT OF ARTIFICIAL INTELLIGENCE

AI FUNDAMENTALS

Module Code 2AIT403 Level 4 Credit 15 Semester 2

This module aims to provide you with fundamental knowledge of the ways one can describe (knowledge representation, with a strong focus on Logic), search and solve real life problems. Moreover, it provides an overview of the current technology. As the name suggests, the areas where AI techniques and algorithms are used are identified.

CULTURAL ANTHROPOLOGY

Module Code 2COG402 Level 4 Credit 15 Semester 2

This module introduces the student to the discipline of Social Anthropology and in particular the areas of cultural and cross-cultural anthropology. This will form a basis for understanding the various rules, processes and meanings of cultural systems, languages and cognition in general.

INTRODUCTION TO INTERACTIVE MULTIMEDIA

Module Code 2MME402 Level 4 Credit 15 Semester 2

This module offers an introduction to tools, theory and methods of interactive multimedia, ranging from potential applications of Multimedia computing its potential influence within society to examples of techniques and including HCI.

EXPERT SYSTEMS

Module Code 2AIT503 Level 5 Credit 15 Semester 2

This module introduces you to building Expert Systems - a growing trend in capturing human expertise and representing it in a format that allows the computer to emulate the expert's problem solving process. Emphasis is given to case studies and current expert systems' shells.

KNOWLEDGE REPRESENTATION

Module Code 2AIT505 Level 5 Credit 15 Semester 2

Pre-requisites: 2AIT502 Logic Programming or equivalent

Knowledge Representation introduces alternative ways of representing advanced data structures that aim to encapsulate human knowledge.

IMAGE PROCESSING

Module Code 2AIT510 Level 5 Credit 15 Semester 2

Pre-requisites: 2COS402 Introduction to Computer Programming or equivalent

The aims of the module are to introduce the primary concepts and algorithms of digital image analysis that are of particularly relevance to 2-dimensional pattern recognition applications. Within this context you are exposed to the design and implementation of image analysis algorithms and gain practical experience in the development of pattern recognition modules.

OBJECT-ORIENTED DESIGN FOR AI APPLICATIONS

Module Code 2AIT516 Level 5 Credit 15 Semester 2

Pre-requisites: 2COS402 Introduction to Computer Programming, attempted and 2AIT515 Object-orientated Software Development or equivalent

This module applies techniques and methods of object-oriented design to large-scale, robust web applications. Typical architectures for the interaction between a user and a web application are presented and implementations are constructed using current Java technologies.

MULTIMEDIA DEVELOPMENT TOOLS

Module Code 2MME501 Level 5 Credit 15 Semester 2

Pre-requisites: 2MME402 Introduction to Interactive Multimedia

The idea of this course is to give you a solid grounding in using multimedia development tools such as Director, Author ware, Opus pro etc. The emphasis is placed on developing a strong grounding in the both the media production elements of the tools as well the scripting languages that support them. The course can be divided into two parts.

DIGITAL ANIMATION

Module Code 2MME506 Level 5 Credit 15 Semester 2

The module aims to provide you with an overview of the concepts of animation and motion graphics within the multimedia field and an opportunity to develop skills necessary in the production of appropriate animations.

APPLIED SOUND AND MUSIC PRODUCTION

Module Code 2MME516 Level 5 Credit 15 Semester 2

The module aims to introduce you to basic principles of electronic sound and music production. It teaches how to produce an appropriate sequence of sound for a specific application. The module introduces properties of sound and its relationship between physical and audible characteristics. The module also focuses on the principles and practices of methods of sound synthesis, and current sound technologies and formats.

MACHINE LEARNING AND DATA MINING

Module Code 2AIT608 level 6 Credit 15 Semester 2

Pre-requisites: 2AIT503 Expert Systems and any second year programming module covering one of the languages; Prolog, Perl, Java, C, C++. Similar languages may be permitted or equivalent

This module aims to give you a good understanding of learning applications in Artificial Intelligence. A wide variety of approaches and basic theory will be covered in this module, as well as the design and implementation of practical systems for Data Mining.

