UNIVERSITY OF WESTMINSTER

LEADING THE WAY

PROGRAMME SPECIFICATION
Course record information

Name and level of final award:	B.Sc. (Hons) Computer Games Development is a B.Sc. Honours degree that is Bologna FQ-EHEA first cycle degree or diploma compatible.
Name and level of intermediate awards:	BSc in Computer Games Development Diploma in Higher Education (Dip HE) in Computer Games Development Certificate in Higher Education (Cert. HE) in Computer Games Development
Awarding body/institution:	University of Westminster
Status of awarding body/institution:	Recognised body
Location of delivery:	Central London (Cavendish)
Language of delivery and assessment:	English
Course/programme leader:	Dr Li Jin
Course URL:	http://www.westminster.ac.uk/courses/subjects/multimedia-and-games-computing/undergraduate-courses/full-time/u09fucgd-bsc-honours-computer-games-development
Mode and length of study:	3 years full-time 4 years full-time sandwich
University of Westminster course code:	U09FUCGD
JACS code:	G490
UCAS code:	GG46
QAA subject benchmarking group:	Computing
Professional body accreditation:	British Computer Society (BSC)
Date of course review:	November 2013
Date of programme specification:	November 2013

Admissions requirements
Current University Requirements:
Level 4 entry: 240 UCAS points (A2 - CCC)

Aims of the course
Computer games pose greater challenges than conventional software projects due to complexities in production, evaluation, and platform. Computer game development is a

multidisciplinary sector which bridges over computer systems, software engineering, digital content creation and human computer interaction. The game industry is still expanding and continually evolving and exploiting cutting-edge technologies. Thus it requires practitioners to exercise more flexibility in software specifications and functionality through adapting their approaches to design and team management while keeping abreast of broad changes to technology. This course covers major aspects of the computer games development process, from game programming to game design and production, with emphasis on the sound understanding of game technologies and the required technical skills for the new era of game developers. The course aims to prepare students for a career in software development with a particular emphasis on computer games development. To support this aim, the course is structured around a thorough knowledge of programming, computer graphics and mathematical principles and practice, together with an appreciation of the industrial environment. Students will study both the theoretical grounding and the practical skills needed in the game industry. Meanwhile, they are also encouraged to explore related subject areas by taking optional modules that expand a broad range of knowledge and skills including mobile and web application development. The course also offers a number of talks from key industry organisations as well as visits to computer shows and fairs. Students are strongly supported to find industrial placements and internships.

Upon completion of the course students will be expected to gain a software developer role in the games industry and wider creative industry. However, since the games industry relies on the work of multidisciplinary groups, a range of design, production and management modules is involved in the course structure. As an integrated course of programming and design, it offers diverse career opportunities in well-established game companies as well as small and medium sized game studios. Additionally, the skill set gained fully prepares graduates for other software career within general computing sectors.

The course aims:

- To provide students with a comprehensive knowledge and understanding of the theories and technologies that underpin the discipline of computing with emphasis on the technical skills required in computer games development.

- To equip students with a solid knowledge and understanding of software development principles across the whole game production procedure.

- To foster strong programming in mainstream languages as well as high level languages, content management and architectural design skills required in modern computer game systems.

- To provide students with a full game development experience, from concept to software design to final implementation by incorporating industry software tools, game engines and APIs.

- To 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.

- To prepare graduates with professional attitudes, interpersonal and entrepreneurial skills required in the industry.

- To prepare graduates with awareness, knowledge and practical skills in the field of computer games for continued study at an advanced level in either formal postgraduate study or as continued professional development.

