PROGRAMME SPECIFICATION
MSc Computer Games and Entertainment
Department of Computing, Goldsmiths College
1	Programme Title	MSc Computer Games and Entertainment
2	Name of final award	MSc Computer Games and Entertainment
3	Level of Award	M-level
4	Originating Department	Computing
5	Final Award	MSc
6	Programme	Computer Games and Entertainment
7	UCAS code	
8	Relevant QAA subject benchmarking group	Computing
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Revised in April 2010

This specification is informed by *The Framework for Higher Education Qualifications, The Guidelines for Preparing Programme Specifications* and *The Goldsmiths Learning and Teaching Strategy.* It was first drafted by Prof. William Latham, Programme Director, with the collaboration of Frederic F. Leymarie, Professor of Arts Computing. January 2007. Updated in revised form by Prof. Frederic F. Leymarie April 2010.

1. Overview of the field

We propose to create a unique portfolio of post-graduate courses in the areas of Games and Special Effects for the Creative (Computer Games, TV, Film, Design) industries. There are presently no good post-graduate course in the London area serving these industries. Furthermore, no program is ready to answer a number of nascent needs from these fields:

(1) know-how in new hardware and software in game consoles and computing based on parallel processing and on-the-fly generation of data,

(2) special requirements of the mobile phone gaming sector,

(3) well-rounded candidates in arts and computing with a post-graduate degree relevant to the concerned industries,

(4) multi-disciplinary research focused on these industries.

The proposal is centred around a core MSc program that would support the most urgent needs of the industry in multicore and procedural programming and serve to rapidly establish its reputation in the UK and abroad. A number of variants would then be introduced (post-2007) to target the needs of artists, musicians, writers, choreographs, creators, interested in making a transition to these areas (games and entertainment) or in learning and using these new technologies in their own practice.

The result would be a unique post-graduate portfolio with world-wide appeal, serving the needs of rapidly growing multi-billion pounds industries.

2. Programme Aims

There are presently no good Games Programming Courses in London or the whole of the South East (at both the undergraduate and postgraduate levels). In the UK, none of the courses offered --- 29 undergraduate and 7 postgraduate --- cover procedural, multicore and/or Massively Multiplayer Online Game (MMOG) technologies.

Employment catchment of students would be:
- within London: Eidos (Wimbledon), SONY SCEE (Soho), SEGA, Creative

Assembly, Konami (Japanese company);
- Electronic Arts (EA) European HQ at Chertsey (near Heathrow);
- Guildford development area: EA Criterion, Lionhead and others;
- Cambridge: including SONY Cambridge;
- Brighton: including NC Soft (Korean company), Babel Media, and others;
- and more.

We propose to establish a novel post-graduate program at Goldsmiths, at the crossroads of arts and computing, at a time of great foreseeable needs from the creative and games industries, in the UK and abroad. A number of key opportunities justify this proposal as described below.

Opportunity 1: A New Era in Computing and Game Consoles
We are witnessing a major change in the Computer industry: the move to massively multicore processors --- e.g., the new Play Station 3 (PS3) by Sony, to be released in Europe in 2007, which is based on new multicore technology developed jointly by Sony, IBM and Toshiba.

This key event --- which is in response to the first breakdown of the infamous Moore's "law" --- is further emphasised by (i) the emerging demand to use parallel processing programming techniques, (ii) the increasing penetration of Field Programmable Gate Array (FPGA)-based technologies, (iii) the introduction of new hardware platforms by all of the major games console providers, and (iv) the increasing growth in popularity of massively distributed online games (MMOG).

Opportunity 2: A New Era in Games on Mobile Phones
Mobile phone makers are also introducing a new generation of devices which will incorporate significantly more powerful graphics hardware and displays. Together with this next generation of mobile phone hardware is the introduction by major players, such as Nokia in Europe, of software environments dedicated to games development: e.g., the Nokia Play application.

Opportunity 3: The Demand for Highly-Skilled People is on the Rise
In the UK alone, according to Develop Magazine (July 2006), hundreds of games development jobs are unfulfilled in studios and development companies, and the situation will worsen with the arrival of the next generation of game consoles (i.e., opportunity 1 above). There is "almost zero staff with next-gen[eration] console experience" according to Ed Daly, Head of Kuju in Brighton; and the "UK doesn't produce enough computer science graduates to go around, but does produce artists with limited career options."

