

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	8195F/P
6	Programme Accreditation	Not applicable
7	QAA Subject Benchmark(s)	Not applicable
8	FHEQ Level	8
9	Date written/revised	May 2023

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 the following areas. The Programme outcomes have references to the benchmark statements for computing.

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 be 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.

Practical Skills

- 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. 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)

[-R8195FP.pdf \(ncl.ac.uk\)](#)

13 Support for Student Learning

Generic information regarding University provision is available at the following link.

[Generic Information](#)

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

Generic information regarding University provision is available at the following link.

[Generic Information](#)

15 Regulation of assessment

Generic information regarding University provision is available at the following link.

[Generic Information](#)

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

The University Prospectus: <https://www.ncl.ac.uk/postgraduate/>

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.