Employment and further study opportunities

The computer games industry, expending from PCs to consoles, to portable devices like mobile phones and tablets, has grown rapidly in recent years and is now a multi-billion pound global industry. The course is designed to prepare motivated graduates with sound technical skills and creativity to adapt their abilities with the evolving technology and develop a range of careers within the wider industry including games programmers, game designers, game producers, and software developers. Our graduates, with the continuous support and guidance from the member of staff over the years, have been successful in participating in various international and national competitions (e.g. "Dare to be digital", "Brains Eden", "GamesJam"), gaining internships and placements, and securing jobs roles in both well known companies and SMEs including Microsoft, Sony, We R Interactive, TT Games Publishing and Traveller's Tales, Portable Pixels, Slitherine Software UK Ltd., etc.

Because of the achievements of Westminster's graduates already in the software engineering profession, the Computer Games Development degree from Westminster has become a highly respected qualification. The University of Westminster is committed to developing employable graduates by ensuring that:
- Career development skills are embedded in all courses
- Opportunities for part-time work, placements and work-related learning activities are widely available to students
- Staff continue to widen and strengthen the University's links with employers in all sectors, involving them in curriculum design and encouraging their participation in other aspects of the University's career education and guidance provision
- Staff are provided with up-to-date data on labour market trends and employers' requirements which will inform the service delivered to students.

Computer Games is a very promising industry with high profits, with UK the largest video game market in Europe and the third largest in the world. On graduating graduates would typically take up posts associated with software design and implementation. Other than games development, opportunities exist in fields as diverse as New Media, finance, IT services. In addition, the course will encourage and support graduates to pursue research/further study including Masters degree and PhD study in Computer Science and related disciplines.

Learning outcomes

Learning outcomes are statements on what successful students have achieved as the result of learning. These threshold statements of achievement and are linked to the knowledge, understanding and skills that a student will have gained on successfully completing a course.

Knowledge and Understanding (Level 4)

Year 1 modules provide an underpinning of the subject area. Students are introduced to software development principles and programming, the computer system design, and essential maths for game development. These subjects are accompanied by a year-long games group project that explores fundamentals of games development, game design and production, and other essential issues e.g. creativity and playability through a group working for a simple game prototype.

By the end of level 4 students should be able to:

K1   Confidently plan, design and implement algorithms using fundamental procedural programming constructs;

K2 Design and represent the flow of a simple computer programme in a standard design language;

K3 Describe and use the basic concept of classes and objects in computer programs;

K4 Describe the structure of a computing system, the design of its basic components and explain the interactions of hardware and software components;

K5 Manipulate data and data representation through logical and numerical techniques;

K6 Describe the file architecture and organisation of a web site;

K7 Apply appropriate mathematical techniques in computer science and games programming;

K8 Describe the main ethical, social, legal and professional issues in computer games industry and other digital creative industry;

K9 Design and implement 2D games using object oriented principles and game assets creation and management;

K10 Apply problem solving methodology to address simple problems in computer game and other interactive computer systems ;

K11 Demonstrate knowledge of the issues related to games design and programming and the ability to work in multi-disciplinary teams for the production of game prototypes.

Subject specific and practical skills (Level 4)

By the end of level 4 students will be able to:

S1 Describe the fundamental principles of the key components of computer science with the appropriate terminology;

S2 Use standard techniques to analyse, design and test key aspects of computer hardware and software systems that are fundamental to understanding the main concepts in computer science;

S3 Apply game theory fundamentals to the comprehension and evaluation of game prototypes;

S4 Understand the use of basic computer software enabling simple games prototypes and artwork to be created;

S5 Analyse problems and design and develop solutions within a gaming environment;

S6 Utilise a range of widely used computing applications and identify implications with their use;

S7 Apply numerical skills to the solutions of game problems;

Transferable skills (Level 4)

By the end of level 4 students will be able to:

T1 Carry out a literature research on a given topic, with guidance, using a range of resources;

T2 Apply computer science principles to relevant case studies;

T3 Apply numeracy to quantitative problems;

T4 Integrate game theory with the appropriate technologies;

T5 Evaluate and reflect on their own strength and weaknesses, with guidance;

T6 Manage time and resources;

T7 Communicate effectively using various media and with a variety of audiences;

T8 Recognise the implications of working in a group;

