

PROGRAMME SPECIFICATION



1	Awarding Institution	Newcastle University
2	Teaching Institution	Newcastle University
3	Final Award	Master of Science (MSc)
4	Programme Title	Advanced Computer Science
5	Programme Code	5178F / 5178P
6	Programme Accreditation	The British Computer Society
7	QAA Subject Benchmark(s)	N/A
8	FHEQ Level	7
9	Last updated	16/04/14

10 Programme Aims

1. To provide a qualification enhancing employment prospects in the wide range of IT based careers.
2. To provide a foundation for students wishing to embark on a research career in academia or industry.
3. To provide opportunities for students with a background in computer science to acquire further knowledge, both in breadth and depth, in a range of relevant advanced computer science topics.
4. To equip students with a range of advanced practical computing skills.
5. To equip students with professional skills in project management and team work.
6. To develop and improve skills in written and oral communication.
7. To provide students with the opportunities to acquire research skills.
8. 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.
9. To provide a programme which meets the accreditation requirements of the appropriate professional bodies, thus providing a basis for further professional development and lifelong learning.
10. To provide a programme of study which meets FHEQ at Masters level and which takes appropriate account of subject benchmarks in QAA Computer Science at the Masters level and UK professional standards.

11 Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, practical skills and other attributes in areas of computer science that are consistent with FHEQ Level 7 study.

Knowledge and Understanding

On completing the programme students should have:

- A1** Background knowledge in advanced computer science concepts.
- A2** An advanced understanding of the fundamental principles and theories of computer science.
- A3** Advanced knowledge and understanding in the specific areas of computer science chosen as part of their study.
- A4** Knowledge and understanding of software development techniques.

A5 Knowledge and understanding of the role of computing and computer science in society.

Teaching and Learning Methods

The primary method of imparting knowledge and understanding (A1-A5) is lectures supported by practical work in tutorial classes and laboratories. Students will be encouraged to deepen understanding by independent reading in the relevant technical and scientific literature. This is supported by guidance in information literacy skills, given during induction and prior to the group and individual projects, and subject-specific guidance given in lectures. The group and individual projects also provide an important role, allowing students to strengthen and apply the knowledge they have gained and thus deepen their understanding.

Assessment Strategy

Assessment of the technical knowledge and understanding (A1-5) is through a combination of unseen written examinations and assessed coursework in the form of coursework reports, project reports and presentations.

Intellectual Skills

On completing the programme students should be able to:

- B1** Critically evaluate research and literature relating to a wide range of computer science topics.
- B2** Be creative and innovative in the solution of computer based problems.
- B3** Critically evaluate, both theoretically and empirically, alternative solutions.
- B4** Develop computing systems by applying professional judgements to balance risks, costs, benefits, safety, reliability, aesthetics and environmental impact.
- B5** Evaluate and use appropriate computer based support tools and techniques.
- B6** Plan, conduct and report a programme of novel investigative work.

Teaching and Learning Methods

Intellectual skills (B1-6) are introduced and practised throughout the taught modules taken by the students. In particular, the taught modules make use of appropriate case studies in practical and tutorial classes to address these skills. Specific research skills are introduced through lectures on research methods (B1,B3,B5,B6). Both the team and individual student projects provide an important opportunity for students to apply and develop all these skills (B1-B6). Small group and one-to-one project supervision is employed in the team and individual projects to ensure students receive the support needed.

Assessment Strategy

Research and design skills (B1-6) are assessed by the practical coursework assessments and by the reports and presentations associated with the team and individual projects. Analysis and problem solving skills (B2-5) are further assessed through unseen written examinations. Note that the reports, presentations and final dissertation associated with the individual research project are seen as key assessments for these intellectual skills.

Practical Skills

On completing the programme students should be able to:

- C1** Apply advanced practical skills in the specific areas of computer science chosen as part of their study.
- C2** Design, model and implement computer based systems.
- C3** Apply appropriate engineering techniques to a range of computer based problem areas.

- C4** Use the scientific literature effectively to search for information to address research problems.
- C5** Prepare technical reports and give technical presentations.
- C6** Manage a research project.

Teaching and Learning Methods

Practical skills (C1-6) are developed through hands on practical exercises, coursework assignments and project work. Support for this is provided by lectures, tutorials, and practical classes. Both the team project and individual research project provide an important opportunity for students to develop these skills (C1-6) supported by appropriate feedback from team monitors and project supervisors.

Assessment Strategy

Practical skills (C1-6) are assessed through various coursework assignments associated with taught modules and through the range of project deliverables (e.g. progress reports, presentations, demonstrations and dissertation) associated with the team and individual projects.

