| PROGRAMME SPECIFICATION |  |
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| **1** | **Awarding Institution** | Newcastle University |
| **2** | **Teaching Institution** | Newcastle University |
| **3** | **Final Award** | BEng |
| **4** | **Programme Title** | Electronics and Computer Engineering |
| **5** | **UCAS/Programme Code** | H652 |
| **6** | **Programme Accreditation** | IET |
| **7** | **QAA Subject Benchmark(s)** | Engineering / Computing |
| **8** | **FHEQ Level** | H |
| **9** | **Date written/revised** | October 2007 |

## 10 Programme Aims

The programme aims:

- to provide opportunities for students to undertake a broad-based education in electronics and computer engineering and to acquire appropriate knowledge and understanding, of engineering skills and key skills,
- to produce graduates who will be equipped to enter employment in industry, the professions or public service, or to follow a postgraduate route into research, industry or academia, or apply the skills learnt in a range of areas other than engineering,
- to produce graduates who will meet the accreditation requirements of the Institution of Electrical Engineers, subject to the completion of matching studies,
- to provide a programme which meets the FHEQ at Honours level and which takes appropriate account of the subject benchmark statements in Engineering and Computing.

## 11 Learning Outcomes

The programme outcomes have references to the benchmark statements for Engineering (E) and Computing (C)

### Knowledge and Understanding

A successful student will have gained and be able to demonstrate:

1. Basic mathematics, science and technologies relevant to electronics and computer engineering (E, C).
2. The fundamental concepts, principles and theories of electronics and computer engineering (E, C).
3. Business and management techniques that are relevant to electronics and computer engineering (E).
4. Detailed knowledge and understanding of the essential facts, concepts, principles and theories relevant to the student's chosen area of specialisation within electronics and computer engineering (E).
5. The application of IT principles and tools as appropriate to the role of a electronics and computer engineer (E, C).
6. The components and materials used by electronics and computer engineers (E).
7. Business practices and experience of tools used in the field of engineering for the management of engineering projects (E, C).
8. Safe working practices as they apply the field of electronics and computer engineering (E).

9. Critical evaluation and testing techniques to analyse the extent to which a computer-based system meets the criteria for its use and further development (C).

**Teaching and Learning Methods**

Acquisition of 1, 2 and 5 is through a combination of lectures, tutorials, example classes, laboratory experiments, coursework and projects in Stages 1 and 2.
Acquistion of 5 is also through simulation exercises, CAL and CAD.
Acquisition of 3 is through a combination of lectures, supervisions, coursework and projects in Stages 2 and 3.
Acquisition of 4 is through a combination of lectures, laboratory experiments, coursework and projects in Stage 3.
Acquisition of 6 is through lectures, laboratory experiments, tutorials and project work throughout the programme.
Acquisition of 7 is through a combination of lectures, seminars, coursework and projects, especially in Stages 2 and 3 and through project work in Stages 2 and 3.
Acquisition of 8 is through specific lectures and workshop practice in Stage 1 and is also addressed as appropriate during lecture and laboratory work throughout the course.
Acquisition of 9 is through lectures, coursework and projects in all three stages.

Throughout the course the learner is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.

**Assessment Strategy**

Testing the knowledge base is through a combination of unseen written examinations (1-6), and assessed coursework (1-9) in the form of laboratory reports (1-8), essays (7), coursework reports (1-7,9) and project reports and presentations (2-9).

