

Programme Specification

Programme title: BSc (Hons) Computer Science for Games

Academic Year:	2018/19
Degree Awarding Body:	University of Bradford
Partner(s), delivery organisation or support provider (if appropriate):	
Final and interim award(s):	BSc (Honours) [Framework for Higher Education Qualifications (FHEQ) level 6] BSc (Ordinary) – exit award [Framework for Higher Education Qualifications (FHEQ) level 6] Diploma of Higher Education [Framework for Higher Education Qualifications (FHEQ) level 5] Certificate of Higher Education [Framework for Higher Education Qualifications (FHEQ) level 4]
Programme accredited by (if appropriate):	BCS The Chartered Institute for IT
Programme duration:	3 years full time; 4 years full time including a year of study abroad and/or a work placement
UCAS code:	I600 (3-year) I601 (4-year)
QAA Subject benchmark statement(s):	Computing; Art and Design; Communication, Media, Film & Cultural Studies
Date of Senate Approval:	2009
Date last confirmed and/or minor modification approved by Faculty Board	November 2016

Introduction

The Computer Games industry employs multidisciplinary teams to design and develop computer games, but each specialist in the team needs an appreciation of the role of others, and a feel for ‘the big picture’. The BSc (Hons) in Computer Science for Games aims to develop computer scientists with a particular interest in

games programming, and their industry, commercial and research applications. The shortage of skilled computer scientists within the games industry provides job opportunities for graduates from this programme but the solid computer science base allows diversification beyond games, offering a range of additional prospects. This programme is offered by the School of Electrical Engineering and Computer Science, one of the oldest such departments in the United Kingdom, with support from the School of Media, Design and Technology. Both are located in the Faculty of Engineering and Informatics which, with its close ties to the National Media Museum and the Bradford Animation Festival, provides a vibrant teaching and research environment, providing opportunities to progress to postgraduate taught programmes or research degrees on completion of their undergraduate degree.

Exposure to Industry is embedded within our programmes in a number of ways. Our Industry Advisory Board (IAB), with a membership comprised of industry representatives from both regional and national companies, meets twice a year to review our existing provision and to propose improvements throughout the academic year industry speakers and researchers deliver invited talks that inform and inspire our students about current and future developments within their discipline. For further information on industry talks and research seminars please refer to:

<http://www.brad.ac.uk/ei/electrical-engineering-and-computer-science/research/research-seminars/>

Student societies with links to professional bodies afford further opportunities for our students to engage with industry, such as Pi Soc as the first ever BCS Student Chapter, and our ACM student chapter. These societies are encouraged and supported by the School to participate in industry led activities such as programming competitions, data dives and extra-curricular visits. In addition, our placement scheme gives students the opportunity to work in real companies for up to one year as part of their programme, further enhancing their discipline specific and transferable skills.

Our teaching is informed by industry in several ways. Staff undertaking Knowledge Transfer Partnership projects, national and EU funded research projects and consultancy work embed new knowledge and concepts into their teaching materials and curriculum planning based on the research and development work they conduct.

The launch of the Computing Enterprise Centre offers our students the opportunity to develop industry-based projects and provides industry-sponsored competitive internships. We support industry placements and collaborate with local, national and international organisations offering students opportunities through our industry contacts and extended network of successful graduates.

Through our Computing Enterprise Centre we leverage industry contacts to embed cutting edge projects within modules such as Technical and Professional Skills in year 1, Enterprise-Pro in year 2 and Final Year Project, allowing students to work on topics highly relevant to their future careers throughout their course. Our Final Year Project showcase allows students to interact with both our Industry Advisory Board members and a wider audience of industry contacts to demonstrate their work and to receive feedback and ideas from professionals within the discipline.