T9 Participate in a mini professional practise project and understand the variety of roles and responsibilities held by the principle team members of a computer games project;

T10 Demonstrate competence in technical and academic writing and presentation;

Knowledge and Understanding (Level 5)

In Year 2 you continue to develop your programming skills by designing and implementing 2D game prototypes using C++ programming and game engines. You are also introduced to 3D graphics programming and real-time graphics. The maths becomes more advanced and games physics required in the games programming are introduced. Other subjects covered include professional practice for games, a mini professional games proposal and prototype which can be used as part of your games portfolio if you decide to undertake the placement year, algorithms and data structures, and optional modules on mobile and web programming.

By the end of level 5 students will be able to:

K12 Demonstrate competency in Object Oriented Programming methodologies related to computer games industry by developing 2D game;

K13 Explain and demonstrate how data is persistently stored, manipulated, and retrieved in object-oriented software development;

K14 Research, analyse and critically understand the factors responsible for efficient games playability, design and longevity;

K15 Practically apply these concepts, issues and methods in the production of games prototypes;

K16 Identify the main roles and responsibilities of a professional software engineer;

K17 Apply the principles of algorithm and data structure design in the implementation of algorithms;

K18 Employ knowledge of software engineering principles to successfully plan and execute a software project;

K19 Demonstrate knowledge of 3D graphics programming;

K20 Demonstrate knowledge of the execution mechanism and processing pipelines used in gaming hardware and real-time graphics;

K21 Use mathematics and the physics underlying the implementation of games engines effectively;

K22 Discuss ethical, social, legal and professional issues in computer games development;

K23 Prepare the students for work placement in the fields of games programming and other related fields.

Subject specific and practical skills (Level 5)

By the end of level 5 students should be able to:

S1 Assess the requirements and solutions for a given computer games task;

S2 Apply computing principles to the comprehension and evaluation of advanced game technologies;

S3 Prepare and interpret system problems specifications and reports;

S4 Utilise a range of software tools and APIs across a variety of computer games applications;

S5 Work in groups and make direct contact with industry through portfolio drop-offs, interviews with game directors or job applications;

Transferable skills (Level 5)

By the end of level 5 students should be able to:

T1 Report on actions critically, clearly, autonomously and competently;
T2 Have independent learning ability required for continuing professional study;
T3 Interact effectively within a team or group, planning, collaborating and exchanging information and ideas;
T4 Possess a basic understanding of business strategies and practices that relate to freelance work;
T5 Develop time management, organisational skills and awareness of entrepreneurship issues;
T6 Demonstrate competence in CV preparation, interview, and presentation techniques;
T7 Work effectively as part of a team on a group development project.

Knowledge and Understanding (Level 6)

In Year 3 you build upon specific skills that have been developed in year 2 to more advanced and professional level. Specifically, you focus on advanced maths for games programming, advanced graphics programming and shading languages, and advanced gaming programming using C++ and DirectX. You have the chance to develop a large scale practical project which will be part of your games portfolio.

By the end of level 6 students will be able to:

K24 Identify and use appropriate software engineering principles to successfully design and develop a software project;
K25 Apply requirements engineering techniques in the design of projects;
K26 Demonstrate a good working knowledge of the work-flow, structure and co-ordination involved in the production of complex games;
K27 Demonstrate the use of object oriented programming knowledge for advanced games development;
K28 Explore how advanced methods of applied mathematics are used in the development of games engines;
K29 Utilise advanced 3D graphics programming in a computer game;
K30 Identify and appraise the main threats to computer systems security and integrity;
K31 Illustrate how software quality issues impact on software design;
K32 Demonstrate an understanding and knowledge of the opportunities and markets for future employment in the games and related industries;
K33 Carry out a piece of independent research and produce a report on it.