**Intellectual Skills**

On completing the programme students should be able to:

1. Plan, conduct and report a programme of investigative work.
2. Analyse electronic and computer systems (E, C).
3. Design a circuit. program or system to meet a specification (E, C).
4. Be creative in the solution of problems and in the development of designs (E, C).
5. Evaluate designs and consider improvements (E, C).
6. Integrate and evaluate information and data from a variety of sources (E, C).
7. Determine the appropriate mathematical tools for the solution of problems in computer systems engineering (E, C).
8. Determine the correct model to use in the analysis of electronic and software systems. (E, C).
9. Determine the correct theoretical and computer-based techniques to use for the analysis of computer engineering problems and synthesis of circuits and systems. (E, C)

**Teaching and Learning Methods**

Intellectual skills are developed through the teaching and learning programme outlined above (and in section 11).
Analysis and problem solving skills are further developed through example classes, tutorials, coursework and project work.
Experimental, research and design skills are further developed through coursework activities, laboratory experiments, and projects. Creative and design skills are developed through design and project work.

**Assessment Strategy**

Analysis and problem solving skills are assessed through written examinations and coursework and through project work, which appears throughout the course.

Experimental, research and design skills are assessed through laboratory experiment reports, assignments and project reports, presentations and written examinations.
Creative and design skills are assessed through coursework written examinations and project work.

**Practical Skills**

On completing the programme students should be able to:

1. Execute safely a series of experiments (E).
2. Use laboratory equipment effectively to generate data and monitor the performance of circuits and systems (E, C).
3. Analyse experimental or computational results and determine their strength and validity (E, C).
4. Prepare technical reports.
5. Give technical presentations.
6. Use the scientific literature effectively (E, C).
7. Take notes effectively.
8. Use computational tools and packages (E, C).
9. Apply the appropriate mathematical tools for the solution of problems in computer systems engineering (E, C).
10. Apply the correct model to use in the analysis of electronic and software systems (E, C).
11. Apply the correct theoretical and computer-based techniques to use for the analysis of computer systems engineering problems and synthesis of circuits and systems. (E, C).
12. Apply project management techniques to the organisation of small projects (E, C).
13. Specify, design and construct circuits, systems and software (E, C).

**Teaching and Learning Methods**

Practical skills are developed through the teaching and learning programme outlined above (and in section 11).
Skills (1-4) are developed through laboratory experiments and project work and through safety lectures.
Skills (4-7,9) are taught through communications skills lectures and through practice throughout the course.
Skill 8 is taught through classes in Stages 1 and 2 in terms of general computational skills, specialist packages are introduced in particular courses.

**Assessment Strategy**

Assessment of skills (1-6) is through observed laboratory work, laboratory and project report writing and assessed presentations and demonstrations. Skill 8 is assessed directly by assignment and by written examination and by integration into project and laboratory work. Skill 9 is assessed through project work and through extended coursework. Skills (10-13) are assessed through written examination, assignments and project work

**Transferable/Key Skills**

A successful student will be able to:

1. Communicate effectively in writing, verbally and diagramatically (E, C).
2. Give oral presentations using a variety of visual aids (E).
3. Be able to effectively retrieve information (C) and organise data (E).
4. Apply mathematical skills (E).
5. Work as a member of a team (E, C).

6. Use information and communications technology (E, C).
7. Manage resources and time (E, C).
8. Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry (E).
9. Learn effectively for the purpose of continuing professional development and in a wider context throughout their career (E,C).

**Teaching and Learning Methods**

Transferable skills are developed through the teaching and learning programme outlined above (and in section 11).
Skills (1,2,7) are taught through classes and reinforced through feedback from laboratory and project reports and presentations.
Skill 3 is taught through laboratory work.
Skill 4 is integrated into the majority of the course.
Skill 5 is taught as part of group project activities in Stage 2.
Skill 6 and 7 are taught through courses in Stages 1 and 2 and through feedback related to laboratory and project work.
Skills 8 and 9 are inculcated throughout the course

**Assessment Strategy**

Skills (1,3) are assessed through coursework, laboratory and project reports.
Skill 2 is assessed through presentations.
Skill 4 is assessed throughout the course.
Skill5 is assessed as part of the group project activities in Stages 2 and 4
Skill 8 is assessed as part of specialist modules and through integration in other activities.
Other skills are not directly assessed.