Programme Aims

The BSc (Hons) Computer Science for Games is intended to provide students with the theoretical base, and the tools and techniques which software developers need, regardless of their field of application, but placed within the interesting, practical context of games design. This aim will be achieved by:

1. providing students with a core of fundamental modules that are essential to all computer scientists in the first year, which are built upon in the second year. In parallel, the technical fundamentals and conventions of games are introduced and developed in the second year. The final year consists of a major project, together with choices from a range of options, so that students may choose the particular area in which they are strong or wish to specialise, which builds on the knowledge and understanding gained earlier.
2. providing the support, in the form of lectures, labs and tutorials together with up-to-date computing facilities, that will help students to successfully complete their programme.
3. developing their discipline skills and personal transferable skills so that on graduation students are in a position to apply for positions in industry or commerce, or pursue further programmes of study.
4. Enabling development of problem analysis and computational solutions by application of fundamental principles and concepts of computer science, such as abstraction, data representation, logic, algorithms and digital technologies.
5. Promoting educational opportunities and interest in academic development for ethnic minorities, women, mature and alternatively qualified students, as well as for school-leavers and traditionally qualified students.

Programme Learning Outcomes

To be eligible for the award of Certificate of Higher Education at FHEQ level 4, students will be able to:

- LO1 Describe the history of computer science.
- LO2 Outline the professional, ethical, security, industrial and research dimensions of the discipline of computer science.
- LO3 Demonstrate knowledge of fundamental concepts and theories of computer science for games, and the environment in which they operate.
- LO4 Demonstrate knowledge of basics of software construction and the tools required to support it, develop skill in constructing software.
- LO5 State and explain relevant, models, principles and practices applicable to the study of computers, computer architecture and systems.
- LO6 Collect, manage and present information, ideas and concepts, and interpret data using suitable techniques.
- LO7 Work effectively as individuals and in groups.
- LO8 Communicate accurately and reliably with a range of audiences using basic theories and concepts of the subjects of study.

Additionally, to be eligible for the award of Diploma of Higher Education at FHEQ level 5, students will be able to:

- LO9 Apply knowledge and skills in computing to the analysis of complex software systems.
- LO10 Apply knowledge of investigative and research principles to demonstrate an understanding of how to evaluate computing designs, processes and products in the games market.
- LO11 Apply knowledge of relevant software to problem solving and system design.
- LO12 Apply knowledge of computer systems to the assessment and management of specific problems and challenges.
- LO13 Use practical computer science skills in the design and development, and testing of games.
- LO14 Use personal and technical skills to communicate effectively within computing environments in partnership with other professionals.

Additionally, to be eligible for the exit award of Ordinary Degree of Bachelor at FHEQ level 6, students will be able to:

- LO15 Demonstrate a systematic understanding of key aspects of their field of study, including acquisition of coherent and detailed knowledge informed by aspects of Computer Science for Games.
- LO16 Deploy accurately established techniques of analysis and enquiry within Computer Science for Games.
- LO17 Show conceptual understanding that enables students to devise and sustain arguments, and/or to solve problems, using ideas and techniques and to describe and comment upon particular aspects of current research, or equivalent scholarship, or practice in Computer Science for Games.
- LO18 Demonstrate an appreciation of the uncertainty, ambiguity and limits of knowledge.
- LO19 Manage and communicate their own learning, and to make use of primary sources.

Additionally, to be eligible for the award of Honours Degree of Bachelor at FHEQ level 6, students will be able to:

- LO20 Demonstrate comprehensive and coherent knowledge, understanding and application of computing science for games concepts and principles.
- LO21 Evaluate appropriate aspects of theory and practice in computing.
- LO22 Synthesise, evaluate, choose and apply solutions to open-ended computing problems and situations in a critical manner.
- LO23 Research a range of contemporary, relatively complex computing problems independently and in groups.
- LO24 Contribute to research into gaming computer science issues using appropriate data, sources and methodologies.
- LO25 Act independently in planning and managing tasks with limited guidance.
- LO26 Autonomously analyse, critique and challenge contemporary issues in Computer Science for games.
- LO27 Apply knowledge in core computer science and games areas such as computer systems analysis, design, programming and administration, and specialise in artificial intelligence, computer graphics, game design and development, mobile applications.
- LO28 Demonstrate professional interest and expertise for a variety of careers such as software programmer, game developer, graphics programmer,

system administrator, IT consultant or computer science researcher that match both learners and employers expectations.

