<table>
<tr><td></td><td>PROGRAMME SPECIFICATION</td><td>Newcastle University</td></tr>
</table>

PROGRAMME SPECIFICATION

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	Integrated PhD
4	**Programme Title**	Integrated PhD in Computer Science
5	**UCAS/Programme Code**	8195
6	**Programme Accreditation**	Not applicable
7	**QAA Subject Benchmark(s)**	Not applicable
8	**FHEQ Level**	8
9	**Date written/revised**	25 April 2013

10	**Programme Aims**

The aim of the Degree programme is to produce Integrated PhD (IPhD) graduates who have a coherent understanding of computer science, combining a sound theoretical grasp of relevant subjects with in depth research experience and an awareness of their responsibilities to society. IPhD graduates will be capable of becoming professional computer engineers and scientists in the IT industry or of undertaking further research in an academic career. They will gain the capability to tackle open-ended research problems and arrive at research solutions demonstrating innovative / novel approaches. In doing so they will have the ability to conceptualize, design and implement projects for the generation of significant new knowledge and/or understanding. To meet these aims, the IPhD Degree programme has the following objectives:

1. To recruit good students from a range of geographical, social and academic backgrounds.
2. To produce graduates who have vision and the ability to address the challenges posed by society through the deployment of the skills and knowledge gained during their IPhD studies.
3. To provide opportunities for students to acquire further knowledge, both in breadth and depth, and to specialise according to their own interests as they develop over the duration of the IPhD programme.
4. To equip students with appropriate practical skills in advanced topic of computer science, including cloud computing, security and resilience, bioinformatics and game engineering.
5. To provide students with the opportunities to acquire research skills and to demonstrate the application of these skills to solve novel computer science research problems.
6. To provide an environment within the University such that students enjoy the University learning experience sufficiently to want to maintain contact in its future recruitment, teaching, research and social activities.
7. To provide a programme of study which meets FHEQ Level 8 and which exceeds the subject benchmarks in QAA Computer Science at the Masters level and UK professional standards.
8. To ensure the research component satisfies Newcastle University's QA framework for research degree programmes

11	Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in areas of computer science that are consistent with FHEQ Level 8 study.

Knowledge and Understanding

On completing the programme students should have:

A1 Background knowledge in advanced computer science concepts.
A2 A knowledge and understanding of the fundamental concepts, principles and theories of computer science.
A3 Advanced knowledge and understanding gained for the IPhD research area of study
A4 Knowledge and understanding of business and management techniques, intellectual property and regulatory issues relevant to computer science.
A5 Knowledge and understanding of the role of computing and computer science in society and the constraints within which their judgement will be exercised.

Teaching and Learning Methods

Foundation knowledge and understanding are primarily imparted through a combination of lectures, tutorials, example classes, case studies, coursework and projects. In some cases, the formal lectures are supplemented by computer assisted learning (CAL). A number of visiting lecturers and professors from the computing industry and other academic institutions will contribute to A1 through A5.

The IPhD research will build on knowledge gained and to the background process understanding, to deliver against the research requirement while at the same time provide depth of understanding associated with A3. Throughout the IPhD research project, students are required to undertake independent reading to deepen, supplement and consolidate their research findings and what is being taught/learnt to broaden their individual knowledge and understanding of the subject. During the research studies, students are required to submit regular reports describing their progress and they will be given guidance and direction by the supervisory team. Formal records of training are maintained on the University e-portfolio system. Feedback on reports will allow the student to assess the level of their knowledge and understanding and provide the necessary capability to write the IPhD research thesis.

Assessment Strategy

Assessment of the taught modules is through a combination of unseen written examinations and assessed coursework in the form of experiment write-ups, coursework reports, project reports and presentations. Progression through the research programme is monitored by the IPhD Progression Panel. At the panel the student is required to present the current state of their research and their plans for future research and is questioned on these by the panel. Assessment of the IPhD thesis is by viva voce by two examiners and the thesis is assessed against the learning objectives and satisfaction of FHEQ Level 8 criteria. The panel will chaired by an independent Chair person in accordance with the University regulations.