## 12 Programme Curriculum, Structure and Features

**Basic structure of the programme**

Stage 1 aims to provide all the students with a firm foundation on which to build their future studies. A substantial mathematical base (A1) is provided through ENG1001, this is enhanced by mathematical techniques and introduced in other modules. Knowledge and understanding (A2-A5) is provided through the technical modules, which also serve to broaden and enhance intellectual abilities (B1-B3, B5, B6, B8). Practical work in the laboratory emphasises a project-based approach, this, together with computing classes, develops a range of practical (C1-C5) and transferable (D1-D4, D7, D8, D10) skills.

Stage 2 builds on the work of Stage 1, continuing the development of an understanding of mathematical methods (A1), especially in EEE2011. Knowledge and understanding (A2-A5) is increased through all modules. Project work again forms a major part of the practical work at this stage. In Stage 2 all students take part in a group project, which develops and exercises practical skills (C) as well as enhancing intellectual abilities.

A module on Project Management and a module on Professional Issues provides and enhances understanding of the requirements of the management of engineering programmes (A6-A9). This work is practised and assessed as part of the group project (B5,B7,C6-C10, D8, D9).

Stage 3 continues to enhance and expand the student's knowledge, understanding and intellectual abilities. However, as distinct from Stages 1 and 2, where all modules are compulsory, the student may now opt to specialise in particular aspects of electronics and computer engineering. All students take a module in business management to further their understanding of commercial engineering practice.

A major part of Stage 3 is the individual student project, which is a significant part of the training of a professional engineer. This project enables the development of intellectual ability

and practical and transferable skills as well as providing a mechanism for their assessment.

**Key features of the programme**

The normal Undergraduate year is arranged in three terms and is divided into two Semesters. Semester 1 is of twelve weeks, it is preceded by an induction week and followed by a period of examination for those topics completed in Semester 1. Semester 2 is also twelve weeks long and is followed by a second examination period

The course normally lasts three years, although it is possible to take a gap year.

Every Honours student studies 120 credits in each Stage (or year), resulting in BEng. candidates completing 360 credits by the end of their course. Candidates must successfully complete all parts of a stage before progressing to the next. Courses are pursued through full-time study, the only part-time study is limited provision for the repetition of failed modules.

All students follow the same programmes in Stages 1 and 2. In the third year students elect to follow a specialisation within electronics and computer engineering. Courses are common with the equivalent MEng programme up to the end of Stage 2 and it is possible for students to transfer between courses (subject to conditions) up to this point.

There is a Foundation Year for candidates not adequately qualified to embark on Stage 1 of Degree Programmes.

**Programme regulations (link to on-line version)**

http://www.ncl.ac.uk/regulations/programme/2007-2008/programme/h652_with_foundation_year_h653.php

**13 Criteria for admission**

Admission offers normally exceed the UK Engineering Council "SARTOR" minimum requirements for B.Eng with Chartered Engineer status (i.e. UK GCE A-level grades BCC including Mathematics and Science) for Stage 1 admission. In addition, the University recruits candidates with a wide range of equivalent qualifications based on its knowledge of SARTOR equivalents and other international qualifications. A limited number of international qualifications and HND holders with appropriate subjects and grades may be considered for direct entry to Stage 2.

Engineering requires a wide range of attributes and abilities, so selection is not solely based on academic grades. Selectors seek evidence of motivation and commitment from the Personal Statement and Reference on UCAS forms.

Notwithstanding adherence to SARTOR standards, the School is committed to widening access, particularly for "late developers". Links exist with the Engineering Access Course at Newcastle College and there is a Faculty Foundation Year (Stage 0) for those with insufficient science and mathematics to enter Stage 1 directly. Limited numbers of places may be available to Regional candidates through the University's "Partners Programme". All UCAS forms, including Late or Summer applications are considered, as well as candidates through Clearing.