Opportunity 4: Multi-Disciplinary Research is Needed
According to a number of games development "gurus," such as Craig Lindley (Gotland university, SE), Harald Riegler (Managing Director, Sproing Interactive Media GmbH, Wien, AT), Malte Behrmann (Managing Director, politics, GAME e.v., Federal Association of the Developers of Computer Games, Berlin, Germany. www.game-bundesverband.de), we are standing at the watershed of a new era in education and gaming, where multi-disciplinary research and development need to be put forward to address a number of more and more pressing needs:
- A number of areas in gaming are barely developed, such as narratology, design (of games, virtual environments, interfaces, etc.), social impacts.
- Asset creation, i.e., in particular 3D data production, needs to be moved away

from "vertices manipulation" toward more natural manipulation of forms (as artists would do).

- Novel generative and procedural technologies are needed to make more efficient the work of developers and reduce the demand on artists.
- Industry and Academics need to talk/interact more.
- Games need to benefit from research in Cognitive models as the emerging social context is that a "new generation of pupils/students is less and less text-friendly (reading books, etc.)."

This opens-up the possibility to re-invent education/training/teaching:

"Rather than adapt game technologies to the present ways of teaching, educating, we should re-think education using games." (Craig Lindley at the recent "Game development technologies and networking" workshop).Workshop on "Game development technologies and networking;" organised by the IST program of the EU, Directorate D --- Network and Communication Technologies Networked Audiovisual Systems. Venue: International Trade Union House, 5 King Albert II Blvd 1210 Brussels, April 2006 (http://www.cordis.lu/ist/audiovisual/neweve/e/ws050406/ws050406.htm).

Opportunity 5: The Gaming Market will keep Growing

The latest Global Entertainment and Media Report from Price-Waterhouse Coopers has said that the games market will keep booming at least until 2010 and estimates that the market will be worth over 50 Billion US$ (www.pwcglobal.com) from 25 Billion US$ in 2004.

3. Learning Outcomes

Learning outcomes for the PGCert and PGDip and MSc.

A. Knowledge and understanding

1. Show knowledge and ability with the main concepts and methodologies of the games and interactive entertainment.
2. Understand the collaborative and team management aspects of projects that operate in the context of games and interactive entertainment.
3. Object Oriented programming (typically, in C++) and scripting (e.g., Python or Lua).
4. Apply the taught advanced programming and core concepts in graphics, perception (e.g., graphics, audio, touch), and A.I.

B. Thinking Skills

1. Be able to efficiently design a software or a system to fulfill a given high-level task (e.g., for an interactive computer vision game application).
2. Be able to come up with original and innovative ideas that fit the context, both creative and technical.
3. Be conversant with the Games and Interactive Entertainment, with terminology and current state of the industry in multiple format areas and articulate views and opinions.

C. Practical/subject skills

1. Be able to devise projects and other forms of research that actively work with and test the main concepts and methodologies of the Games and Interactive Entertainment.

2. Be comfortable and familiar with team work under tight scheduling.
3. Explore and use a range of technologies, middlewares and languages (both compiled and scripted).
4. Be familiar with the main software project management techniques, e.g., waterfall, agile, xp, x-discipline, and critically evaluate those approaches.
5. Be able to able to work in a team in a commercial product development environment and engage in production issues and where appropriate management issues, to be an effective team member.

D. Transferable skills
1. Develop the ability to work in a multidisciplinary context (games software/production, maths, business/IP, presentation/marketing, art/design, cultural/social impacts) and to transfer information and collaborative materials from one kind of work to another.
2. To be able to develop learning strategies for the ongoing acquisition of skills and knowledge.
3. To be able to communicate ideas, plans and projects to different kinds of collaborators.
4. To design, take part in and lead team-based projects, as well as be able to plan and undertake independent projects.
5. To be able to produce extended written work of a high academic standard.
6. To be able to orally present (e.g., in seminars) state-of-the-art research in the studied fields (e.g., in computer graphics).

