

CATS/ERASMUS Computer Science Module List

Contents

This catalogue contains the module list for computer science within the School of Physics, Engineering, and Computer Science which is coequally referred to as SPECS. The catalogue is ordered by semester with Semester A September to January on pages 2-9. Semester B January to May on pages 10-13.

What do the module codes mean?

Each module is referred to by its identifying code consisting of an initial number (4, 5 or 6) followed by COM for computer science. The number 4 corresponds to 'Level 4' (first year modules), 5 corresponds to 'Level 5' (second year modules) and 6 corresponds to 'Level 6' (third year level modules). Some modules have duplicates in different disciplines, for example there are several project modules at level 6 in different topics.

What are the assessment types?

There are three assessment types listed for each module with the percentage weighting if the type carries weight for the module.

Coursework consists of in-session practical activities, labs, and of course written reports with a set due date.

Tests refer to in-class or in-session tests, typically involving numerical work, taken in near-exam conditions with an allocated time limit.

Examinations are the universities formal assessment type. They are organized and run independently of the module academic team to ensure academic integrity. They take place within an examination period at the end of each semester. This type of assessment may be a requirement of some exchange programs.

How many modules should I study per semester?

Normally, students study 4 modules per semester (each module is worth 15 credits). However, it is possible to study 5 modules in some cases.

If I have any questions about the modules, who should I contact?

Your first point of contact is the Study Abroad Team (studyabroad@herts.ac.uk). They will then either answer your question or pass your enquiry on to the appropriate person.



4COM2002 Introduction to Programming and Discrete Structures

On this module we aim to help you develop computational thinking and practical problem-solving skills, teach you some key concept in discrete mathematics and high-level programming, and illustrate some links between the two. Help you to apply these concepts in the modelling and solution of small-scale problems help you to develop practical programming skills sufficient to implement algorithms in Python 3, and to test and debug the resulting programs.

Module code 4COM2002
Semester A
30 Credits
Assessment Coursework 100%

4COM2004 Data Modelling for Databases

This is primarily an introductory course in databases and database design. The focus at this stage is heavily on the practical aspects of database systems design and some of the tools and techniques that support them. You will also be expected to learn Structured Query Language to allow you to build a specify a database schema, enter data into that schema and query the schema.

Module code 4COM2004
Semester A
15 Credits
Assessment Coursework 50%, Test 0%, Examination 50%

5COM1054 Algorithms and Data Structures

In this module, we will learn about how to organize data and the corresponding algorithms to solve problems, and to make them efficient even in intricate settings. We will learn about the different ways data are represented in the memory of a computer and how to make use of these representations in different circumstances. We will explore how complexity (the cost of an algorithm) is measured and how that helps us to evaluate algorithms and to decide which algorithm to use in which case. We will encounter a number of subtle and clever algorithms to implement nonobvious concepts, including heap algorithms, graph algorithms, or dynamic programming.

Module code 5COM1054
Semester A
15 Credits
Assessment Coursework 15%, Test 0%, Examination 85%

5COM2002 Accessibility and Usability

This module is concerned with usability and accessibility issues may affect the work of practitioners in the computing and technology sectors. The aims of this module are to enable students to develop their understanding of the legal, social, ethical and professional issues that pertain to accessibility and usability concerns. Deepen their own awareness of the implications of accessibility and usability problems. Practice and develop written and oral communication skills and apply these effectively in the analysis of accessibility and usability issues.

Module code 5COM2002
Semester A
15 Credits
Assessment Coursework 100%

5COM2005 Database Systems

This module is built further on the first-year Database System module, 4COM2005. Therefore, this module assumes an understanding of fundamental relational database design, implementation, and use. This module extends your understanding of database systems further, starting from some advanced SQL like - PL/SQL, trigger, etc. Teaching will be directed at both the practical design, implementation, and use of these systems as well as understanding the key advantages of each, providing an ability to compare and critique their appropriateness in a range of scenarios. In using these systems, the module will consider the limitations and appropriateness of query languages and the interaction between query languages and programming languages. The module will also provide insights into the key functional requirements of various database management systems covering topics such as Data Consistency, Transaction Management, Query Optimisation, big data, and different database systems like XML. This module will involve a large practical component, with a range of tools and case studies being utilized to develop practical skills and theoretical understanding.

