

PROGRAMME SPECIFICATION

Course record information

Name and level of final award:	BSc (Hons) Computer Science with Industrial Experience The BSc (Hons) Computer Science is a B.Sc. Honours degree that is Bologna FQ-EHEA first cycle degree or diploma compatible
Name and level of intermediate awards:	BSc Computer Science Diploma of Higher Education in Computer Science Certificate of Higher Education in Computer Science
Awarding body/institution:	University of Westminster
Teaching Institution:	University of Westminster
Status of awarding body/institution:	Recognised Body
Location of delivery:	Central London (Cavendish)
Language of delivery and assessment:	English
Mode, length of study and normal starting month:	3 years full time or 4 years full-time with industry placement
QAA subject benchmarking group(s):	QAA subject benchmark for Computing British Computer Society guidelines on accreditation
Professional statutory or regulatory body:	This programme is accredited by the British Computer Society (BCS)
Date of course validation/review:	February 2015
Date of programme specification approval:	December 2015
Valid for cohorts:	2016/17 for levels 4 and 5, 2017/18 for levels 4,5 and 6
Course Leader:	Dr Philip Trwoga
UCAS code and URL:	http://www.westminster.ac.uk/courses/undergraduate

What are the minimum entry requirements for the course?

There are standard minimum [entry requirements](#) for all undergraduate courses. Students are advised to check the standard requirements for the most up-to-date information.

westminster.ac.uk/courses/undergraduate/how-to-apply

For most courses a decision will be made on the basis of your application form alone. However, for some courses the selection process may include an interview to demonstrate your strengths in addition to any formal entry requirements.

More information can be found here: westminster.ac.uk/courses/undergraduate/how-to-apply

Aims of the course

The BSc Computer Science degree has been designed to:

1. Provide students with knowledge and understanding of the fundamental principles and technologies that underpin the discipline of computing;
2. Give students technical expertise in computer science and practical experience enabling them to be effective in a varied and fast-developing range of careers in computing;
3. Provide students with sound knowledge of software engineering principles across the whole software development lifecycle;
4. Provide students with the knowledge and practical use of industry tools and techniques to develop software applications;
5. Provide the ability to apply this knowledge and skills to a range of practical situations to resolve business and technical problems and to encourage a disciplined and professional attitude towards the development of such systems;
6. Provide a motivating and inclusive environment with the opportunity to develop themselves intellectually and socially and to encourage students to develop as independent and self-critical problem solvers;
7. Prepare students for continued study at an advanced level, either in formal postgraduate study or as continued professional development.

What will you be expected to achieve?

Learning outcomes are statements on what successful students have achieved as the result of learning. These are threshold statements of achievement the learning outcomes broadly fall into four categories:

- The overall **knowledge and understanding** you will gain from your course (KU).
- **Graduate Attributes** are characteristics that you will have developed during the duration of your course (GA). The course is designed to help students to be: critical and creative thinkers, global in outlook and community engaged, a literate and effective communicator, socially, environmentally and ethically aware.
- **Professional and personal practice learning outcomes** are specific skills that you will be expected to have gained on successful completion of the course (PPP).
- **Key transferable skills** that you will be expected to have gained on successful completion of the course (KTS).

In following list of Learning Outcomes, L4 refers to your first year of study, L5 refers to your second year of study, and L6 refers to your final year of study. Each statement in the list describes a course learning outcome (statement of achievement) and its associated domain as described in the table below.

Code	Domain	Description
C	Client-User Focussed	Associated with the user interface and usability of systems. Focussed on the client component of systems.
D	Data	Relates to knowledge and application of the processing and storage of information.
M	Maths	Relates to mathematical skills and knowledge.
O	Operating Environment	Relates to knowledge and understanding of the environment in which users run application software.
P	Programming	Relates to programming and development skills.
S	Skills	Relates to professional and practical skills.

For example: **L4-C-LO1-CS**

L4, this at level 4 (first year)

C, it relates to the Client-User domain

LO1, learning outcome 1

CS, the course code i.e. Computer Science.

Level 4 learning outcomes

Upon completion of level 4 you will be able to:

L4-C-LO1-CS - Use appropriately the client-server architecture with respect to client design and security implications.

L4-D-LO2-CS - Methodically capture user requirements and create a specification that meets them.

L4-D-LO3-CS - Describe, create and manipulate simple data collections through their underlying representation.

L4-M-LO4-CS - Analyse small scale problems and design their solutions by applying algorithmic and mathematical techniques.

L4-M-LO5-CS - Apply core mathematical elements to solve algorithmic problems.