Intellectual Skills

On completing the programme students should be able to:

B1 Plan, conduct and report a programme of novel investigative work.
B2 Design / implement a novel solution to meet a computer science need.
B3 Be creative and innovative in the solution of problems and in the development of computing systems.
B4 Take a holistic approach to solving problems and designing systems, applying professional judgements to balance risks, costs, benefits, safety, reliability, aesthetics and environmental impact.
B5 Generate novel and publishable material.

Teaching and Learning Methods

Intellectual skills are developed through the research, teaching and learning programme outlined above. While the IPhD is primarily personal study, team-work is essential in learning and for this reason some module assessments are carried out in small groups (3-4) during the taught component of the programme. All IPhD students are supervised by one academic supervisor and at least one additional thesis committee member. Analysis and problem solving skills are further developed through example classes, tutorials, coursework and put into practice in the research project work. Experimental, research and design skills are further developed through coursework activities, experiments and the research project. Individual feedback is given to students on all assessed module work. Students are required, following appropriate guidance, to plan and carry out their investigative work in a critical manner. Feedback provided on all submitted work and draft sections of the IPhD thesis provides opportunities for students to improve their intellectual skills. In particular, the IPhD research project work will provide the opportunity to develop skills B1-B5.

Assessment Strategy

Analysis and problem solving skills are assessed through unseen written examinations, coursework and the IPhD thesis viva. Experimental, research and design skills are assessed through laboratory experiment write-ups, coursework reports and project reports, presentations, unseen written examinations and the IPhD thesis. Creative and design skills are assessed through the research reported in the IPhD thesis.

<div align="center">

Practical Skills

</div>

On completing the programme IPhD students should be able to:

C1   Produce a conceptual or elemental design or procedure to solve a computer science problem that involves novel solution approaches and generates new capability or understanding.
C2   Prepare technical reports, specifications and give technical presentations
C3   Use the scientific literature effectively and to search for information to develop concepts and relate concepts that are in the literature to the solution requirements of the research problems.
C4   Identify the required cost, quality, safety, risk, reliability, appearance, fitness for purpose of the design, approach or procedures and critically assess new approaches to existing methods / designs.
C5   Time and project management tasks to deliver an IPhD thesis in a 4 year period (including the time allocated for the taught component of the IPhD).

Teaching and Learning Methods

Practical skills are developed through experiments and coursework and the research undertaken throughout the IPhD programme. Lectures, tutorials, case studies and seminars for specific modules will develop skills C1-C5. From the first year, students are required, after appropriate guidance, to search the literature for information and submit all written work in an appropriate scientific and engineering format so that C2-C3 are thoroughly integrated into all submitted work and research reports. Students are encouraged to develop appropriate professional and practical skills (C4) during the taught component of the IPhD in Year 1 that are built on through their research on their project.

Assessment Strategy

Practical skills are assessed through experiment write-ups, coursework and project reports, presentations, group oral discussions, and unseen written examinations culminating in the assessment of the IPhD thesis through a viva. Skills C1-C5 form a major part of the assessment of the IPhD research project.

Transferable/Key Skills
On completing the IPhD programme students should be able to: **D1** Communicate effectively (verbally and in writing). **D2** Develop novel ideas and solutions to engineering and scientific problems. **D3** Manage resources and time, plan, organise and prioritise work effectively to meet deadlines. **D4** Use information and communications technology. **D5** Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry. **D6** Learn effectively for the purpose of continuing professional development and in a wider context throughout their career.
Teaching and Learning Methods
Transferable skills are developed through the research programme and the initial teaching and learning components outlined above. Basic communication skills, D1, will be acquired through individual and team projects through a number of modules and the research project. These are then developed and enhanced through feedback on written reports and presentations. Students will be required to find information and give oral and/or written presentations throughout their study. Deadlines for submission of coursework and reports are enforced, encouraging students to develop D3. The research project provides the scope and opportunity to develop skills D1-D6.
Assessment Strategy
Transferable and communication skills are assessed through coursework reports, presentations and oral examinations in a number of compulsory and optional modules and progression monitoring activities. The assessment of the IPhD thesis includes key skills content.