Module code 5COM2005
Semester A
15 Credits
Assessment Coursework 50%, Test 0%, Examination 50%

5COM2009 Web Application Development and Deployment

In this module, you will be developing programming skills relevant to the creation of web applications; Developing skills around the commissioning, deployment and customization of a web-based content management system; Learning how to liaise with stakeholders within an organization regarding the feature sets and functionality required and proposed of a web content management system.

Module code 5COM2009
Semester A
30 Credits
Assessment Coursework 100%

6COM1033 Computer Systems Security

It is accepted that the wide development and acceptance of Internet technologies has further destabilised the fragile balance between the defenders and the attackers of computer systems. Human society is indeed dependent on vulnerable computers, controlling/hosting valuable information. In our modern, socially-driven, knowledge-centred, virtual computing era, organisations are forced to allocate considerable resources for protecting their information assets. Worldwide statistics are indicating that things do go wrong, with catastrophic results most of the times. In the last three decades, we have learned that most risks cannot be avoided. Instead we should be trying to control them, to some extent, in a practical and cost effective manner. This module will provide you with the necessary technical and theoretical knowledge needed for undertaking computer systems security assessments and full scale penetration tests.

Module code 6COM1033
Semester A
15 Credits
Assessment Coursework 100%

6COM2000 Advanced Artificial Intelligence

“The branch of computer science that is concerned with the automation of intelligent behavior”. Luger Stubblefield, 1993 In this module you will learn what (advanced) AI is; understand (advanced) AI concepts and terms; be exposed to various issues and concerns surrounding AI; also demonstrate AI in action with mini projects.

Module code 6COM2000
Semester A
15 Credits
Assessment Coursework 100%

6COM2002 Cloud Computing

In this module, you will explore the fundamental issues practical in cloud computing by applying cloud computing concepts through practical exercises To start your work, it is important to study the Module Information provided under Units, as it contains the learning outcomes, reading list, and other key information about this module. The module aims to develop insights into the principles of cloud computing and the related notion of cloud. The module provides insight into the fundamentals, futures, and capabilities of cloud computing as well as the risks, and approaches to cloud design. The module aims to differentiate the models and services typically provided by cloud computing. Evaluate the effectiveness of cloud computing for a given use case by comparing different approaches and/or providers. Undertake the practical configuration and deployment of a solution to the cloud. Be able to manage a cloud solution including data, cost, users, and security.

Module code 6COM2002
Semester A
15 Credits
Assessment Coursework 100%

6COM2006 Incident Response Digital Forensics

This is an exciting module that involves a number of practical and technical activities that will introduce you to Digital Forensics Incident Response (DFIR). This module will help you to detect how and when a security breach occurs against an information environment; be able to identify compromised systems and perform damage assessments to determine the impact of the breach as well as to contain and remediate it. The module will provide you with the skill set required to be part of an incident response team in a Computer Network Operations (CNO) environment.

Module code 6COM2006
Semester A
15 Credits
Assessment Coursework 100%

6COM2008 Internet of Things

In this module, you will explore the principles (standards, architectures, and interoperability) of Internet of Things required to configure and design the IoT network. 6COM2008 Internet of Things is a 15-credit module, and it requires around 150 hours of student effort.

Module code 6COM2008
Semester A
15 Credits
Assessment Coursework 50%, Test 0%, Examination 50%

6COM2009 Real-time and Control Systems

The aims of this module are understand the problem domain of resource-constrained computing systems and match them with adequate design solutions; understand the problem domain of dependable real-time computing and match them with adequate design solutions; appreciate the advantages of system design based on hybrid systems, which are a combination of the discrete controller with the continuous environment. ANSI C is the programming language used in this module. If you don't have experience with ANCI C, work through the link of given C programming tutorials to prepare yourself for the module.

Module code 6COM2009
Semester A
15 Credits
Assessment Coursework 100%

6COM2012 Social and Collective Artificial Intelligence

The aims of this module are to enable students to understand different ways in which intelligence goes beyond single agents. Develop theoretical and practical knowledge and understanding of AI systems/agents and their underlying algorithms, with social cognition and intelligence, i.e., with cognitive and interactional capabilities and skills allowing them to know about and interact with other agents. Develop theoretical and practical knowledge of different ways in which (groups of) AI systems/agents and their underlying algorithms can show intelligent behaviour, problem-solving and adaptive capabilities by coordinating their behaviour and acting as a collective.