L4-O-LO6-CS - Describe the structure of a computing system, the design of its basic components and explain the interactions of hardware and software components.

L4-P-LO7-CS - Apply programming principles and constructs to implement solutions to small scale problems.

L4-S-LO8-CS - Recognise and explain behaviour constraints of a professional code of conduct towards third parties in a Computer Science working environment.

L4-S-LO9-CS - Following guidance, review literature in Computer Science and present in written and oral form own work and learning, critically comparing, contrasting and evaluating the findings.

Level 5 learning outcomes

Upon completion of level 5 you will be able to:

L5-C-LO1-CS - Identify, evaluate, and improve on interface issues between human users and computer systems using multiple platforms.

L5-C-LO2-CS - Identify and explain security risks and their implications for computer systems.

L5-D-LO3-CS - Demonstrate how information is modelled, persistently stored, manipulated and retrieved, as data, to serve scalable solutions to medium-scale object-oriented problems.

L5-D-LO4-CS - Employ a standard design language for the design, representation and formal specification of software.

L5-M-LO5-CS - Demonstrate competency in object-oriented design and algorithmic and mathematical approaches to solve medium scale problems.

L5-M-LO6-CS - Successfully plan and execute a medium-scale software project with appropriate software engineering principles.

L5-O-LO7-CS - Explain the basic principles of modern operating systems and how they serve operational needs.

L5-P-LO8-CS - Utilise, compare and contrast software frameworks and architectures and implement solutions using object-oriented programming.

L5-S-LO9-CS - Demonstrate professional responsibility in the development of quality computer science solutions in a global context and the presentation and defence of these in multiple communication forms, supported by methodical research.

L5-S-LO10-CS - Demonstrate professional responsibility in the development of quality computer science solutions in a global context and the presentation and defence of these in multiple communication forms, supported by methodical research.

Level 6 learning outcomes

Upon completion of level 6 you will be able to:

L6-C-LO1-CS - Identify and appraise the main threats to computer systems and networks security and integrity.

L6-D-LO2-CS - Appropriately analyse and design large scale data systems to serve the retrieval and/or decision making needs of computer systems and their clients.

L6-M-LO3-CS - Methodically and independently develop requirements to a solution for a large scale software problem using appropriate languages and tools.

L6-P-LO4-CS - Implement a comprehensive technical solution to an advanced problem using appropriate programming languages.

L6-S-LO5-CS - Demonstrate complete handling of the full life-cycle of a computer science project underpinned by an entrepreneurial approach and a focus on the needs of real clients and the wider society.

L6-S-LO6-CS - Apply appropriate research methodologies in carrying out independent research in computer science and produce a report demonstrating evidence of critical thinking.

How will you learn?

Your course is a collection of learning opportunities. Using these opportunities will help you mature in attitude and competence, preparing you for your future career and life in general. Learning in your course is a partnership: expert University staff will guide you through the necessary core knowledge of your subject and help you develop an understanding, while you, increasingly, take the leading role in pursuing the learning that meets your specific needs.

Your course is organised into a number of **modules** at each level. These are the building blocks of your course. Each module consists of a number of learning activities over a number of weeks designed to help you achieve the knowledge and skills related to a particular area within your subject.

The principal aim of your course is to equip you for professional life, or higher study, relevant to your current programme of study.

To prepare you for this, the learning in your course will not take place only in the class. Your learning will use four methods, each supporting the others:

- **Lectures** will give you access to expertise and present you with the knowledge you need in your subject.
- **Practical tutorial or laboratory sessions** will allow you to understand, apply and strengthen your skills under the guidance of a tutor.
- **Independent study time** will let you take more control of your own learning and give you the framework that will help you to keep on learning without supervision.
- **Personal development** will allow you to complement your knowledge with the specific specialised skills that meet your individual needs.

In your first year of study (called **Level 4**) you will make the full transition into Higher Education. You will develop the key core skills for Computer Science complemented with the foundations of your specific course or cognate area. To help this transition your course has additional classes and support sessions at this level that you will need to fully engage with so you can prepare for the advanced study that follows.

Your second year of study (**Level 5**) will help you develop some autonomy. At this level you will develop detailed knowledge in Computer Science and will be able to deal with more areas by yourself and in teams, reflecting on your own strengths and identifying areas to specialise in. Following that level you may choose to have a year in industry (a **placement year**) to strengthen your understanding of industry needs through direct application of your evolving skills.

In your final year of study (**Level 6**) you will have learned to work autonomously with your lecturers increasingly being there to support you and challenge your thinking; this is the level that completes your preparation for going into industry and further study, with an ability to handle the complexity of large-scale systems and environments and with full control of your further development needs.