Unlike many other Universities, the School is committed to retaining its B.Eng. programme, both in recognition of the number of international students who wish to graduate after three years and to avoid exclusion of potentially good applicants who either have no desire to seek an M.Eng qualification or have not yet been able to demonstrate M.Eng. academic standards. The first two years of B.Eng. and M.Eng. are essentially common and any candidate passing Stage 2 "with Merit" may enter Stage 3 M.Eng.

## 14 Support for Student Learning

*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 (see http://www.ncl.ac.uk/international/coming_to_newcastle/orientation.phtml)

*Study skills support*
Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification.

*Academic support*
The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Staff-Student Committee, and/or at the Board of Studies.

*Pastoral support*
All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. Details of the personal tutor system can be found at http://www.ncl.ac.uk/undergraduate/support/tutor.phtml
In addition the University offers a range of support services, including the Student Advice Centre, the Counselling and Wellbeing team, the Mature Student Support Officer, and a Childcare Support Officer, see http://www.ncl.ac.uk/undergraduate/support/welfare.phtml

*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. For further details see http://www.ncl.ac.uk/disability-support/

*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, see
http://www.ncl.ac.uk/undergraduate/support/acfacilities.phtml

All new students whose first language is not English are required to take an English Language test in the Language Centre. Where appropriate, in-sessional language training can be provided. The Language Centre houses a range of resources for learning other languages which may be particularly appropriate for those interested in an Erasmus exchange. See http://www.ncl.ac.uk/undergraduate/support/facilities/langcen.phtml

## 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 also considered at the Board of Studies. Student opinion is sought at the Staff-Student Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and Learning Committee.

*Programme reviews*
The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Teaching and Learning Committee.

*External Examiner reports*
External Examiner reports 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. The National Student Survey is sent out every year to final-year undergraduate students, and consists of a set of questions seeking the students' views on the quality of the learning and teaching in their HEIs. Further information is at www.thestudentsurvey.com/ With reference to the outcomes of the NSS and institutional student satisfaction surveys actions are taken at all appropriate levels by the institution.

*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, see http://www.ncl.ac.uk/aqss/qsh/internal_subject_review/index.php

*Accreditation reports*
These programmes are accredited by the Institute of Engineering and Technology.

## 16 Regulation of assessment

*Pass mark*
The pass mark is 40 (Undergraduate programmes)

*Course requirements*
Progression is subject to the University's Undergraduate Progress Regulations (http://www.ncl.ac.uk/calendar/university.regs/ugcont.pdf) and Undergraduate Examination Conventions (http://www.ncl.ac.uk/calendar/university.regs/ugexamconv.pdf). In summary, students must pass, or be deemed to have passed, 120 credits at each Stage. Limited compensation up to 40 credits and down to a mark of 35 is possible at each Stage and there are resit opportunities, with certain restrictions.

*Weighting of stages*
The marks from Stages 2 and 3 will contribute to the final classification of the degree
The weighting of marks contributing to the degree for Stages 2 and 3 is 25:75

*Common Marking Scheme*
The University employs a common marking scheme, which is specified in the Undergraduate Examination Conventions, namely

| | **Honours** | **Non-honours** |
|---|---|---|
| <40 | Fail | Failing |
| 40-49 | Third Class | Basic |
| 50-59 | Second Class, Second Division | Good |
| 60-69 | Second Class, First Division | Very Good |
| 70+ | First Class | Excellent |

*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:

- See and approve examination papers
- Moderate examination and coursework marking
- Attend the Board of Examiners
- Report to the University on the standards of the programme

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

The University Prospectus (see http://www.ncl.ac.uk/undergraduate/)

The School Brochure (contact enquiries@ncl.ac.uk)

The University Regulations (see http://www.ncl.ac.uk/calendar/university.regs/)

The Degree Programme Handbook

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.