12	**Programme Curriculum, Structure and Features**
Basic structure of the programme	

The IPhD programme is full time lasting four years or part time lasting six years. In full-time mode, during Year 1 the students undertake a coherent programme of study equivalent to an existing MSc in one of the Computing Science MScs plus, in some cases, a short (30 credits) individual project, leading to the accumulation of 120 credits. At the end of the first year the students will have to acquire the necessary credits and achieve over 65 on average. Those students that fail to achieve these levels may be able to retake any necessary modules and may be eligible for the award of an MSc. Limited compensation of marks is permitted. Further details are contained in the Programme Regulations. Under part-time mode, the pattern of accumulating credits for the taught element may be varied at the discretion of the Degree Programme director.

The remainder of the programme is dominated by the research project. During the research element, progression each year is subject to satisfactory performance as judged by the independent Progression Panel, in a manner which is consistent with the University's Code of Practice for Research Degree Programmes. Satisfactory progress includes effective performance as judged in the assessed modules undertaken in that year. At the end of the fourth year of study, the students will have completed a thesis that will be examined by two examiners, with awareness of Level 8.

Key features of the programme (including what makes the programme distinctive)
The IPhD will deliver trained doctoral students who have the skills and tools to understand and invent new computing solutions to facilitate the rapid and efficient development of products and services. Particular features of the programme are: • To provide IPhD students with a well-rounded computer science research training to promote development of skills in computer and information systems. • To provide students with skills through to high-level modelling and design capability, needed for modern computer scientist to work in an industrial or academic research environment. • To provide training to IPhD students to develop both technical and professional skills to underpin personal development and future career success
Programme regulations (link to on-line version)
Main Integrated PhD regulations can be found at: http://www.ncl.ac.uk/regulations/docs/

13	Criteria for admission

Entry qualifications
All applicants are considered individually on the basis of past academic performance and potential for achievement. Applicants are expected to have at least BSc 2.1 or MSc in a relevant field. Equivalent qualifications will also be acceptable.

Admissions policy/selection tools
Standard application via University online application process. Prospective students offered places based on entry qualifications.

Level of English Language capability
6.5 IELTS or equivalent

14	Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: *http://www.ncl.ac.uk/students/*

Induction
During the first week of the first semester students attend an IPhD induction programme that will incorporate aspects of the Faculty of Science, Agriculture and Engineering induction programme. New students will be given a general introduction to University life and the University's principle support services and general information about the Integrated PhD programme. The International Office offers an additional induction programme for overseas students.

Study skills support
Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. Some of this material, e.g. time management is covered in the appropriate Induction Programme. Students are explicitly tutored on their approach to both group and individual projects.

Support for IPhD thesis writing is provided by the Writing Development Centre with additional support opportunities coordinated by the SAgE Graduate School through the Faculty Research Development programme.

Academic support
The initial point of contact for a student during the taught element is with a lecturer or module leader, or their tutor for more generic issues. Thereafter the Degree Programme Director of the Integrated PhD may be consulted, as may be the Head of School. The initial point of contact for a student during the research element is with the supervisor and the supervisory committee. Thereafter the Degree Programme Director of the Integrated PhD may be consulted as may be the Head of School. It is expected that the first year tutor will be the supervisor during the research element. Issues related to the taught as well as research element may be raised at the staff-student committee and/or at the Board of Studies.

Pastoral support
During the taught element, all students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. During the research element, this role is taken over by the personal supervisory team (i.e. supervisor and thesis committee member(s)). In addition the University offers a range of support services, including one-to-one counselling and guidance or group sessions/workshops on a range of topics, such as emotional issues eg. Stress and anxiety, student finance and budgeting, disability matters etc. There is specialist support available for students with dyslexia and mental health issues. Furthermore, the Union Society operates a Student Advice Centre, which can provide advocacy and support to students on a range of topics including housing, debt, legal issues etc.

Support for students with disabilities
The University's Disability Support Service provides help and advice for disabled students at the University - and those thinking of coming to Newcastle. It provides individuals with: advice about the University's facilities, services and the accessibility of campus; details about the technical support available; guidance in study skills and advice on financial support arrangements; a resources room with equipment and software to assist students in their studies.