Throughout all levels of your course you will also develop necessary, distinct, attributes that will help you compete effectively in a global changing environment.

The Graduate Attributes (GA) are developed throughout the course through the knowledge and professional skills modules, and are intended to ensure that you have a deep knowledge of the subject area, you are critical and creative thinkers, are professional, socially, ethically and environmentally aware, global in outlook and community engaged, and a literate and effective communicator. The tables below maps these key attributes to the core course modules.

How will you be assessed?

As your learning continues it is important to stop every now and then and take stock of how much you learn so that you know where you are and how much more you still need to cover. In your course, assessment and feedback are the key elements in measuring learning. Assessment in your course has two functions: formative assessment is assessment that lets you see where you are in your learning and what you have learned so far, while summative assessment measures how much you have learned in a way that contributes to your overall grades.

You will undertake a **wide variety of assessment tasks** as you progress through your degree course. Their nature will vary according to your level and the nature of the task. Some, such as group work, will help you to develop practical skills alongside the more specific skills that are being assessed. You will write essays and research reports, and learn to write in a style suitable to a piece of academic work, and to make proper use of references and bibliographies.

Other forms of assessment will include practical exercises ranging from small tasks that might be completed in a tutorial, to something more complex like designing and writing a larger computer program. There will be some formal examinations (usually at the end of each academic year). Some of the work will be completed individually, and sometimes you will work with other students as part of a team, emulating as close as possible the environment you will face in your later life in industry.

Many assessments will be based on real-life scenarios typically found in the software industry. This might include client requirement elicitation, extracting hard software requirements from given business requirements, then designing and implementing a solution.

All assessments that contribute to your final grades will be assessed against set criteria, following rigorous quality mechanisms that ensure our academic judgement remains fair and consistent with the wider educational sector. Typically, assessment tasks will become longer, and more self-managed, as you get into the second year and the final year of your course and they will have less detail in guidance and more room for you to innovate through your own decisions informed by your own research in your specialist areas. **Assessment is designed to be a learning experience in itself** and will help you make that transition from small practical exercises to more complex piece of work towards the substantial, year-long, project of your final year.

To help you see how different areas connect with each other you will have in some cases tasks that assess the outcomes from different modules in one complex piece of work. These are called **synoptic assessments**. Examples of synoptic assessment for your course include the Group Project at level 5 and the individual project at level 6.

Throughout your learning you will get feedback. **Feedback** will help you reflect on what you have learned so you can identify the areas in which you are strong and the areas in which you need to learn more. Feedback will be given to you in response to assessment, in response to questions in lectures, seminars and tutorials, and in guidance you get during supervision. But feedback will also come from your interactions with other students and with industry. All feedback will be useful to help you guide your learning so that you develop the right skills faster.

Employment and further study opportunities

University of Westminster graduates will be able to demonstrate the following five Graduate Attributes:

- Critical and creative thinkers
- Literate and effective communicator
- Entrepreneurial
- Global in outlook and engaged in communities
- Social, ethically and environmentally aware

University of Westminster courses capitalise on the benefits that London as a global city and as a major creative, intellectual and technology hub has to offer for the learning environment and experience of our students.

The BSc Computer Science course aims to create high quality graduates who have a strong focus on solving real-world problems, will have adaptability and maturity, and have a strong foundation of knowledge and the technical capability to be able to immediately contribute to their workplace environment. Graduates of the BSc Computer Science course will have been taught and utilised industrial tools and techniques and will be versed in all aspects of the software lifecycle. As well as having a solid background in computer science, graduates from the course shall also have one or more specialisms that open up career pathways during their early years as a computing professional. Graduates shall be independent thinkers, lifelong learners and be able to analyse, critically reflect, and be able to confidently and effectively communicate. Graduating from this accredited course where professional skills and practice are embedded, graduates shall be able to meet the required professional and ethical standards expected in the modern workplace. Graduates shall also be capable and prepared for the broadening their knowledge by undertaking Masters level study or higher.

Graduates would typically be part of a team designing, implementing and or maintaining sophisticated distributed applications. The actual role within the team may be, for example, designer, programmer, systems administrator or systems analyst. Other types of roles possible are in computer science research in a commercial company or academic institution.

Course structure

This section shows the core and option modules available as part of the course and their credit value. Full-time Undergraduate students study 120 credits per year. Course structures can be subject to change each academic year following feedback from a variety of sources.

Modules are described as:

- **Core** modules are ones that must be undertaken by all students on the course.
- **Option** modules are related to your specific course
- **Faculty electives** are modules offered by the faculty
- **Westminster electives:** are modules from across the whole University which allow you to broaden your experience.