**Annex**

## Mapping of Intended Learning Outcomes onto Curriculum/Modules

| Intended Learning Outcome | Module codes (Comp/Core in Bold) |
|---|---|
| A1 | **EEE2011, CSC1001, CSC1002, ENG1001, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** |
| A2 | **CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** |
| A3 | **EEE2008, ENG2001** |
| A4 | **EEE3095**, *final year optional modules* |
| A5 | **CSC1001, CSC1002, CSC2001, CSC2003, EEE1005, EEE2008, EEE3095.** |
| A6 | **CSC1001, CSC1002, CSC2001, CSC2003** |
| A7 | **EEE2007, EEE2008, EEE3095, ENG2001** |
| A8 | **Integrated into laboratory programme supporting, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2008** |
| A9 | **CSC1001, CSC1002, CSC2001, CSC2003,** *final year options* |
| B1 | **EEE2007, EEE2008, EEE3095, CSC1001, CSC1002, CSC2001, CSC2003** *plus integrated laboratory programme.* |
| B2 | **CSC1001, CSC1002, CSC2001, CSC2003, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004,** *plus final year optional modules.* |
| B3 | **EEE1002, EEE2007, EEE2008, EEE3095** |
| B4 | **EEE1002, EEE2008, EEE3095, CSC2002** |
| B5 | **EEE1002, EEE2007, EEE2008, EEE3095, CSC2002** |
| B6 | **EEE2007, EEE2008, EEE3095** |
| B7 | **CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** *plus final year optional modules.* |
| B8 | **CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** *plus final year optional modules.* |
| B9 | **CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** *plus final year optional modules.* |
| C1 | **EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2008, EEE2004,** *plus integrated laboratory programme.* |
| C2 | **Integrated into laboratory programme supporting EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2008, EEE2004, CSC2001, CSC2003** |
| C3 | **Integrated into laboratory programme supporting CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2008, EEE2004, CSC2001, CSC2003** plus **EEE3095** |
| C4 | **Integrated into laboratory programme supporting CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2008, EEE2004, CSC2001, CSC2003** plus **EEE3095** |
| C5 | **EEE1005, EEE2008, EEE3095** |
| C6 | **EEE1005, EEE2008, EEE3095** |
| C7 | All taught modules. |
| C8 | **Integrated into laboratory programme supporting CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** *plus* |

| | |
|---|---|
| | *final year optional modules.* |
| C9 | **Integrated into laboratory programme supporting CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** *plus final year optional modules.* |
| C10 | **Integrated into laboratory programme supporting CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** *plus final year optional modules.* |
| C11 | **Integrated into laboratory programme supporting CSC1001, CSC1002, EEE1002, EEE1003, EEE1005, EEE2006, EEE2007, EEE2004, CSC2001, CSC2003** *plus final year optional modules.* |
| C12 | **EEE2007, EEE2008, EEE3095** |
| C13 | **CSC1001, CSC1002, EEE2008, EEE3095 CSC2001, CSC2003** *plus final year optional modules and integrated into laboratory programme supporting EEE1002, EEE1003, EEE1005* |
| D1 | **CSC1001, CSC1002, CSC2001, CSC2003, EEE1005, EEE2008, EEE3095 and integrated laboratory programme supporting EEE1002, EEE1003**. |
| D2 | **EEE1005, EEE2008, EEE3095** |
| D3 | **EEE2007, EEE2008, EEE3095 and integrated laboratory programme supporting EEE1002, EEE1003, EEE1005**. |
| D4 | **ENG2001, EEE2011** *and integrated into the majority of EEE modules.* |
| D5 | **EEE2007, EEE2008 plus integrated laboratory programme.** |
| D6 | **EEE1005, EEE2008.** |
| D7 | **EEE1005, EEE2007, EEE2008, EEE3095 plus integrated laboratory programme supporting EEE1002, EEE1003.** |
| D8 | **Particularly project work in EEE2007, EEE2008, EEE3095 but also inculcated in the rest of the course.** |
| D9 | **Inculcated throughout the course.** |