PROGRAMME SPECIFICATION

MSC COGNITIVE COMPUTING

Awarding Institution	University of London
Teaching Institution	Goldsmiths College
Department	Computing
Final Award	MSc
FHEQ Award Level	7
QAA subject benchmarking group	Computing
Date	March 2010

Background to this Programme Specification

This document is the result of the curriculum review undertaken by the Department of Computing which has resulted in a fully revised curriculum starting 2010.11. It is the specification of the 2010-11 MSC Cognitive Computing programme, which is intended to replace the existing Cognitive Computing MSc programme and forms part of the Department's integrated suite of taught postgraduate programmes.

The MSc in Cognitive Computing has been specifically developed to take graduates from a wide range of backgrounds and critically introduce them to classical computational models of cognition and artificial intelligence in the context of a broad exploration of radical new theoretical approaches, characterised by their emphasis on embodiment, enactivism and European phenomenology.

The notions of computation and classical computational theories of mind are central to the study of cognitive computing and this one-year full-time programme of study emphasizes the links between them. It aims to equip students with a rigorous grounding in advanced object orientated computing skills and artificial intelligence, sufficient for students to exploit the technical potential of computers in any future career, while at the same time equipping students with a strong critical background to both classical [computational] and more recent [embodied, embedded, enactive] theories of mind.

Introduction to the Programme

This programme, which is the first of its kind in the United Kingdom, is primarily intended for graduates who wish to develop careers in cognitive science, artificial intelligence, human–computer interfaces (HCI) and computing. The programme will provide students with market-led practical skills in object orientated programming and the technologies of thought, alongside core conceptual understanding of cognitive processes and rigorous research and analytic skills.

What are the admissions criteria?

The modular structure and choices provided by this programme enable it to be equally accessible and challenging to students with a background in the pure sciences, the applied engineering sciences (including computing) and the arts/humanities (including psychologists, linguists and anthropologists). The award of MSc emphasizes the technical focus to the inter-disciplinary content of the degree.

All students would normally have, or be expected to gain, a first degree of at least second class; a lower degree class may require an additional viva or written examination. Exceptionally, students may be eligible for admission if they have industrial experience at a senior level, although this may be also subject to a qualifying examination or viva.

Non-native English students should normally have a minimum IELTS score of 7.0 or equivalent. Students may be called to interview.

What are the aims of the programme?

The aim of this programme is to produce graduates who have a deep conceptual understanding of cognition and the mind. Our graduates should have solid understanding of:

- The computing machine: both at a conceptual level (including knowledge of what such machines are and what they fundamentally can and cannot do) and at a practical level (by developing programming skills to solve complex tasks, using modern object orientated programming methodologies).
- Artificial intelligence and neural networks; developing skills at applying these 'technologies of thought' to solve complex tasks that would otherwise require human-like 'intelligence' to complete.
- Classical theories of mind - from dualism to functionalism & connectionism - and understanding the representational (and computational) foundations of this theory; understanding criticisms of computational and representational theories.
- The modern embodied, embedded, enactive vision of cognition; the expression of cognition via interplay of agent and environment interaction.
- Advanced skills in critical thinking and analysis; academic writing and presentation skills.

What are the learning outcomes of the programme?

Learning outcomes for PGCert, PGDip and MSc

The PGCert and PGDip have the same learning outcomes, but the PGCert requires a pass in 60 credits worth of taught courses, and the PGDip requires 120 credits.

Knowledge and understanding

Graduates should have:	Taught by:
Knowledge and understanding of the computing machine at a conceptual level; including knowledge of what such machines are – what is a computer; what is a computation - and what tasks they fundamentally can and cannot do.	Consciousness and computations;
Knowledge and understanding of classical theories of mind - from dualism to functionalism & connectionism - and understanding the representational (and later computational) foundations of this theory; understanding criticisms of computational theories.	The computer and the mind;
Knowledge and understanding of the modern embodied, embedded, enactive vision of cognition; the expression of cognition via interplay of agent and environment interaction.	Embodiment and enactivism

