

PROGRAMME SPECIFICATION



1	Awarding Institution	Newcastle University
2	Teaching Institution	Newcastle University
3	Final Award	MSc
4	Programme Title	Cloud Computing
5	Programme Code	5056
6	Programme Accreditation	British Computer Society
7	QAA Subject Benchmark(s)	Computing
8	FHEQ Level	Level 7
9	Last updated	16/04/14

10 Programme Aims

1. To equip students with the skills and knowledge required to develop and assess cloud computing applications
2. To provide a qualification enhancing employment prospects in cloud computing
3. To develop research skills
4. To develop and improve key skills in written and oral communication and in teamwork
5. To develop and improve skills in using the literature and information technology resources relevant to internet based distributed computing
6. To encourage the development of creativity skills
7. To develop skills in critical assessment, analysis and storage of information
8. 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
9. To address the relevant professional, legal and ethical issues relevant to the development, assessment and maintenance of Internet and enterprise applications
10. To provide an international perspective on developments in distributed enterprise computing
11. To provide a programme which meets the FHEQ at Masters level and takes appropriate account of the draft subject benchmark statements in Computing.

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 be able to demonstrate knowledge and understanding of:

- A1. Programming tools and techniques necessary for structuring cloud applications
- A2. Web and Grid services middleware
- A3. Java/CORBA component middleware
- A4. Fundamental algorithms of distributed systems
- A5. Information management
- A6. Design, implementation, testing and validation of distributed applications
- A7. Techniques for improving security of network-based applications
- A8. Future trends in networked information systems

A9. Understanding of major professional, social, legal and ethical issues associated with work in cloud computing applications

Teaching and Learning Methods

The primary means of imparting knowledge and understanding is through lectures, associated coursework and project work (A1-A9). The course is based on a mixture of taught modules and project work. Taught module: a given course module is either a traditional taught module involving lectures supplemented by laboratory course work or a continually assessed, seminar-based guided reading module (that enforces A8), involving extensive student participation. Independent learning is encouraged through the provision of reading lists, literature reviews and critical analysis of research papers, and ready access to online information resources. Adequate time is provided in all modules for private study for independent learning.

Assessment Strategy

Knowledge and understanding are assessed by unseen written examinations, student seminars and associated reports, coursework, group project reports and associated computer programs and an individual dissertation (A1-A9).

Intellectual Skills

On completing the programme students should be able to:

- B1. Carry out and write up an extended research project involving where appropriate a literature review, problem specifications, design, implementation, and analysis.
- B2. Be familiar with the process of software development
- B3. Have expertise in the use and applicability of up-to-date software development tools.
- B4. Design and implement new applications by composing and extending existing software components, services and applications.
- B5. Analyse system requirements and the production of system specifications.

Teaching and Learning Methods

B2-B5 feature prominently in all modules; the group project in particular requires students to work in teams and develop a working system. The individual project during the second half of the course requires students to carry out and write up an extended research project involving where appropriate a literature review, problem specification, design, implementation, and analysis (B1-B5).

Assessment Strategy

B1-B5 are assessed by coursework consisting of reports plus computer programs, group project reports, plus individual dissertation.

Practical Skills

On completing the programme students should be able to:

- C1. Critically evaluate research and literature relating to networking, distributed applications
- C2. Use and evaluate appropriate tools and techniques
- C3. Undertake critical evaluation (both theoretical and empirical) of alternative solutions
- C4. Solve system design problems

Teaching and Learning Methods

Practical skills feature in all modules since all involve an amount of coursework (C4). This is especially so in the group and individual projects where students need to select, evaluate and apply appropriate tools and techniques (C2). Here and elsewhere students will need to investigate possible alternatives in the technical and professional literature (C1, C3). Practical skills are also developed through seminars, and individual and group projects.

Assessment Strategy

C1-C4 are assessed by unseen written examinations, student seminars and associated reports, coursework, group project reports and associated computer programs and individual dissertation.