The list below shows the core and option modules that are available as part of the course and their credit value. A *core* module is one that must be attempted to gain the award of BSc Computer Science. In addition to the core modules, a student can take up to 2 free choice modules, either 2 options or 1 option + 1 elective, at both level 5 and 6. Therefore a student can choose either 2 subject specific options or 1 subject specific option plus one elective option. The subject specific option modules are grouped to form a set of cognate areas as shown below; however, these do not result in any specific named awards. Students are not required to take option modules from just one specific cognate area and are free to choose modules from all cognate areas (timetable dependent).

The School organises module information sessions where advice is given to students regarding their module choices and cognate areas. Student can also seek advice from their personal tutor and other academics concerning their choice.

Some, but not all, of these modules will have to be taken to gain the award of BSc Computer Science. The course specific regulations give full details of what must be taken and passed in order to gain an award.

BSc Computer Science – Core Modules

Credit Level 4 - Core				
Module code	Module title	Status	UK credit	ECTS
4COSC003W	Computer Science Practice	Core	20	10
4COSC004W	Computer Systems Fundamentals	Core	20	10
4COSC001W	Programming Principles I	Core	20	10
4COSC011W	Web Design and Development	Core	20	10
4ELEN010W	Mathematics for Computing	Core	20	10
4COSC005W	Programming Principles II	Core	20	10
Award of Certificate of Higher Education available				
Credit Level 5 - Core				
Module code	Module title	Status	UK credit	ECTS
5COSC001W	Object Oriented Programming	Core	20	10
5COSC004W	Client-Server Architectures	Core	20	10
5COSC003W	Software Development Group Project	Core	20	10
5COSC002W	Database Systems	Core	20	10
Award of Diploma of Higher Education available				
In addition the module Computer Science Placement is core for those undertaking the Industrial Placement year				
Credit Level 6 - Core				
Module code	Module title	Status	UK credit	ECTS
6COSC006W	Final Year Project	Core	40	20
6COSC002W	Security and Forensics	Core	20	10
6COSC001W	Enterprise Application Development	Core	20	10

BSc Computer Science – Cognate Area Option Modules (at each level you can pick 2 options or 1 option and 1 elective)

Credit Level 5 – Options - Mobile and Web Computing				
Module code	Module title	Status	UK credit	ECTS
5COSC005W	Mobile Application Development	Option	20	10
5COSC006W	Server-side Web Development	Option	20	10
5COSC015W	Advanced Client-side Development	Option	20	10
Credit Level 6 – Options - Mobile and Web Computing				
6COSC004W	Mobile Native Application Development	Option	20	10
6COSC005W	Advanced Server-side web Programming	Option	20	10
6COSC003W	Web Intelligence	Option	20	10

Credit Level 5 – Options – Games and Computer Graphics Development				
Module code	Module title	Status	UK credit	ECTS
5CCGD003W	3D Graphics Programming	Option	20	10
5CCGD002W	Applied Maths and Physics	Option	20	10
5CCGD004W	Game Engine Architecture	Option	20	10
Credit Level 6 – Options – Games and Computer Graphics Development				
6CCGD002W	Advanced Maths and Game AI	Option	20	10
6CCGD003W	Networked Games and Security	Option	20	10

Credit Level 5 – Options – Software Engineering				
Module code	Module title	Status	UK credit	ECTS
5CCGD003W	3D Graphics Programming	Option	20	10
5SENG001W	Algorithms: theory design and implementation	Option	20	10
Credit Level 6 – Options – Software Engineering				
6SENG002W	Concurrent Programming	Option	20	10
6COSC003W	Web Intelligence	Option	20	10

Credit Level 5 – Options – Multimedia Computing				
Module code	Module title	Status	UK credit	ECTS
5MMCS002W	Usability Testing	Option	20	10
5MMCS001W	3D Interactive Media Development	Option	20	10
Credit Level 6 – Options – Multimedia Computing				
6MMCS002W	Digital marketing, Social Media and Web Analytics	Option	20	10
6MMCS001W	Mobile User Experience	Option	20	10
6MMCS004W	Advanced Interactive Media Development	Option	20	10

Credit Level 5 – Options – Business Information Systems				
Module code	Module title	Status	UK credit	ECTS
5BUIS003W	Information Technology Security	Option	20	10
5BUIS002W	Business Analytics	Option	20	10
Credit Level 6 – Options – Business Information Systems				
6BUIS002W	Information Driven Entrepreneurship and Enterprise	Option	20	10
6BUIS001W	Business Intelligence	Option	20	10

Please note: Not all option modules will necessarily be offered in any one year.