Thinking (cognitive/intellectual) skills

Graduates should be able to:	Taught by:
Knowledge and understanding of advanced skills in critical thinking and analysis; academic writing and presentation skills.	This will be taught throughout the programme and specifically in the course, 'Advanced topics in cognitive science'.
Critically analyze computational, representational and embodied theories of mind.	This will be taught throughout the programme

Practical (including subject-specific) skills

Graduates should be able to:	Taught by:
Solve complex tasks using the computing machine, using modern object orientated programming methodologies.	This will be taught in the object orientated programming course.
Apply 'technologies of thought' to solve complex tasks that would otherwise require human-like 'intelligence' to complete.	This is taught in the following options: artificial intelligence, neural networks, artificial intelligence for games, semantic web, physical computing and technology workshop courses.

Transferable skills

Graduates should:	Taught by:
Advanced skills in critical thinking and analysis; academic writing and presentation skills.	This will be taught throughout the programme and specifically in the course, 'Advanced topics in cognitive science'.
Be able to reflect on and evaluate their own work	This will be taught throughout the programme
Be able to make decisions and solve complex problems in novel contexts	This will be taught within practical work for individual courses.

Additional Learning outcomes for MSc only

Thinking (cognitive/intellectual) skills

Graduates should be able to:	Taught by:

Graduates should be able to:	Taught by:
Propose, plan, execute and evaluate a significant piece of original work.	Project in Cognitive Computing

Practical (including subject-specific) skills

Graduates should be able to:	Taught by:
Execute a significant piece of original work.	This will be taught by the Project in Cognitive Computing

Transferable skills

Graduates should:	Taught by:
Be independent and creative workers and learners, able to exercise initiative and personal responsibility in their work.	This will be taught in throughout the course and in particular in the final project

What courses are offered on this programme?

Terms 1 and 2

The programme will consist of the following **compulsory** courses in 'cognition':
:
- [Course code] The computer and the mind (15)
- [Course code] Consciousness and computations (15)
- [Course code] Embodiment and enactivism (15)
- [Course code] Advanced topics in cognitive computing (15)

In addition students will take one of the following **compulsory** courses in 'computing':

- [Course code] Introduction programming (30) **OR**
- [Course code] Programming for the Artists (30) **OR**
- [Course code] Introduction and Advanced programming for Games and Interactive Graphics (30)

Students can also select 2 optional 15 credit courses (or 1x30 credit course) exploring the 'technologies of thought and knowledge' from:

- [Course code] Artificial Intelligence
- [Course code] Neural Networks
- [Course code] Physical computing
- [Course code] Semantic Web
- [Course code] Technology workshops in audio visual computing
- [Course code] Artificial Intelligence for games & special effects

Term 3

In the third term students will be expected to undertake a substantial research project.

How will courses be taught?

The Department of Computing is committed to a diverse and stimulating range of learning and teaching methods that ensure the programme outcomes are addressed rigorously and effectively. Learning emphasises a close synthesis between theoretical understanding and practical application that helps you develop an advanced, critical approach to the subject of computing.

The various courses of the programme provide a diverse range of topics across the scope of cognitive computing but are designed to form a coherent and cumulative body of knowledge and skills. These are further developed through your independent research and learning activities directed towards course assignments and the large-scale project component. The department is committed to providing a diverse and innovative range of teaching styles across its degree programmes. These include traditional lecture, seminars and laboratory sessions but also a range of more interactive and self-directed activities focusing on independent, creative work and self presentation. The nature of the learning activities will vary greatly between different courses, but includes programming, software design, seminars, research and written work etc. In addition students will be expected to engage in considerable independent reading and practical work for all courses culminating in the final year project. This independent work will be supported by library resources, access to lab space and supervision from teaching staff.

The programme provides a range of courses which provide a network of cross-referenced and cumulative knowledge across diverse areas of computing. All courses provide a weekly lecture, seminar, lab or other session, which reinforces preparatory or follow-up reading, and other related learning activities in both group and individual settings to foster new understandings and skills.

How will my work be assessed?