Additional Learning outcomes for the MSc.

C. Practical/subject skills
1. Experience in evaluating a particular research question of relevance to computer games or entertainment graphic systems.
2. Independent development of a piece of software in support of the explored research question.

D. Transferable skills
1. Appropriately plan and design, present and evaluate, a research project in computer games or entertainment graphic systems.
2. Experience in writing an extended report in support of a research project.

4. Admissions Criteria

This Masters course is aimed at graduates with an interest in working and intervening in computing in the Games and Entertainment (TV, Film, Design) Industries. Some candidates may come via the traditional academic route, while others will have experience of working within the Games and Interactive Entertainment field in some way prior to undertaking the course. Candidates will normally have an undergraduate degree in the computing, engineering or mathematical sciences. In all cases, applicants will be expected to be interested in and capable of working in interdisciplinary contexts. An upper second class honours degree or its equivalent in a relevant discipline is normally required. In exceptional circumstances, outstanding practitioners, or individuals with strong commercial experience may arrive at the course via other routes. Non-native speakers of English will normally have to satisfy the University of London requirements

of IELTS (6.5), and may be encouraged to use the resources of the English Language Unit.

Candidates will be required to demonstrate sufficient proficiency at programming in a major language, such as C, C++ or Java, prior to being accepted and enrolled on the MSc programme. This may take the form of a test, or during an interview, of a practical challenge to program a well-known method or algorithm.

Students will be asked to attend for interview where appropriate. Students will be expected to present a small portfolio of work including programming samples, demos and graphics.

5. Teaching, learning and assessment strategies

5.1 Teaching and learning strategies

The MSc consists of compulsory courses (3 main one unit courses, and 2 half-unit courses amongst a choice from "options") and a Final project. Students are required to accumulate 180 CAT points (credits) to graduate - the equivalent of 8 x 15 credits and a Final project valued as 60 credits.

NB: Taught options may not all be available each year; but at least one option each semester will be available to allow students to fulfil their degree requirements.

A range of teaching methods is employed to support the learning outcomes detailed above. Students take courses organised around the recognised protocols of lectures, labs and seminars, as well as individual tutorials to discuss work and general progress, workshops, project work and student presentations. Throughout the programme students are involved in the development of projects via the use of the lab facilties.

Students are encouraged to study independently and to make full use of the extensive libraries available to all University of London students. Students are strongly encouraged to attend the full range of seminars taking place throughout the University of London and beyond. Events of particular interest to this cohort are publicised through the notice board in the department, via an e-mail list, and a dedicated website.

5.2 Assessment Methods

Exams/Courseworks (including projects)
Exams and courseworks test the student's understanding of concepts and examples presented in class. Includes programming challenges. Projects for a given course represent a more ambitious challenge, with room for novelty or the test/implementation of state-of-the-art topics seen in class. Typically, a project may stand as the final coursework or exam of a given course.

Essays
Assessed essays test the ability of the student to sustain a coherent and original argument on the basis of their reading and research throughout the duration of the course. Students are expected to discuss the content of their report with their course convenor.

Dissertation (Final project)
The written and programming component of the dissertation develops and assesses the

capacity of students to work independently, to define a research and development problem and design the research and presentation and, where applicable, to collect suitable and reliable data. The dissertation promotes and tests the ability to construct a clear argument on a complex and extensively treated topic.

6. Programme Structure and Requirements

6.1 Full-time Route

Autumn Term	Credits
Induction	
Programming for Games and Interactive Graphics	15
Mathematics & Graphics for Computer Games 1 (MGCG)	15
Business & Practice	15
Tools and Middleware	15

Winter/Spring Term	
Advanced Programming for Games and Interactive Graphics	15
Option 1	15
Option 1	15
Option 2	15

Summer-September	
Final Project with Dissertation	60

6.2 Part-time Route

First Year

Autumn Term	Credits
Induction	
Programming for Games and Interactive Graphics	15
Mathematics & Graphics for Computer Games 1 (MGCG)	15

Winter/Spring Term	
Advanced Programming for Games and Interactive Graphics	15
Option 1	15

Summer-September	
Off.	