Curriculum

Stage 1

FHEQ Level	Module Title	Type (Core/ Option/ Elective)	Credits	Semester (s)	Module Code
4	Mathematics for Computing	C	20	1	COS4014-B
4	Technical and Professional Skills	C	20	1	COS4015-B
4	Fundamentals of Programming	C	20	1	COS4016-B
4	Computer Architecture and Systems Software	C	20	2	COS4001-B
4	Software Design and Development	C	20	2	COS4017-B
4	Internet Technologies	C	20	2	COS4018-B

At the end of stage 1, students will be eligible to exit with the award of Certificate of Higher Education if they have successfully completed at least 120 credits and achieved the award learning outcomes.

Stage 2

FHEQ Level	Module Title	Core/ Option	Credits	Semester (s)	Module Code
5	Database Systems	C	20	1	COS5020-B
5	Data Structures and Algorithms	C	20	1	COS5021-B
5	Game Design, Programming and Development	C	20	1	GAV5002-B
5	Enterprise-Pro	C	20	2	COS5019-B
5	Computer Communications and Networks	C	20	2	COS5025-B
5	Computational Modelling & Artificial Intelligence	O	20	2	COS5022-B
5	Indie Games: Concept, Design and Development	O	20	2	GAV5011-B

At the end of stage 2, students will be eligible to exit with the award of Diploma of Higher Education if they have successfully completed at least 240 credits and achieved the award learning outcomes.

Stage 3

FHEQ Level	Module Title	Core/ Option	Credits	Semester(s)	Module Code
6	Final Year Project	C	20+20	1&2	COS6006-D
6	Numerical Methods and Computer Graphics	C	20	1	COS6021-B
6	Mobile Application Development	O	20	1	COS7025-B
6	Neural Networks and Fuzzy Systems	O	20	1	COS6004-B
6 or 7	Elective*	O	20	1 or 2	
6	AI for Games	C	20	2	COS6017-B
6	Concurrent and Distributed Systems	O	20	2	COS6012-B
5	Motion Capture and Digital Scanning	O	20	2	GAV5017-B

* Choice for Elective is one 20-credit module at level 6 or 7 with no timetable clashes once in programme.

The exit award of Ordinary Degree DOES NOT CONFER ELIGIBILITY TO REGISTER WITH BCS.

Students will be eligible for the award of Honours Degree of Bachelor if they have successfully completed at least 360 credits and achieved the award learning outcomes.

THE AWARD OF HONOURS DEGREE CONFERS ELIGIBILITY TO REGISTER WITH BCS.

Placement and/or Study Abroad

This programme provides the option for students to undertake a work placement or period of study abroad between Stages 2 and 3. Students wishing to take this option will be registered for the 4 year programme.

Students can alternatively go abroad for one or two semesters during their second year. Students will undertake modules to replace those they would have studied at the University of Bradford.

On successful completion of the ENG5002-Z, placement, students will be eligible for the award of University Diploma Industrial Studies.

On successful completion of the ENG5004-Z, study abroad experience, students will be eligible for the award of University Diploma Industrial Studies (International).

For further information about study abroad opportunities please refer to <http://www.brad.ac.uk/international/erasmus-and-international-exchanges/>

Learning and Teaching Strategy

The programme is designed to give students a wide experience of teaching, learning and assessment strategies. Concepts, principles and theories are generally explored in formal lectures, practised in associated tutorials and seminars, and demonstrated in laboratory classes. Practical skills are developed in laboratory

sessions. The programme is designed to allow students to develop and enhance their practical and inter-personal skills through working in small groups engaging in problem solving scenarios. Project work is included to allow students to demonstrate their ability to solve problems using the knowledge, understanding and skills they have gained during their programme.