Transferable/Key Skills

On completing the programme students should be able to:

- D1** Communicate effectively (verbally and in writing).
- D2** Have an ability to work effectively as part of a team.
- D3** Develop novel ideas and solutions to engineering and scientific problems.
- D4** Manage resources and time, plan, organise and prioritise work effectively to meet deadlines.
- D5** Use information and communications technology.
- D6** Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry.
- D7** Learn effectively for the purpose of continuing professional development and in a wider context throughout their career.

Teaching and Learning Methods

Transferable skills (D1-7) are developed through coursework exercises in the taught modules and project work. Basic communication skills (D1) will be acquired through the team and individual projects. These are then developed and enhanced through feedback on written reports and presentations. Support for this is provided by supervisory meetings and the research methods module. The team working skills (D2) are directly developed during the team project. Deadlines for submission of coursework and reports are enforced, encouraging students to develop time and resource management skills (D4). Note that the individual research project provides an important role in developing these key skills (D1,D3-7).

Assessment Strategy

Transferable and communication skills (D1,D3-D7) are assessed throughout the taught modules via coursework exercises (including reports and presentations) and by progression monitoring activities. The team project directly assesses students' ability to work as part of a team (D2). The individual research project includes reports, presentations and a final dissertation which are important elements in assessing these skills (D1,D3-7).

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The programme is studied over one year full-time. There is a single stage to the programme, requiring the study of 180 credits. A 10 credit module consists of 100 hours of student effort, covering lectures, practical classes, small group teaching and private study, completion of coursework and revision. The typical modules vary in size from 5 credits to 15 credits. There is one 90-credit module containing the individual project.

An overview of the structure of the programme is given below:

Semester 1

Is divided into three phases within each of which a student takes 20 credits:

Phase 1: Students take one of the following programming modules

CSC8404: Advanced Programming in Java (10 credits)

CSC8406: Object-Oriented Programming (10 credits)

and choose one of the following modules

CSC8103: Distributed Algorithms (10 credits)

CSC8201: The Challenge of Dependable Systems (10 credits)

Phase 2: Students choose two modules from the modules below:

CSC8104: Enterprise Middleware (10 credits)

CSC8105: System Validation (10 credits)

CSC8106: System Design (10 credits)

CSC8202: Information Security and Trust (10 credits)

Phase 3: Students choose two modules from the modules below:

CSC8102: System Security (10 credits)

CSC8110: Cloud Computing (10 credits)

CSC8111: Machine Learning (10 credits)

CSC8204: High Integrity Software Development (10 credits)

Semester 2

Students take 15 credits of taught modules, undertake a team project module and begin their research project. A student will take the following compulsory modules

CSC8205: Research Skills (5 credits)

CSC8206: Group Project in CSR (15 credits)

and choose one module from the following

CSC8101 Big Data Analytics (10 credits)

CSC8203: Human Factors Engineering (10 credits)

Students will also begin their research project

CSC8499: Project and Dissertation for MSc in ACS (30 credits)

Semester 3

Students complete their research project

CSC8499: Project and Dissertation for MSc in ACS (60 credits)

Key features of the programme (including what makes the programme distinctive)

The MSc in Advanced Computer Science will deliver trained postgraduate students who have advanced knowledge, understanding and skills that will equip them for a career in Academia or IT Industry. Particular features of the programme are:

- Flexible programme of study that students can tailor to their individual interests and needs.

- Provides students with a well-rounded computer science research training to promote development of skills in computer and information systems.
- Enhances employment possibilities in the IT industry.
- Provides students with a foundation to begin a career in an industrial or academic research environment.
- Provides training to students to develop both technical and professional skills to underpin personal development and future career success.

Programme regulations (link to on-line version)

<http://www.ncl.ac.uk/regulations/programme/>

13 Criteria for admission

Entry qualifications

Good Honours degree (2.2 or above) or equivalent in Computing Science, Software Engineering or a discipline with a significant computing component (e.g. Engineering including Systems Engineering and Mathematics).

Admissions policy/selection tools

Standard application via University online application process. Prospective students are offered places based on entry qualifications.

Non-standard Entry Requirements

Science and Engineering graduates with several years' industrial experience will also be considered. Holders of professional qualifications in computing will also be considered.

Level of English Language capability

IELTS 6.5 (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 induction programme that will incorporate aspects of the Faculty of Science, Agriculture and Engineering induction programme. Students will be given a general introduction to University life and the University's principle support services and general information about the School and their programme, as described in the Degree Programme Handbook. 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.

Numeracy support is available through Maths Aid and help with academic writing is available from the Writing Development Centre (further information is available from the Robinson Library).

Academic and Pastoral support

Each undergraduate and taught postgraduate student will be assigned a personal tutor.* A personal tutor is one part of a wider network of advice and guidance available to students to support their personal and general academic development. The module leader acts as the first point of contact for subject-specific academic advice. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Student-Staff Committee, and/or at the Board of Studies. Within the academic unit, students may also receive additional academic and pastoral advice from a range of other student-facing staff including degree programme directors, dissertation/project supervisors, and administrative support staff.