Second Year

Autumn Term	Credits
Business & Practice	15
Tools & Middleware	15

Winter/Spring Term	
Option 2	15
Option 3	15

Summer-September
Final Project with Dissertation   60

6.3 Progression requirements

Part time candidates will be expected to pass all of their first year curriculum elements before progressing onto the second year.

Full-time and second year part-time candidates will be required to have passed all taught course elements before proceeding to their Final Project with dissertation.

After the successful completion of all taught units (equivalent of 4 cu or 8 x 15 credits) the students will have the possibility to obtain an interim award (PGDip) if they decide not to pursue and complete the Final Project (2 cu).

7. Particular support for learning

The programme convenor, course convenor and course tutors are available to discuss any issues arising throughout the course of study. All members of staff have office hours each week to discuss any matters; outside these hours students may arrange an appointment with any member of staff via email or telephone

Tutorials are provided in a range of formats:
1. Personal Tutors
   - Each student has a personal tutor from the Department of Computing who acts as a continuing source of advice and support. The personal tutor provides advice and guidance and pastoral support.
2. Academic Tutors
   - In addition to their personal tutor, each student has tutors for specific areas of their academic work; the course convener often provides supervision for the dissertation.

Programme and course information, a student handbook, as well as timetable details are sent to students in advance of the beginning of term. Within the Department, students and staff are linked together via course-specific mailing lists which allow for formal announcements and informal discussion and arrangements to take place. Students are also expected to attend special induction meetings prior to the commencement of teaching, when they are offered further guidance regarding timetables and enrolment procedures.

A variety of library resources and arrangements enhance learning. There is an adequate collection of journals and substantial and up-to-date texts in the College library. Heavily used texts are placed on reference and short-loan. Students are also encouraged to take advantage of the excellent library resources available through the University of London. Support for using the library and college computers are incorporated into the course induction.

If students encounter difficulties at any time with their studies, the course convenor and other course tutors can provide additional academic support whilst the Senior Tutor and Deputy Senior Tutor are available by appointment to discuss welfare-centred issues.

The Department is taking advantage of and pursuing the College's Disability Awareness policies. Students with specific needs in this regard are considered on an individual basis. In addition to specialist advice and assistance within the College, the Department ensures that course materials are suitable for all students and, where necessary, these are altered to meet the requirements of individual students. Where necessary, the location and length of examinations are individually tailored to ensure that no student is at a disadvantage as regards assessment.

The College also provides a range of other student support services. Details can be found on the College web site (www.goldsmiths.ac.uk). Students have access to the College Library, Multi-media, Audio-Visual Study resources and Computer Services and Language Resources and these provide a substantial means of supporting other aspects of your learning. Postgraduate students also have access to a dedicated Postgraduate Resource Centre (Hatcham House), which houses a number of online resources and offers space for seminars and the informal exchange of ideas.

8. Methods for evaluating and improving the quality and standard of learning

The quality of this Programme is under continuous review by a number of procedures. First, students will provide feedback on course content and lecturer attributes (e.g., pace of lecturers delivery) in the form of Course Evaluations that students will complete at the end of each taught course. Second, a formal Staff/Student Forum reviews quality within Goldsmiths College: staff and student representatives meet to raise issues of quality (students may contribute directly to this procedure by serving as a student representative, for which Student Union training is provided). The Chair, who is a member of staff, produces an annual report which is sent to Quality Affairs; this report, and the Minutes of the meetings, are also sent to Department Board (on which there is a postgraduate representative). Third, the External Examiners' reports contain a digest of strengths and weaknesses of this Programme and, where suggestions for further improvements are made, these are quickly acted upon. Fourth, Subject Review monitors the general quality of teaching and learning provision in the College. Fifth, regular team meetings are designed proactively to monitor and consider modifications to programmes. Sixth, all members of staff engage in ongoing reflective practice based on awareness of pedagogical issues; this process is facilitated by College-level seminars aimed at raising awareness of such issues.