Subject specific and practical skills (Level 6)

By the end of level 6 students will be able to:

S1 Reflect critically on the relationship between theory and practice;
S2 Design schedules and strategies to ensure the smooth running of a complex project;
S3 Plan and manage a research topic in the area of computer games, including costing, time-management and task allocation;
S4 Produce a well-structured and coherent report of an extended piece of work and be able to defend it;
S5 Apply engineering and computing studies skills in the development of advanced case studies.

Transferable skills (Level 6)

By the end of level 6 students will be able to:

T1 Possess key skills in career management and understanding of strategies for self-promotion;

T2 Work professionally in a group in a variety of situations and on a range of tasks and deal independently with a range of situations within group work;

T3 Autonomously manage a project with respect to time and task management;

T4 Make decisions independently with respect to the needs and limitations of a task or project;

T5 Produce coherent reports showing evidence of critical thinking;

T6 Learn in both familiar and unfamiliar situations making effective use of learning resources.

Learning, teaching and assessment methods

The delivery of modules within the BSc (Honours) in Computer Games Development Degree is through lectures, tutorials, seminars, workshops and case studies.

The BSc (Honours) in Computer Games Development course has two points of focus, vocational skills and academic knowledge. It is important that students are able to develop vocational skills which are both subject specific and more generic and transferable to enable graduates to confidently enter the workplace. This skill development however needs to be built upon an academic framework of concept, theory and technique, providing for a more in-depth and rounded educational experience. This will provide more opportunities for career progression and choices as well as support for continuous personal development.

Learning

Level 4
Core knowledge and understanding are promoted via lectures, student centred tutorials, and group work. Assessment method: In-class tests, normally consisting of multiple choice and short answer questions; coursework; group presentations; year-long group project; exams.

Specific skills are promoted via demonstrations and tutorial activities in the labs, and guided independent study (GIS). Assessment method: In-class tests, normally consisting of multiple choice and short answer questions; coursework; year-long group project; exams.

Key skills are promoted via student centred activities in tutorials; these include group discussions, group work, construction of a portfolio, writing reflective statements.

Level 5
Core knowledge and understanding are promoted via lectures, student centred tutorials, group work, seminars, invited talks. Assessment method: Coursework, consisting of problem based exercises, essays, literature reviews; group presentations; year-long group project; exams. In some modules the seminars provide the forum for discussions, debate and conceptualisation. This is particularly true of modules focused on areas such as gameplay design, object oriented game development, and professional practice.

Specific skills are promoted via tutorial activities in the labs. Assessment method: coursework consisting of problem based exercises, programming activities and problems; independent research for reports and essays; exams and guided independent study (GIS).

Key skills are promoted via student centred activities in tutorials; these include group discussions, group work. Coursework assignments provide a vehicle for students to practice writing academically, including essay and report writing, as well as group work and group presentations, both orally and in writing. Evaluation of the literature and existing work is fostered through seminar discussions and as part of the assessments. Assessment method: group presentation, written coursework (essay, report) and exams.

Level 6

Core knowledge and understanding are promoted via lectures, student centred tutorials, group work. Assessment method: major final year project, coursework; group presentations; year-long group project; exams.

Specific skills are promoted via tutorial activities in the labs, problem based scenarios, guided independent study (GIS). Assessment method: major final year project, coursework; group presentations; group project; exams.

Key skills are promoted via student centred activities in tutorials; these include group discussions, group work. Coursework assignments provide a vehicle for students to practice writing academically, including essay and report writing, as well as group work and group presentations, both orally and in writing. Critical evaluation of the literature and existing work is fostered through seminar discussions and as part of the assessments. All key skills converge in the major final year project where they are supported by the student's supervisor. Assessment method: group presentation, written coursework (essay, report, literature search), exams, major final year project.