Module code 6COM2012
Semester A
15 Credits
Assessment Coursework 100%

6COM2013 Software Architecture

The aims of this module are to enable students to understand the different ways to structure large software systems. Be able to design systems using common architectural patterns.

Module code 6COM2013
Semester A
15 Credits
Assessment Coursework 100%

6COM2014 Software Engineering Techniques

In this module you will study tools and techniques for software engineering, including version control; debugger; software testing; build tools; static analysis. We will develop software using C++ on Linux, but the concepts covered are applicable to any programming language or operating system you use in the future.

Module code 6COM2014
Semester A
15 Credits
Assessment Coursework 100%

6COM2015 Software Quality

In this module, you will explore both a theoretical and practical introduction to quality both in terms of the software development process and the products of that process. You will also investigate how quality can be defined and measured, and by analysing actual program code to determine its quality according to pre-determined quality metrics. In this module, we will make the following considerations: How reliable are the software systems that we build? How maintainable are they? Can we test them easily? Do they satisfy users' requirements? Are they completed on time and in budget?

Module code 6COM2015
Semester A
15 Credits
Assessment Coursework 100%

4COM2003 From Silicon To C

In this module we are concerned with how computing platforms are designed, implemented, and controlled. You will study several different levels within a layered model of computing similar to that proposed by Andrew Tanenbaum in his book *Structured Computer Organization*, and engage in a series of related problem-solving exercises. We want you to come away with a good understanding of how simple devices may be aggregated to create functional hardware platforms, and of how software is used both to control hardware platforms and to create more sophisticated platforms that could be implemented in hardware, but that would be too costly, too difficult, or too specialist in nature to make doing so worthwhile. You will explore how computing devices (such as logic gates, adders, multiplexers and registers) may be constructed from components, how a computing platform (Central Processing Unit and memory and input-output infrastructure) may be constructed from these devices, how such a platform may be programmed (in machine code, in assembly language and in C), and how it may be made to control and communicate with other devices and platforms. You will learn about a variety of computing principles and problem-solving techniques, and examine the influence of engineering considerations and technological constraints upon the design and implementation of useful computing platforms.

Module code 4COM2003
Semester AB
30 Credits
Assessment Coursework 100%

5COM2007 Principles and Practices of Large-Scale Programming

In this module, you will start the process of transforming you into a more professional programmer and software developer. In the first semester, you will improve your programming skills by exploring both advanced programming topics and issues concerning good program design; in particular, designing for maintainability and re-usability. This is a very practical module and not only will you design and implement software, but will also need to consider "re-factoring" code to improve its maintainability. In the second semester, you will be using more formal methods for requirements engineering, design and implementation. An essential component of this will be working in small teams. You will be expected to do a substantial amount of programming in Java. However, this module is more concerned with the issues of "good" program design, rather than with details of the Java programming language or its latest versions. Although "correctness" is the main feature of good software, we will be considering the features which improve the quality of software design and improving team working.

Module code 5COM2007
Semester AB
30 Credits
Assessment Coursework 100%

6COM2003 Computer Studies Technical Report

The aims of this module are to enable students to learning and skills being developed on other Level 5 and 6 modules allowing the theoretical and fundamental principles to be further developed. Apply their knowledge and skills in an unfamiliar context. Plan, produce and refine a significant technical report describing and reflecting upon the program of work undertaken. Advance their researching, planning, report-writing and presentation skills.

Module code 6COM2003
Semester AB
30 Credits
Assessment Coursework 100%

6COM2005 Data Mining and Visualisation

In this module, you will explore the different techniques of Data Mining and how to visualise the data. This is a 30-credit module, and it requires around 300 hours of student effort spread over two semesters.

Module code 6COM2005
Semester AB
30 Credits
Assessment Coursework 100%

6COM2020 Information Technology Project

The aims of this module are to enable students to undertake a complex individual project answering a real-world, Information Technology challenge. Plan, undertake and evaluate a practical solution or solutions to a suitable detailed problem, designed to extend and deepen their knowledge in this specific area relevant to their studies. Plan, produce and refine a significant technical report describing and reflecting upon the program of work undertaken to solve a real-world problem. Increase their competency and confidence in presenting to a knowledgeable audience in this domain. Advance their researching, planning, report-writing, and presentation skills.