9. Indicators of Quality, including employment prospects of graduates

This programme is expected to run for the first time in 2007-2008 and so it is not possible to provide employment information as yet. Graduates of the "MSc Computer Games and Entertainment" are expected to be people who rapidly find work in the Games and Entertainment industries, be original thinkers, "hands on" and will often be

managers or directors as they progress in their careers. During their course there will be opportunity to meet computer games and recruitment companies through networking events and external lectures.

10. Scheme of Marking

10.1 Marking criteria applicable to formal assessment are as follows.

MSc Computer Games & Entertainment: Grading and Specific Grading Criteria (marking criteria)

Mark	Grade	Descriptor	Generic Grading Descriptors	Specific Grading Criteria (Marking Criteria)
0%		Non submission or plagiarised assessment	A categorical mark representing either the failure to submit an assessment or a mark assigned for a plagiarised assessment	n/a
1-9%	F	Very bad fail	A submission that does not even attempt to address the specified learning outcomes (shall be deemed a non valid attempt and unit must be re-sat).	n/a
10-29%	E	Bad fail	Represents a significant overall failure to achieve the appropriate learning outcomes	A mark between 10-29% is awarded when only some but not all of the learning outcomes specified for the course have been achieved. Typically a candidate in this position will not have satisfied the examiners that they have read and understood the essential texts of the course. Research involved in the writing of coursework, the realization of projects or the dissertation will be poorly organised and inadequately discussed.
30-49%	D	Fail	Represents an overall failure to achieve the appropriate learning outcomes.	A mark between 30-49% is awarded when there is not a satisfactory application of appropriate knowledge, understanding and skills as specified in the course learning outcomes. There may be confusion and incoherence and unfocused comment on the state-of-the-art. Documentation or realization of projects or coursework would characteristically be weak and fragmentary.
50-	C	Pass	Represents the overall	A mark of 50-59% is awarded

59%			achievement of the appropriate learning outcomes to a threshold level	when there is clear evidence of a satisfactory application appropriate, knowledge, understanding and skills as specified in the course learning outcomes. Demonstration of an adequate level of understanding of relevant concepts, methodology and content; display of sufficient skill to tackle some complex problems; appropriate organisation of material.
60-69%	B	Good (merit threshold)	Represents the overall achievement of the appropriate learning outcomes to a good level.	A mark of 60-69% is awarded when candidates show a *good* application of appropriate knowledge, understanding and skills as specified in the course learning outcomes. Demonstration of a sound level of understanding based on a competent grasp of relevant concepts, methodology and content; display of skill in interpreting complex material; organisation of material at a high level of competence.
70-79%	A	Excellent (distinction threshold)	Represents the overall achievement of the appropriate learning outcomes to an excellent level.	A mark of 70-79% is awarded when candidates show evidence of an *excellent* application of appropriate knowledge, understanding and skills as specified in the course learning outcomes. Demonstration of a thorough grasp of relevant concepts, methodology and content appropriate to the subject discipline; indication of originality in application of ideas, in synthesis of material or in performance; insight reflects depth and confidence of understanding of the material.
80 - 100 %	A+	Exceptional	Represents the overall achievement of the appropriate learning outcomes to an exceptionally	A mark in the 80s or even the 90s will be awarded in the case of really accomplished work, demonstrating high levels of scholarship and originality,

				accomplished level.	although grades in the 90s should be reserved for work deemed to be outstanding, and of publishable quality.

10.2 Classification of Degree

In order to be awarded a PGCert students must pass 60 credits worth of taught modules, in order to pass a PGDip they must pass all taught modules (120 credits).

In order to progress to the final dissertation/project, students must fulfil the requirements of a PGDip (pass all taught modules).

In order to be awarded an MSc students must pass all taught modules and the dissertation/project.

In order to be considered for the award of a *distinction*, students should normally be expected to have been awarded a mark of 70% for the dissertation/project and a mean score of 70% in all of the taught units.

In order to be considered for the award of a *merit*, students should normally be expected to have been awarded a mark of at least 60% for the dissertation/project and a mean score of 60% in all the taught units.

For the PGCert and PGDip a distinction will be awarded for a mean score of 70% in all taught modules (60 credits for PGCert and 120 for PGDip).

Within each course unit (or half course unit) the minimum pass mark is 50%.