Transferable/Key Skills

On completing the programme students should have skills in:

- D1. Oral communication
- D2. Written communication
- D3. Use of computer based literacy resources
- D4. Working as part of a team
- D5. Creativity
- D6. Planning and organisation

Teaching and Learning Methods

Oral presentation skills are exercised by group discussions during group project exercises, and by the preparation of oral presentations on specific research topics (D1). Written communication skills are developed during independent study, the preparation of coursework, web page design, poster presentation and through the completion of the research project proposal and the project thesis (D2). Formal lectures and practicals address the use of online literacy resources and research techniques, reinforced through the use of practical exercises (D3). The group project develops team skills, creativity, planning and organisation (D4, D5, D6). The preparation and execution of the individual project address creativity, planning and organisation skills (D5, D6).

Assessment Strategy

D1-D6 are assessed through coursework, the group and individual projects, and student seminars.

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

All modules are compulsory. The course has 180 Credits.
 The full-time version of the course will last one whole year and will be split in two halves. The first half, from mid-September to March comprises taught components covering the generic subject areas required in an MSc: advanced knowledge, transferable and personal skills and team working culminating in a group project. In addition, students will undertake preparatory work for their individual systems projects. The second half will be taken up entirely by the individual systems project work with dissertation.
 The first half of the course is composed of seven taught modules of 10 credits each, one 5-credit seminar-based guided reading module and a 15-credit group project module.

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

Subject to agreement with industry, the project work can be undertaken with a sponsoring company.

To gain professional accreditation students must have passed a practical problem-solving project at the first attempt.

Modules in the first semester are taught in intensive mode.

Programme regulations (link to on-line version)

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

13 Criteria for admission*Entry qualifications*

The MSc is intended for graduates with a first degree in computing science (minimum 2(ii) standard) or mature candidates with relevant industrial experience (typically, industrial experience that qualifies the candidate to membership of the British Computer Society is considered sufficient).

Admissions policy/selection tools

Suitable applicants are made an offer without interview as soon as possible after their application forms have been received and considered.

Non-standard Entry Requirements

Science and Engineering graduates with several years' IT industrial experience will also be considered. Holders of professional qualifications in computing (e.g. MBCS) will also be considered.

Additional Requirements

None.

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. New 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. New and continuing students will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. 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.

The School of Computing Science has well equipped computer laboratories consisting of networked PCs. Key software used in the support and delivery of the programme is available to students free of charge. A workstation room for the exclusive use of these students has been made available.

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 CITP Further Learning Element, CEng/Csci (Partial Fulfilment).

Additional mechanisms

None.

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

Summary description applicable to postgraduate Certificate and Diploma programmes

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

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/>

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	CSC8104, CSC8106, CSC8108, CSC8404, CSC8111.
A2	CSC8110, CSC8104, CSC8111, CSC8199.
A3	CSC8104.
A4	CSC8103, CSC8111.
A5	CSC8110.
A6	CSC8106, CSC8109, CSC8111.
A7	CSC8202.
A8	CSC8205.
A9	CSC8205 CSC8109.
B1	CSC8199.
B2	CSC8106, CSC8404.
B3	CSC8104, CSC8109 CSC8108.
B4	CSC8110, CSC8104, CSC8111.
B5	CSC8106.
C1	CSC8205, CSC8199.
C2	CSC8109, CSC8199.
C3	CSC8103, CSC8199, CSC8202.
C4	CSC8106, CSC8109, CSC8199.
D1	CSC8205, CSC8199.
D2	CSC8110, CSC8103, CSC8104, CSC8106, CSC8108, CSC8199.
D3	CSC8110, CSC8103, CSC8104, CSC8106, CSC8108, CSC8199, CSC8404, CSC8111.
D4	CSC8109.
D5	CSC8109, CSC8404.
D6	CSC8109, CSC8205, CSC8199.