INTELLIGENT AGENTS

Module Code 2AIT610 Level 6 Credit 15 Semester 2

Pre-requisites: 2AIT515 Object-orientated Software Development or equivalent

This module will introduce a concept of Intelligent Agent, its role in the development of the contemporary AI, main agent technologies and areas of application.

COMPUTER GAMES AND ARTIFICIAL LIFE

Module Code 2AIT614 Level 6 Credit 15 Semester 2

The module introduces the concept of computer modeling of artificial life systems and of the techniques required to ensure that the systems developed provide, where required, a valid analogue of real life systems. Formal game theory is introduced and considered in the context of computer game development. The module is primarily directed towards the planning and strategy aspects of games rather than to HCI and graphics. You do however have the chance to implement a working game and for this reason programming ability is essential.

EVOLUTIONARY AND ADAPTIVE COMPUTING

Module Code 2AIT615 Level 6 Credit 15 Semester 2

Pre-requisites: 2AIT515 Object-orientated Software Development, 2COS501 Software Development or 2COS404 Information Fundamentals or equivalent

Evolutionary Computation is a new discipline whose main objective is to imitate reproduction genetics and natural selection to produce powerful global optimisation algorithms. These algorithms can be used to solve engineering problems such as parameter optimisation and combinatorial optimisation.

STUDIES IN CONSCIOUSNESS

Module Code 2COG612 Level 6 Credit 15 Semester 2

Pre-requisite: Some psychology or philosophy at degree level

Explores consciousness, drawing on knowledge from AI, Cognitive Neuroscience and Neurophysiology, and examines the implication of this for a contemporary philosophy of mind.

ADVANCED HUMAN COMPUTER INTERACTION TECHNIQUES

Module Code 2MME602 Level 6 Credit 15 Semester 2

Pre-requisites: 2AIT504 Human Computer Interaction or equivalent

The module aims to provide you with an overview of the concepts of representation within interface design and further develop your knowledge and be able to identify and understand changes in interface paradigms. The module also aims to give you skills necessary in the production of user interfaces for complex applications.

ADVANCED APPLIED SOUND AND MUSIC TECHNOLOGY

Module Code 2MME616 Level 6 Credit 15 Semester 2

The aim of this module is to build on the fundamental concepts of sound and music production, together with object oriented skill explored in earlier modules. The module also further develops knowledge and experience of audio, sequencing and multimedia programming.

DEPARTMENT OF COMPUTER NETWORK SYSTEMS

COMPUTER ORGANISATION 2

Module Code 2CST401 Level 4 Credit 15 Semester 2

Pre-requisites: 2COS406 Computer Organisation and System Software or equivalent

The aim of this module is to introduce and critically examine advanced concepts of architecture and organisation and show how these maximise performance. To enhance your ability to apply your knowledge of advanced computing concepts, computing systems operation and the relationships between system software and hardware components. Finally the module aims to introduce the basic concepts of non-instruction flow machines and show how these architectures can offer superior performance when dealing with specific types of problems in contemporary networked and distributed technologies.

DIGITAL ELECTRONICS

Module Code 2CST402 Level 4 Credit 15 Semester 2

Pre-requisites: 2COS404 Information Fundamentals or equivalent

Boolean algebra and its importance for representing and simplifying logical expressions is discussed. Graphical and tabular methods for simplifying logic equations are also covered. The synthesis of combinational logic circuits is covered using both traditional pen and paper techniques and modern computer based methods. The advantages of using programmable logic devices rather than using discrete logic is emphasised throughout.

INTRODUCTION TO NETWORKS AND COMMUNICATION

Module Code 2CST451 Level 4 Credit 15 Semester 2

Pre-requisites: 2COS404 Information Fundamentals or equivalent

The module is intended to introduce you to the concepts of computer networking and computer communications. It deals with the basics of communications and introduces the concept of protocols.

DESIGN SOLUTIONS

Module Code 2CST503 Level 5 Credit 15 Semester 2

Pre-requisites: 2COS406 Computer Organisations and System Software and 2CST401 Computer Organisation II or equivalent

The module examines the design process involved in the creation of computer-based solutions for industry and commerce. It presents a model for phasing of the necessary activities in the context of the product life-cycle and uses this as a basis for considering, for example, the reliability of a solution alongside its functionality. Methods are introduced for analysing problems and implementing solutions.