Teaching informed and enriched by research

1.1. The course team is made up of research active academics and industry practitioners from a range of games industry, computer science and artificial intelligence backgrounds. As such, the curriculum has been designed such that up-to-date research and real-life demos are presented to the students as a means of demonstrating the course content and its strong bond with the industry's requirements and staff's research. For example, in the object oriented module the content is structured around well known video games and the students are requested to design and implement a 2D game engine using object-oriented principles based on the extensive experience of the module team. This practise is extended in the 3rd year with the development of a 3D game using object-oriented principles. Another example is the group games project in the first year where students are required to work in a team and develop a fully functional game by incorporating AI techniques, and artefacts designed and implemented solely by the students.

1.2. Several course staff are active in research and are publishing papers at international conferences and journals and have successfully applied and gained funding between 2009 and 2012 and have been considered for submission in the REF 2014 exercise. The professional activities of several staff also enrich the learning environment on the course. We are able to bring in visiting staff who maintain a professional practice, and we also benefit from the high-level professional experience of core team members. The course team believes this has a direct and positive input on the teaching and we will continue to expand our research profile.

Assessment

A variety of assessment methods are adopted based around traditional academic techniques such as practical and essay-based coursework and exams. Assessment shall include opportunity for self-reflection and contain an element of performance monitoring to ensure student's perform to their abilities and will make full use of the University virtual learning environment.

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.

Module code	Module title	Status	UK credit	ECTS	Course Learning Outcomes
Credit Level 4					
ECSC410	Software Development Principles I	Core	30	15	K1,2
ECSC404	Computer Systems Fundamentals	Core	15	7.5	K4, 6
EICG402	Mathematics for Games Development	Core	15	7.5	K5,7,
EICG406	Games Group Project I	Core	30	15	K3,8,9,10,11
ECSC405	Software Development Principles II	Core	15	7.5	K1,3
ECSC407	Web Technology	Core	15	7.5	K1,6,
Award of Certificate of Higher Education available in Computer Games Development					
Credit Level 5					
Module code	**Module title**	**Status**	**UK credit**	**ECTS**	
EICG505	Games Group Project II	Core	30	15	K12,13,14,15,16,18
EICG508	Professional Practice for Games	Core	15	7.5	K22, 23
EICG502	Applied Maths and Physics	Core	15	7.5	K21,
EICG503	Games Engines Architecture	Core	15	7.5	K20,
EICG501	3D Graphics programming	Core	15	7.5	K19
ECSC522	Algorithms and Complexity	Core	15	7.5	K17,
ECWM506	Mobile Computing Principles	Option	15	7.5	
ECWM507	Advanced Client -side Web Development	Option	15	7.5	
ECWM512	Web Server-side Programming	Option	15	7.5	
ECWM511	Mobile Application Development	Option	15	7.5	
ECWM513	3D Modelling and Animation	Option	15	7.5	
Award of Diploma of Higher Education available in Computer Games Development					
Credit Level 6					
Module code	**Module title**	**Status**	**UK credit**	**ECTS**	
EICG697	Computer Games Project	Core	45	22.5	K24,25,31,32
ECSE609	Security and Forensics	Core	15	7.5	K30
EICG603	Games Group Project III	Core	30	15	K24,26,27,29,31

EICG601	Advanced Maths for Games Development	Core	15	7.5	K28	
One from:						
ECSE610	Formal Specification	Option	15	7.5		
ECWM604	Advanced Web Technology	Option	15	7.5		
ECWM601	Native Programming	Option	15	7.5		
ECSE615	Computer Systems Administration	Option	15	7.5		
ECWM602	Advanced Animation Techniques	Option	15	7.5		
Award of BSc available in Computer Games Development **Award of BSc Honours available in Computer Games Development**						

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

Academic regulations

The BSc Honours Computer Games Development and its intermediate awards operate in accordance with the University's Academic Regulations and the *Framework for Higher Education Qualifications in England, Wales and Northern Ireland* **published by the Quality Assurance Agency for Higher Education (QAA) in 2008.**

All students should make sure that they access a copy of the current edition of the general University handbook called Essential Westminster*,* which is available at **westminster.ac.uk/essential-westminster**. The following regulations should be read in conjunction with the Modular Fr*amework for Undergraduate Courses* and relevant sections of the current *Handbook of Academic Regulations*, which is available at **westminster.ac.uk/academic-regulations**.