Learning resources
The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

All new students whose first language is not English are required to take an English Language Proficiency Test. This is administered by INTO Newcastle University Centre on behalf of Newcastle University. Where appropriate, in-sessional language training can be provided. The INTO Newcastle University Centre houses a range of resources which may be particularly appropriate for those interested in an Erasmus exchange.

15	Methods for evaluating and improving the quality and standards of teaching and learning

Module reviews
In accordance with the methods of the individual MScs, all modules of the taught element are subject to continuous evaluation and improvement, including methods such as questionnaires, reviews at the School teaching and learning committee, the staff-student committee and/or the Board of Studies.

Programme reviews
The Board of Studies conducts Annual Monitoring and Review of the taught and research elements of the programme and reports to the Faculty Teaching and Learning and Graduate School Committees as appropriate.

External Examiner reports
External Examiner reports for the taught component are considered by the Board of Studies. The Board responds to these reports through Faculty Teaching and Learning Committee. External Examiner reports are shared with institutional student representatives, through the Staff-Student Committee.

Student evaluations
All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Staff-Student Committee, and the Board of Studies.

Mechanisms for gaining student feedback
Feedback is channelled via the Staff-Student Committee and the Board of Studies.

Faculty and University Review Mechanisms
The programme is subject to the University's Internal Subject Review process.

16	Regulation of assessment

For the taught element, the individual MSc regulations define the assessment regulations. The common elements are summarised here and exceptions are noted:

Common Marking Scheme
The University employs a common marking scheme for taught postgraduate modules, which is specified in the Taught Postgraduate Examination Conventions and applies to the taught modules in the Integrated PhD, namely:
     <50   Fail
    50-59   Pass
    60-69   Pass with Merit
   70 or above   Pass with Distinction

Progression
A candidate's progress shall be reviewed by the Board of Examiners on completion of the first year's taught modules and no later than 12 months after the programme has commenced. In order to progress onto the research element the candidate must (i) after the application of compensation, have obtained, for at least 100 credits (inclusive the short project module in cases when the students take this module), a weighted average mark for the taught component of at least 65; (ii) have failed no more than 20 credits and; (iii) have no module marks below 40.

A student who fails to progress to the research element of the IPhD may be eligible for an award of postgraduate certificate or diploma, as specified under the appropriate MSc programme regulations (according to the modules studied). Alternatively a student may transfer onto the appropriate MSc programme if they have satisfied the progression requirements for that programme.

A candidate's subsequent progress in the research element of the IPhD shall be monitored annually by an independent progress panel in manner which is consistent with the University's Code of Practice for Research degree Programmes.

Role of the External Examiner
An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching and Learning Committee, after recommendation from the Board of Studies. The External Examiner is expected to:
- Oversee reading and approving of examination papers.
- Oversee moderation of examination and coursework marking.
- Attend the Board of Examiners to oversee progression to the research element.
- Report to the University on the standards of the programme.

In addition, information relating to the programme is provided in:

The University Prospectus: http://www.ncl.ac.uk/postgraduate/

The School Brochure: http://www.ncl.ac.uk/computing/

Degree Programme and University Regulations: http://www.ncl.ac.uk/regulations/docs/

Please note. This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

Mapping of Intended Learning Outcomes onto Curriculum/Modules

Programme		Intended Learning Outcomes			
		A	**B**	**C**	**D**
5055	Computer Science	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
5056	Cloud Computing	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
5144	Computer Security and Resilience	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
5152	Computer Game Engineering	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
5178	Advanced Computer Science	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
5198	Bioinformatics	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
5199	Neuroinformatics	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
5200	Synthetic Biology	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
5201	Computational Systems Biology	A1,A2,A3, A5	B2,B3	C2,C3	D1,D2,D3, D4
CSC 8498	Project and Dissertation for MCOMP	A4, A5	B3, B4	C2, C4	D1,D2,D3, D4, D5, D6
	Research Project and Dissertation	A1,A2,A3, A4,A5	B1,B2,B3, B4,B5	C1,C2,C3, C4.C5	D1,D2,D3, D4,D5,D6