The department recognises that high quality assessment is a vital part of learning, particular when used formatively, providing valuable feedback for future learning. Our assessment is designed to reflect "real world" skills and activity in order to give our students a strong preparation for the work place.

Feedback is vital to effective continuing learning, the true value of assessment is that it shows students how to improve their work and learn more effectively in future. Five attributes of students' written work are considered when assigning marks (1 = poor; 5 = very good):

1.   Answer. (Does the work answer the question or address the issue?)
2.   Structure. (Is the general structure of the work coherent?)
3.   Flow. (Does each statement follow sensibly from its predecessor?)
4.   Argument. (Is there a convincing quality of argument in the work?)
5.   Evidence. (Are claims supported by relevant evidence from the literature?)

Throughout the degree programme assessment will happen in individual courses each having formative and summative assignments. As well as these small assignments, students will have a major project in the summer term. This is a large scale piece of work which should integrate what students have learned throughout the programme. It provides students with an opportunity to independently tackle a large project at a research level.

What are the grading criteria for an MSc degree?

Mark	Descriptor	Grading Criteria
0%	Non submission	Work was not submitted or it was plagiarised

Mark	Descriptor	Grading Criteria
1-9%	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).
10-29%	Bad fail	Represents a significant overall failure to achieve the appropriate learning outcomes (shall be deemed a valid attempt and not necessarily required to be re-sat). 20% might be awarded to an answer that contains something that shows that the student has attended the relevant lecture course, even if there is little in the answer that is of direct relevance to the question. A 10% answer contains no evidence that the student knows anything from the literature that is relevant to the question.
30-49%	Fail	Failing work is likely to: 1. fail to adequately address the topic or to answer the question, either by reproducing material that is only partly relevant or by inaccurately reproducing material that is relevant 2. lack a clear structure or framework 3. have relationships between statements that are often difficult to recognise 4. have a poor quality line of argument 5. make poor use of evidence to support most of the claims that are made Within this category the mark awarded will be below 50%. The mark awarded will depend on the extent to which the work is judged to meet the above-mentioned criteria. The mark awarded will depend on how badly the work fails to meet the above-mentioned criteria. 30% might be awarded to an answer that contains some indication that the student can recall once having heard or read something relevant to the question. This grade reflects the specific Learning Outcomes have not been achieved.

Mark	Descriptor	Grading Criteria
50-59%	Pass	Work awarded a borderline pass mark is likely to: 1. present relevant material but fail to use it to answer the question or address the issue 2. have a structure, but one that is rather loose and unannounced 3. have relationships between statements that are sometimes hard to follow 4. have a fair quality line of argument (information drives argument, rather than other way round) 5. tend to make claims without sufficient supporting evidence Within this category of work, the mark awarded will be in the range 50-59%. The mark awarded will depend on the extent to which the work is judged to meet the above-mentioned criteria. At minimum, such a piece of work must show that the student has a fair knowledge of the basic material relating to the question or issue concerned. Higher marks within this category will be awarded as a function of the accuracy with which this material is handled, the relevance and quantity of the material that is presented, and the clarity with which the essay is written. This grade reflects the specific Learning Outcomes have been largely achieved.

Mark	Descriptor	Grading Criteria
60-69	Good pass	Work awarded a good pass mark is likely to: 1. attempt to address the topic or answer the question 2. have a detectable structure that is adhered to for the most part 3. have relationships between statements that are generally easy to follow 4. have a good quality line of argument 5. support claims by reference to relevant literature Within this category of good work, the mark awarded will be in the range 60-69%. The mark awarded will depend on how successfully the work is judged to meet the above-mentioned criteria. At minimum, a good pass piece of work must attempt to answer the question or address the issue concerned, be clearly written, and show signs that the student has read beyond the basic source material. For lecture-based assessments, this usually means going beyond what was presented in the lectures themselves; for essays that are not lecture-based, this means going beyond recommended 'essential reading'. A top good pass will in addition be likely to have a clearer structure, a stronger line of argument, and draw on a broader range of material. This grade reflects the specific Learning Outcomes have been achieved; and, in addition, good evidence that the content of the unit has been embedded in the wider.