Professional Body Accreditation or other external references

Reference points for the course

Internally

University Teaching and Learning policy statements,
University Quality Assurance Handbook and Modular Frameworks, staff research.

Externally

QAA Subject Benchmark statements,
Professional, Statutory, Regulatory Body requirements/guidance, University and SEEC (credit consortium) level descriptors.

Professional body accreditation

British Computer Society (BCS) Criteria.

Academic Regulations

The current Handbook of Academic Regulations is available at westminster.ac.uk/academic-regulations

How will you be supported in your studies? Course Management

The BSc (Honours) Computer Science course is under the Department of Computer Science and the management structure supporting the course is as follows:

- Dr Philip Trwoga, Course Leader is responsible for day to day running and overall management of the course and development of the curriculum
- Dr Alexandra Psarrou, Head of Department, holds academic responsibility for the course and other courses within the Department
- Professor Jane Lewis, Dean of Faculty, holds overall responsibility for the course, and for the other courses run by the Faculty

Academic Support

Upon arrival, an induction programme will introduce you to the staff responsible for the course, the campus on which you will be studying, the Library and IT facilities, additional support available and to your Faculty Registry Office. You will be provided with the Course Handbook, which provides detailed information about the course. Each course has a course leader or Director of Studies. All students enrolled on a full-time course and part time students registered for more than 60 credits a year have a personal tutor, who provides advice and guidance on academic matters. The University uses a Virtual Learning Environment called Blackboard where students access their course materials, and can communicate and collaborate with staff and other students

Learning Support

The Academic Learning Development Centre supports students in developing the skills required for higher education. As well as online resources in Blackboard, students have the opportunity to attend Study Skills workshops and one to one appointments.

Learning support includes four libraries, each holding a collection of resources related to the subjects taught at that site. Students¹ can search the entire library collection online through the Library Search service to find and reserve printed books, and access electronic resources (databases, e-journals, e-books). Students can choose to study in the libraries, which have areas for silent and group study, desktop computers, laptops for loan, photocopying and printing services. They can also choose from several computer rooms at each campus where desktop computers are available with the general and specialist software that supports the courses taught at their Faculty. Students can also securely connect their own laptops and mobile devices to the University wireless network.

Support Services

The University of Westminster Student Affairs department provide advice and guidance on accommodation, financial and legal matters, personal counselling, health and disability issues, careers, specialist advice for international students and the chaplaincy providing multi-faith guidance. The University of Westminster Students' Union also provides a range of facilities to support students during their time at the University.

How do we ensure the quality of our courses and continuous improvement?

The course was initially approved by a University Validation Panel in 2009. The panel included internal peers from the University, academic(s) from another university and a representative from industry. This helps to ensure the comparability of the course to those offered in other universities and the relevance to employers.

The course is also monitored each year by the Faculty to ensure it is running effectively and that issues which might affect the student experience have been appropriately addressed. Staff will consider evidence about the course, including the outcomes from Course Committees, evidence of student progression and achievement and the reports from external examiners, to evaluate the effectiveness of the course. Each Faculty puts in to place an action plan. This may for example include making changes on the way the module is taught, assessed or even how the course is structured in order to improve the course, in such cases an approval process is in place.

A Course review takes place periodically to ensure that the curriculum is up-to-date and that the skills gained on the course continue to be relevant to employers. Students meet with review panels to provide feedback on their experiences. Student feedback from previous years e.g. from Course Committees is also part of the evidence used to assess how the course has been running.

How do we act on student feedback?

Student feedback is important to the University and student views are taken seriously. Student feedback is gathered in a variety of ways.

- Through Course Committees students have the opportunity to express their voice in the running of their course. Student representatives are elected to Committee to expressly represent the views of their peer. The University and the Students' Union work together to provide a full induction to the role of the student representatives.
- Each Faculty also has its own Faculty Student Forum with student representatives; this enables wider discussions across the Faculty. Student representatives are also represented on key Faculty and university committees.
- All students are invited to complete a questionnaire before the end of each module. The feedback from this will inform the module leader on the effectiveness of the module and highlight areas that could be enhanced.
- The University also has an annual Student Experience Survey which seeks the opinions of students about their course and University experience. Final year undergraduate students will be asked to complete the National Student Survey which helps to inform the national university league tables.

¹ Students enrolled at Collaborative partners may have differing access due to licence agreements.

Please note: This programme specification provides a concise summary of the main features of the course and the learning outcomes that a student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided. This specification should be read in conjunction with the Course Handbook provided to students and Module Handbooks, which provide more detailed information on the specific learning outcomes, content, teaching, learning and assessment methods for each module.

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