The programme includes a number of innovative and active learning methods. For example, Team Based Learning (TBL) strategies are integrated within a number of modules. In addition, we endeavour to use team teaching methods where lecturing staff are able to contribute their highly specialised research and knowledge into the curriculum.

Throughout the programme, we make use of case studies so that students can apply their theoretical understanding to real-world issues. In this way, abstract concepts are brought to life through practical activities.

In addition to the standard technology enhanced learning approaches, we embed technologies to deliver key concepts in an interactive environment that strongly links theory with practical skills. For example: in programming lectures, a remote desktop application allows lecturers to demonstrate coding in an environment identical to that in our cutting edge labs; our stage 2 Enterprise-Pro group project module requires and supports students to develop their projects using an industry standard tool for collaborative team based software development. This allows them to develop industry standard skills based on real working practice.

Each set of 20 credits on the programme requires students to commit an average 200 hours of study. Some of these hours will be formally timetabled - lectures, laboratories, seminars and tutorials – while others involve private study. The balance between these forms of study changes as students pass through the three years of the programme. There are more “contact hours” (time spent with tutors) in the earlier stages of the programme; by the final year students are expected to manage more of their own learning, under the general guidance of their tutors.

An optional placement year, normally taken between Stages 2 and 3, will enable students to extend and apply their learning in an appropriate industrial/commercial context, and gain first-hand experience of how their skills might be applied in the workplace.

All of our staff have achieved, or are working towards, Fellowship of the Higher Education Academy. As part of our commitment to Excellence in Learning and Teaching, we conduct research into innovative and effective teaching methods. For example, assessment for our Final Year Project module was enhanced by incorporating regular formative and summative feedback opportunities to enhance the final outcomes, based on a research project conducted by staff within the School that culminated in a journal publication.

Research active staff are involved in curriculum development based on their research activities, exposing students to the very latest and future developments within their field of expertise. We integrate knowledge and experience from Industrial partners through both our Industry Advisory Board and research projects through case studies, lab based activities and invited talks, ensuring that research findings are at the heart of our curriculum.

Assessment Strategy

The assessment methods students will encounter are varied and progress will be reviewed using a mix of formal examinations, reports, laboratory portfolios, essays,

oral presentations (either individual or team) and the final year dissertation. Student performance in each module will be assessed using a mix of these assessment systems to allow them to demonstrate the particular module learning outcomes.

Assessment Regulations

This Programme conforms to the standard University Regulations which are available at the following link:

<http://www.bradford.ac.uk/aqpo/ordinances-and-regulations/>

Admission Requirements

The University welcomes applications from all potential students and most important in the decision to offer a place is our assessment of a candidate's potential to benefit from their studies and of their ability to succeed on this particular programme. Consideration of applications will be based on a combination of formal academic qualifications and other relevant experience.

The **minimum** entry requirements for the programme are as follows:

- A total of 128 UCAS tariff points, to include 80 points from 2 GCE A levels or equivalent. At least one from Computing, ICT, Maths or a science is preferred. Or DDM in a relevant BTEC Diploma. International Baccalaureate (see UCAS tariff point requirements).
- GCSE English and Maths minimum grade C or grade 4 or equivalent.

The UCAS **tariff** applicable may vary and is published here:

<https://www.bradford.ac.uk/courses/ug/computer-science-for-games-bsc/>

Applications are welcome from students with non-standard qualifications or mature students (those over 21 years of age on entry) with significant relevant experience.

Recognition of Prior Learning

If applicants have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate and recognise this learning in order to provide applicants with exemptions from specified modules or parts of the programme.

Minor Modification Schedule

Version Number	Brief description of Modification	Date of Approval (Faculty Board)
2	Addition of module for semester one, level 6 (EM-0359D)	
3	Updates for Academic Portfolio Review May 2016	
4	Minor Modification November 2016	