Module code 6COM2020
Semester AB
30 Credits
Assessment Coursework 100%

6COM2017 Artificial Intelligence Project

The aims of this module are to enable students to undertake a complex individual project answering a real-world, Artificial Intelligence related problem. Plan, undertake and evaluate a practical solution or solutions to an AI problem, designed to extend and deepen their knowledge in this specific area relevant to their studies. Plan, produce and refine a significant technical report describing and reflecting upon the program of work undertaken to solve a real-world problem. Increase their competency and confidence in presenting to a knowledgeable audience in this domain. Advance their researching, planning, report-writing and presentation skills.

Module code 6COM2017
Semester AB
30 Credits
Assessment Coursework 100%

6COM2018 Computer Science Project

The aims of this module are to enable students to undertake a complex individual project answering a real-world, Artificial Intelligence related problem. Plan, undertake and evaluate a practical solution or solutions to an AI problem, designed to extend and deepen their knowledge in this specific area relevant to their studies. Plan, produce and refine a significant technical report describing and reflecting upon the program of work undertaken to solve a real-world problem. Increase their competency and confidence in presenting to a knowledgeable audience in this domain. Advance their researching, planning, report-writing and presentation skills.

Module code 6COM2018
Semester AB
30 Credits
Assessment Coursework 100%

6COM2019 Cyber Security and Networks Project

The aims of this module are to enable students to undertake a complex individual project answering a real-world, Artificial Intelligence related problem. Plan, undertake and evaluate a practical solution or solutions to an AI problem, designed to extend and deepen their knowledge in this specific area relevant to their studies. Plan, produce and refine a significant technical report describing and reflecting upon the program of work undertaken to solve a real-world problem. Increase their competency and confidence in presenting to a knowledgeable audience in this domain. Advance their researching, planning, report-writing and presentation skills.

Module code 6COM2019
Semester AB
30 Credits
Assessment Coursework 100%

6COM2021 Software Engineering Project

The aims of this module are to enable students to undertake a complex individual project answering a real-world, Artificial Intelligence related problem. Plan, undertake and evaluate a practical solution or solutions to an AI problem, designed to extend and deepen their knowledge in this specific area relevant to their studies. Plan, produce and refine a significant technical report describing and reflecting upon the program of work undertaken to solve a real-world problem. Increase their competency and confidence in presenting to a knowledgeable audience in this domain. Advance their researching, planning, report-writing and presentation skills.

Module code 6COM2021
Semester AB
30 Credits
Assessment Coursework 100%

4COM2005 Computational Problem Solving

The aims of this module are to enable students to: Build upon, and further develop, their computational thinking and practical programming skills. Broaden and deepen their knowledge and understanding of discrete structures and how they may be used in the modelling and solution of computational problems. Understand and construct proofs. Refine and enhance their practical programming skills in a high-level language (Python) to the point where they can develop their own solutions to well-specified problems.

Module code 4COM2005
Semester B
30 Credits
Assessment Coursework 100%

4COM2006 Team Software Project

The aims of this module are to enable students to: Develop employability skills through a subject related project. Work within a team to meet a prescribed collective objective. Develop and extend fundamental lifelong skills. Understand the responsibility for their actions where they affect others.

Module code 4COM2006
Semester B
15 Credits
Assessment Coursework 100%

5COM1055 Operating Systems and Networks

The aims of this module are to enable students to: consolidate understanding of operating systems and how they work by using alternative operating systems that some students have used and doing so as a system administrator rather than an ordinary user; develop their detailed understanding of computer networks, how they operate, and therefore what must be done to configure them correctly; become more familiar with the relationships between theoretical concepts and practical application in an area of computing; build their confidence in using command line tools and configuration files to work with operating systems and networks.

Module code 5COM1055
Semester B
15 Credits
Assessment Coursework 100%

5COM2003 Artificial Intelligence

The aims of this module are to enable students to have a first contact with and broad overview of the aims, scope, paradigms, notions, methods and algorithms of Artificial Intelligence. (AI) Understand the algorithms underlying key basic AI notions. Acquire basic knowledge of programming paradigms and techniques specific to AI. Program simple AI modules and systems.

Module code 5COM2003
Semester B
15 Credits
Assessment Coursework 50%, Test 0%, Examination 50%

5COM2004 Computing Things

The aims of this module are to enable students to understand low-power, low-bit-rate computing devices. To develop skills and understanding for interfacing such devices with sensors and actuators. To discuss cyber security measures available for protecting code and data for small, embedded platforms. This module can be used as a preparation for an IoT module to follow but is also a unit of learning in its own right. It will cover issues of IoT device architecture, sensors/actuators, programming, and also issues of power management and basic cyber-security of such devices. An emphasis will be placed on their practical utility with some attention paid to data gathering from the environment and the low-level interface issues that arise in this type of computing platform.