*Arrangements may vary for students taking special types of provision.

The University also offers a wide range of institutional services and support upon which students can call, such as the Writing Development Centre, Careers Service and Student Wellbeing Service. This includes one-to-one counselling and guidance or group sessions / workshops on a range of topics, such as emotional issues e.g. 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 Student Union 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 team 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-session 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

All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the Board of Studies and/or the School Teaching and Learning Committee. Student opinion is sought at the Student-Staff Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Learning, Teaching and Student Experience Committee.

Programme reviews

The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Learning, Teaching and Student Experience Committee. The FLTSEC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the Faculty Learning, Teaching and Student Experience Committee.

External Examiner reports

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

Student evaluations

All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Student-Staff Committee, and the Board of Studies. The results from student surveys are considered as part of the Annual Monitoring and Review of the programme and any arising actions are captured at programme and School / institutional level and reported to the appropriate body.

Mechanisms for gaining student feedback

Feedback is channelled via the Student-Staff Committee and the Board of Studies.

Faculty and University Review Mechanisms

Every six years degree programmes in each subject area undergo periodic review. This involves both the detailed consideration of a range of documentation, and a review visit by a review team (normally one day in duration) which includes an external subject specialist and a student representative. Following the review a report is produced, which forms the basis for a decision by University Learning, Teaching and Student Experience Committee on whether the programmes reviewed should be re-approved for a further six year period.

Accreditation reports

The BCS have approved this programme for accreditation for CIPF Further Learning Element, CEng/Csci (Partial Fulfilment).

16 Regulation of assessment

Pass mark

The pass mark is 50%

Course requirements

Progression is subject to the University's Masters Degree Progress Regulations, Taught and Research and Examination Conventions for Taught Masters Degrees. There are reassessment opportunities, with certain restrictions. Limited compensation up to 40 credits of the taught element and down to a mark of 40% is possible for candidates who commenced their programme in 2013/14 or earlier. For students starting their programme in 2014/15 or later, no compensation is possible.

The University employs a common marking scheme, which is specified in the Taught Postgraduate Examination Conventions, namely:

Summary description applicable to postgraduate Masters programmes

<50	Fail
50-59	Pass
60-69	Pass with Merit
70 or above	Pass with Distinction

Progression within the MSc degree in Advanced Computer Science

Two assessed components comprise the MSc degree in Advanced Computer Science:

- Component 1: Seven 10 credit modules, one 5-credit module and a 15 credit group project module.
- Component 2: 90 credit individual project with dissertation module.

In order to be permitted to start Component 2 a candidate must

- obtain a weighted average mark for Component 1 of at least 50,
- and have failed no more than 20 credits.

Award of the MSc degree in Advanced Computer Science

To obtain the MSc degree, candidates must satisfy the examiners in both assessed components as follows.

- A student will be recommended for the *award of MSc with Distinction* if at the first attempt they have achieved a pass mark in 160 credits with a weighted average mark across all 180 credits of at least 70 and have a Component 2 mark of at least 70.
- A student will be recommended for the *award of MSc with Merit* if at the first attempt they have achieved a pass mark in 160 credits with a weighted mark across all 180 credits of at least 60 and have a Component 2 mark of at least 60.
- A student will be recommended for the *award of MSc* if they have achieved a pass mark in 160 credits with a weighted average mark across all 180 credits of at least 50.

Role of the External Examiner

An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching and Learning Committee, following recommendation from the Board of Studies. The External Examiner is expected to:

- i. See and approve assessment papers
- ii. Moderate examination and coursework marking
- iii. Attend the Board of Examiners
- iv. 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/>

The Degree Programme Handbook: <http://www.cs.ncl.ac.uk/teaching/handbooks/current/>

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

Intended Learning Outcome	Module codes (Compulsory in Bold)
A1	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203
A2	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
A3	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
A4	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8110, CSC8111, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
A5	CSC8201, CSC8104, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8203
B1	CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
B2	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
B3	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
B4	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
B5	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
B6	CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
C1	CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
C2	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
C3	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
C4	CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
C5	CSC8103, CSC8201, CSC8104, CSC8105, CSC8202,

	CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
C6	CSC8205, CSC8206, CSC8499
D1	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
D2	CSC8206
D3	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
D4	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
D5	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499
D6	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8206, CSC8499
D7	CSC8404, CSC8406 , CSC8103, CSC8201, CSC8104, CSC8105, CSC8202, CSC8110, CSC8111, CSC8102, CSC8106, CSC8204, CSC8108, CSC8203, CSC8205, CSC8206, CSC8499