Award

To qualify for the award of BSc (Honours) Computer Games Development, a student must:

- obtained at least 360 credits including:
  - passed 75 credits at credit Level 4 or higher and achieved at least a condoned credit in each of the remaining modules worth 45 credits at Level 4; and
  - passed a minimum of 120 Credits at credit Level 5 or higher; and
  - passed a minimum of 120 credits at credit Level 6 or higher.
- attempted modules with a maximum value of 330 credits at credit Levels 5 and 6; and
- satisfied the requirements contained within any course specific regulations for the relevant course scheme:

Course Specific Regulation

In addition to the standard University progression regulations, in order to progress from level 4 to level 5 a student must pass ECSC410 Software Development Principles.

The class of the Honours degree awarded is decided by two criteria, the average of the best 105 credits passed at credit Level 6 being in the range of the class to be awarded, and the average of the next best 105 credits passed at credit Levels 5 and 6 provided the next best 105 credits passed are no more than one classification below this.

Support for students
Upon arrival, an induction programme will introduce students to the staff responsible for the course, the campus on which they will be studying, the Library and IT facilities and to the School Registry. Students will be provided with the Course Handbook, which provides detailed information about the course. Students are allocated a personal tutor who can provide advice and guidance on academic matters.
Learning support includes four libraries, each holding a collection of resources related to the subjects taught at their School. Students 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 School. Students can also securely connect their own laptops and mobile devices to the University wireless network.

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.

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

Reference points for the course
Internally
- University Quality Assurance Handbook and Modular Frameworks
- Staff research and development
- University Teaching and Learning policy statements

Externally
- QAA Computing Benchmark Statement
- Industrial advisors from Tower Studios and Gazcorp Ltd.
- Member of British Computer Society

Quality management and enhancement
Course management
The BSc (Honours) Computer Games Development course is under the Department of Computer Science and Software Engineering (CSSE) and the management structure supporting the course is as follows:
- Course Leader Dr. Li Jin, is responsible for day to day running and overall management of the course and development of the curriculum
- Head of Department Dr. Alexandra Psarrou, holds academic responsibility for the course and other courses within the Department
- Dean of School Professor Jane Lewis, holds overall responsibility for the course, and for the other courses run by the School

Course approval, monitoring and review
The course was initially approved by a University Validation Panel in 2009 and reviewed in 2013. The panel included internal peers from the University and external subject specialists from academia and industry to ensure the comparability of the course to those offered in other universities and the relevance to employers. Periodic course review helps to ensure that the curriculum is up-to-date and that the skills gained on the course continue to be relevant to employers.

The course is monitored each year by the School 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 each Course Committee, evidence of student progression and achievement and the reports from external examiners, to evaluate the effectiveness of the course. The Annual Monitoring Sub-Committee considers the School action plans resulting from this process and the outcomes are reported to the Academic Council, which has overall responsibility for the maintenance of quality and standards in the University.

Student involvement in Quality Assurance and Enhancement
Student feedback is important to the University and student views are taken seriously. Student feedback is gathered in a variety of ways. The most formal mechanism for feedback on the course is the Course Committee. Student representatives will be elected to sit on the Committee to represent the views of their peer group in various discussions. The University and the Students' Union work together to provide a full induction to the role of the Course Committee.

All students are invited to complete a Module Feedback 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 elicits feedback from students about their course and University experience.

Students meet with review panels when the periodic review of the course is conducted to provide oral feedback on their experience on the course. Student feedback from course committees is part of the Schools' quality assurance evidence base.

For more information about this course:
BSc (Honours) Computer Games Development:
http://www.westminster.ac.uk/courses/subjects/multimedia-and-games-computing/undergraduate-courses/full-time/u09fucgd-bsc-honours-computer-games-development

For further information and advice contact:
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