OPERATING SYSTEMS STRUCTURE

Module Code 2CST504 Level 5 Credit 15 Semester 2

Pre-requisite: 2COS501 Software Development or equivalent

The module introduces the objectives and functions of generic operating systems structure and through a gradual progression provides a framework for detailed knowledge of the structural components for multi-tasking operating systems, including distributed operating systems.

JAVA FOR NETWORKS

Module Code 2CST552 level 5 Credit 15 Semester 2

Pre-requisites: 2COS402 Introduction to Programming or equivalent

The aim of this module is to provide an introduction to the theory, design and implementation of network software. The aim of the theoretical component is to cover the concepts and facts necessary to understand internet software through an introduction to the TCP/IP model and protocols. To support the aims of designing and implementing network software, the first part of the module covers some basic aspects of the Java programming language. The remaining part of the module relies on network software based on the java.net classes. Efficient and secure design is emphasised throughout. The types of network software treated in this module are Internet applications, typically at the level of sockets: neither lower level device drivers nor higher level distributed systems (such as distributed object systems) are covered. Besides applications that use sockets directly, Web software including Applets and Servlets will be discussed.

NETWORK OPERATIONS

Module Code 2CST554 Level 5 Credit 15 Semester 2

This module begins by considering various network topologies and the components necessary to build enterprise-wide data networks (bridges, hubs, backbones etc.). The architecture of LANs and WANs is then covered before introducing the subject of integrated network management. Standards and standards forming procedures are covered also. Finally emerging applications such as multimedia and interactive video-on-demand are considered.

THREATS AND COUNTERMEASURES

Module Code 2CST555 Level 5 Credit 15 Semester 2

The module gives you an insight into the threats to computer systems and networks and the countermeasures against them.

CRYPTOGRAPHY

Module Code 2CST556 Level 5 Credit 15 Semester 2

TAUGHT AT CAVENDISH

This module, through lectures and practical activities, reviews the theory of classical and modern cryptographic systems and your use in computing, with an emphasis on the practical applications of cryptography to secure network communication and data storage.

PROJECT MANAGEMENT 1

Module Code 2INS509 Level 5 Credit 15 Semester 2

This module is an initiation to project management. It covers the general aspects that the project manager has to deal with from planning to implementation. It also considers the human resources aspect of a project as well as the communication between the project manager, the project team, the customer and the sub-contractors.

SYSTEMS ANALYSIS 2

Module Code 2INS511 Level 5 Credit 15 Semester 2

Pre-requisites: 2INS510 Systems Analysis 1 or equivalent

The aims of the module are to help you appreciate the needs of different computer users within modern information systems; and to help you to recognise the contributions which the users can make to systems design. The module also aims to enable you to specify information systems in a semi-formal way and to realize the meaning of usability and maintainability in the context of information systems design.

DATABASE SYSTEMS DEVELOPMENT

Module Code 2INS513 Level 5 Credit 15 Semester 2

Pre-requisites: 2INS512 Database Theory and Practice or equivalent

The module provides a practical approach to Database and Information System Integration. The module investigates database issues related to data aggregation, query optimisation, web database connectivity, and multi-source databases. The module investigates issues related to taxonomic data representation

NETWORK PLANNING AND IMPLEMENTATION

Module Code 2CST651 Level 6 Credit 15 Semester 2

Pre-requisites: 2CST551 Network and Communication Systems

The module is intended to provide you with an insight into the design and construction of networks, the components that comprise them and the operating systems that facilitate your function. The unit instils an understanding of the importance of specification not only of the network interface but also of the hardware components comprising both servers and workstations. The unit is also intended to allow you to gain some experience in the configuration of users and groups together with the required login scripts to allow easy administration and management.