Module code 5COM2004
Semester B
15 Credits
Assessment Coursework 100%

5COM2006 Design and Configuration Project

The aims of this module are to enable students to experience teamworking on a complete, substantive, Information Technology project addressing a realistic problem; experience key aspects of the system design, management and configuration lifecycles; experience deployment and customisation of a system according to customer needs; migrate data from an existing system to a new one support the planning, evaluation, and integration of subtasks within a multi-task project.

Module code 5COM2006
Semester B
30 Credits
Assessment Coursework 100%

5COM2008 Systems and Network Administration

The aim of this module is to enable students to securely and effectively administer computer infrastructures. Have knowledge and understanding of the principles, concepts and theories of system network administration, and to explain common issues of computer infrastructures Have knowledge and understanding of the values, beliefs and ethics of system and network administration.

Module code 5COM2008
Semester B
30 Credits
Assessment Coursework 100%

6COM1040 Cyber Security

The aims of this module are to enable students to explore advanced principles in cyber security from a systems perspective; provide a further grounding in the fundamental principles underlying cyber security; introduce both theoretical and practical aspects of cyber security and operations.

Module code 6COM1040
Semester B
15 Credits
Assessment Coursework 25%, Test 0%, Examination 75%

6COM1044 Machine Learning and Neural Computing

The aims of this module are to enable students to understand and apply machine learning techniques and/or neural networks to analyse both labelled and unlabelled data; understand and use data visualisation techniques to further analyse data; understand how computational models can capture some aspects of brain function.

Module code 6COM1044
Semester B
15 Credits
Assessment Coursework 100%

6COM1047 Mobile Computing

The aims of this module are to enable students to understand the major ideas of ubiquitous computing; understand and apply the core principles of mobile development; become proficient in the coding of at least one of the major development platforms.

Module code 6COM1047
Semester B
15 Credits
Assessment Coursework 100%

6COM1048 Advanced Database Topics

The aims of this module are to enable students to understand advanced principles, techniques and theories of relational databases and apply these to other types of databases; be capable of designing, implementing and managing multi-user relational databases; gain experience of using extensions to a regular relational database in particular spatial extensions and On-line analytical extensions for data warehousing; have an awareness of where new types of database are emerging and gain practical experience in these areas.

Module code 6COM1048
Semester B
15 Credits
Assessment Coursework 50%, Test 0%, Examination 50%

6COM1050 Information Security Management

The aims of this module are to enable students to explore advanced principles in information security from a management perspective; further develop knowledge of in the fundamental principles underlying information risk and security management; understand theoretical and organisational aspects of information security management and operations.

Module code 6COM1050
Semester B
15 Credits
Assessment Coursework 100%

6COM2001 Advanced Programming Paradigms

The aims of this module are to enable students to appreciate alternative approaches to solving programming problems, using advanced paradigms; Implement solutions to practical problems using advanced programming paradigms.

Module code 6COM2001
Semester B
15 Credits
Assessment Coursework 100%

6COM2007 Intelligent Adaptive Systems

The aims of this module are to enable students to understand the notion of adaptation, its multiple forms, and its roles in natural and artificial intelligence. Develop theoretical and practical knowledge of a variety of Intelligent Adaptive Systems as AI systems. Design, implement and evaluate concrete examples of Intelligent Adaptive Systems.

Module code 6COM2007
Semester B
15 Credits
Assessment Coursework 100%

6COM2010 Responsible Computing

The aims of this module are to enable students to articulate the social, ethical and legal issues and commercial risks together with the opportunities inherent in the use of computing technologies and the deployment of computer-based systems. Have a detailed awareness of the professional issues around current computing and IT practice. Be able to produce outputs and documentation that demonstrate compliance with legal, ethical and professional standards and principles of ethical design.

Module code 6COM2010
Semester B
15 Credits
Assessment Coursework 100%

6COM2011 Robotics

The aims of this module are to enable students to develop knowledge of control architectures for intelligent robotics. Gain an understanding of the core elements that underpin the design and implementation of cognitive robotic architectures. Explore how robot and AI based control architectures can be implemented in an appropriate programming language.

Module code 6COM2011
Semester B
15 Credits
Assessment Coursework 100%