Mark	Descriptor	Grading Criteria

Mark	Descriptor	Grading Criteria
70+	Distinction	Work assigned a Distinction mark is likely to: 1. address the topic in an explicit manner 2. announce its structure at the start and stick closely to this announced structure 3. have relationships between statements that are very easy to recognise 4. have an excellent or original line of argument that can be followed very easily 5. give wide-ranging and appropriate evidential support for claims that are made Within this category of very good work, the mark awarded will be 70% or above. The mark awarded will depend on how successfully the work is judged to meet the above-mentioned criteria. At minimum, a piece of work at this level needs to answer the question or address the issue concerned, be well-constructed, and (perhaps most crucially) show evidence of *independent reading and thinking*. This grade reflects the specific Learning Outcomes have been achieved to a high degree (including material that is relevant but not defined in the content of the unit); and, in addition, strong evidence that the content of the unit has been appropriately embedded in the wider.

Final Degree Classification

Final degree classifications are based on 120 credits of taught courses and the final project (dissertation) and are assessed 100% by coursework component.

Student's final degree classification for PGCert and PGDip exit points will be calculated as follows:

Distinction: average mark over all taught courses 70% or above.

Merit: average mark over all taught courses 60% or above.

Pass: marks of 50% or above in all taught courses.

Fail: failure in one or more of the courses.

The PGCert requires 60 credits of taught courses and the PGDip requires 120 credits (all taught courses).

In order to progress to the Final Project and the MSc assessment students must fulfil the requirements for a pass at PGDip level (pass all 120 credits of taught courses).

Student's final degree classification for the MSc will be calculated as follows:

Distinction: average mark over all taught courses and final project 70% or above.

Merit: average mark over all taught courses and final project 60% or above.

Pass: marks of 50% and above in all taught courses and final project.

Fail: failure in one or more of the courses or final project.

Students will be permitted to resit a failed course only once at the first opportunity. If students fail any of the courses a second time then students will get a Fail mark.

What support can I expect?

Student's learning will be supported by Departmental and College resources, as well as resources held centrally at the University of London library. In the College library there are books and journals specialising in computing and cognitive science. Student's Personal Tutor and Programme Co-ordinator are available to discuss any issues that may arise throughout the course of studies. All members of staff have Office Hours each week for students to discuss any matters; but outside these hours students may arrange an appointment with any member of staff via email or telephone (students will be provided with their own email address).

The College provides counselling, student support services (e.g., English for overseas students) and a language unit to ensure that maximal participation in the academic life of the College. Postgraduate students also have access to a dictated Postgraduate resource centre (Hatcham House), which houses a number of online resources and offers space for seminars and the informal exchange of ideas. The College also actively supports students with specific learning difficulties (e.g., dyslexia), and provisions are made to ensure that all students, regardless of specific difficulty/disability, derive full benefit from the learning environment. 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.

Students will be expected to develop and maintain a Personal Development Plan (PDP) during the course of study. This PDP will record aspirations, plans and goals, record achievement against goals, and enable students to monitor progress in order to achieve personal aims. The student's Personal Tutor will be available to discuss the PDP with students.

The medical, counselling and financial services provide support for students when necessary, and in the case of students with special needs (including dyslexia), the Student Support Office will provide sympathetic advice and help. Goldsmiths also provides a wide range of other support services for students, which can be found on its web site at www.gold.ac.uk. Overseas students whose first language is not English may seek assistance from the Goldsmiths English Language Unit.

The Department is committed to making any reasonable adjustment that allows, as far as possible, for equality of opportunity and access, and to ensuring that students are not substantially disadvantaged because of specific learning difficulties or disability.

What Careers will be open to me?

This programme is primarily intended for graduates who wish to develop careers in cognitive science, artificial intelligence, human–computer interfaces (HCI) and computing. The programme will provide students with market-led skills in object orientated programming coupled with core knowledge of cognitive processes and rigorous research and analytic skills.

How will teaching quality be monitored?

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.