NETWORK SECURITY SYSTEMS

Module Code 2CST653 Level 6 Credit 15 Semester 2

TAUGHT AT CAVENDISH

The module covers implementation, testing and optimisation of the various countermeasures available in order to combat some of the common threats posed to a computer networked system. Topics covered include Firewalls, Intrusion Detection systems, VPNs and Wireless Security.

NETWORK SIMULATION

Module Code 2CST654 Level 6 Credit 15 Semester 2

Pre-requisites: 2CST522 Network Software Design

The module aims to introduce you to this important route to network performance planning and evaluation. This includes considerations of modelling in general and discrete event simulation in particular.

MULTIMEDIA DATA COMMUNICATIONS

Module Code 2CST664 Level 6 Credit 15 Semester 2

Pre-requisites: 2CST451 Introduction to Networks and Communications or 2CST554 Network Operations or equivalent

This module examines the issues and applications of on-line multimedia systems and the underlying technologies. The module assesses the limitations and problems both of the technologies and the user interaction that have to be resolved.

DATABASE MANAGEMENT

Module Code 2INS613 Level 6 Credit 15 Semester 2

The module uses case studies to investigate and solve problems associated with the management of concurrent databases including database access via the World Wide Web. The module introduces security aspects associated with multiple user access of shared data.

DEPARTMENT OF INFORMATION AND SOFTWARE SYSTEMS

COMPUTER SECURITY 2

Module Code 2INS611 Level 6 Credit 15 Semester 2

Pre-requisites: 2INS514 Computer Security 1 or equivalent

The aim of this module is to introduce the advanced concepts of security within an IT/IS environment. You will be introduced to various security breaches, their causes and effects, and how these could be minimised by providing countermeasures. Risk analysis concepts are also introduced. Security standards and requirements are explored.

INTERNET SERVER SOLUTIONS

Module Code 2INS615 level 6 Credit 15 Semester 2

Pre-requisites: (2COS501, 2COS503 or 2AIT515) and (2AIT513 or 2INS508) or equivalent

Co-requisites: 2INS609, 2MME609 or equivalent

The module allows you to investigate, assess and implement a variety of sophisticated components and techniques used in the development of systems based around contemporary Internet servers. It assumes prior knowledge of general web server scripting techniques, and explores advanced features used in Internet-based server solutions. The lectures are for general guidance, and you are expected to have the capacity to develop new systems on your own after working through additional examples from reference material.

INFORMATION SYSTEMS DEVELOPMENT WITH WEB TECHNOLOGIES

Module Code 2INS616 level 6 Credit 15 Semester 2

Pre-requisites: (2COS402 or 2COS407) and 2INS510 and 2Ins512 (or equivalent)

The aim of the module is to enable you to work from industry-standard specifications to build tested database applications with a web front-end. The module puts this practical work in context by exploring important questions in software development e.g. what is the best way to validate requirements? How do we build maintainable systems? How do we achieve reuse? The module will be particularly useful to you who are undertaking your final year project, as it will strengthen your approach to the implementation and evaluation phases of the project.

DEPARTMENT OF BUSINESS COMPUTING

INFORMATION FUNDAMENTALS

Module Code 2COS404 Level 4 Credit 15 Semester 2

The purpose of this module is to give you the mathematical background and experience of relevant practical exercises to promote a better understanding of abstract and physical representation of information.

DATABASE INTRODUCTION

Module Code 2INS401 Level 4 Credit 15 Semester 2

The module provides a practical introduction to the basic concepts and terminology used in the design and implementation of data based information systems.

E-COMMERCE AND INTRANET SYSTEMS

Module Code 2INS508 Level 5 Credit 15 Semester 2

Pre-requisites: 2COS402 Introduction to Computer Programming or 2COS407 Rapid Applications Development 1 or equivalent

The module provides an introduction to the subject of E-Commerce and the use of intranets. It explores the technical aspects of Internet systems, relevant standards and protocols, security issues, and programmed browser scripts. The technical aspects are related to business use and requirements.

COMPUTER SECURITY

Module Code 2INS608 Level 6 Credit 15 Semester 2

The module will provide a theoretical understanding of Computer Security. Particular emphasis will be placed on the threat to computer security and security management. It will explore the tools available for formulating a risk assessment report.