UNIVERSITY
OF
NEWCASTLE UPON TYNE

DEGREE PROGRAMME SPECIFICATION

1.Awarding Institution:	University of Newcastle upon Tyne
2.Teaching Institution:	University of Newcastle upon Tyne
3. Programme Accredited by:	IEE
4.Final Award:	B.Eng. (Hons)
5.Programme Titles:	Computer Systems Engineering
6. UCAS codes:	H652
7. QAA Benchmarking Groups	Engineering, Computing
8. Date of production / revision	February, 2004

9. Educational Aims of the Programme

The programme aims:

- to provide opportunities for students to undertake a broad-based education in computer systems 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 qualification which meets the designated learning outcomes at level 3 of the National Qualifications Framework and meets the requirements of the National Subject Benchmarks in Engineering and Computing.

10.Programme 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 Engineering (E) and Computing.
The typical (modal) student will have:

A Knowledge and understanding

Knowledge and understanding of:

1. Basic mathematics, science and technologies relevant to computer systems engineering (E, C).
2. The fundamental concepts, principles and theories of computer systems engineering (E, C).
3. Business and management techniques that are relevant to 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 computer systems engineering (E).
5. The application of IT principles and tools as appropriate to the role of a computer systems engineer (E, C).
6. The components and materials used by computer systems 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 computer systems 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/learning methods and strategies

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

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).

B Intellectual Abilities

Intellectual (thinking) skills 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/learning methods and strategies

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

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.

C. Practical skills

The skills 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/learning methods and strategies

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

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

D General Transferable Skills

The skills 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/learning methods and strategies

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

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.

11. Programme structures: credits, modules, levels and awards.

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 computer systems engineering. Courses are common with the equivalent BEng 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.

(Refs: Newcastle University Undergraduate Progress Regulations; http://www.newcastle.ac.uk/calendar/volume1.html)

Stage 1

Module code	Credit	Descriptive Title
CSC161	20	Problem Solving, Program Design and Development
CSC162	20	Object Oriented Program Design and Development
EEE102	10	Circuit Theory
EEE103	10	Analogue Electronics I
EEE106	10	Digital Electronics I
EEE107	10	Linear Systems and Signals I
EEE110	5	Basic Manufacturing Techniques for Microelectronics
EEE122	5	Computer Engineering I
EEE121	5	Communication Studies
MAS164	10	Discrete Mathematics for Computing Science
ENM107	15	Engineering Mathematics IM

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 MAS164 and ENM107, 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

Module code	Credit	Descriptive Title
CSC261	20	Advanced Programming
CSC263	20	Computer Systems and Networks
EEE202	10	Linear Systems and Signals II
EEE204	10	Digital Electronics II
EEE207	10	Communications
EEE205	10	Automatic Control
EEE215	20	Microprocessor System Design and Group Project
EEE210	10	Project
EEE212	5	Project Management
ENM226	5	Discrete Transforms

Stage 2 builds on the work of Stage 1, continuing the development of an understanding of mathematical methods (A1), especially in ENM226 and EEE202. 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

Compulsory

Module code	Credit	Descriptive Title
CSC262	20	Requirements Analysis and Database Design **or**
CSC264	20	Modelling and Computation
EEE203	10	Analogue Electronics II
EEE305	10	Digital Signal Processing
EEE350/353/354	40	Individual project and Dissertation including exercises in Communication Skills
ENG201	10	Introduction to Business Management

30 credits selected from the following OPTION LIST list

OPTION LIST

Module code	Credit	Descriptive Title
CSC301	10	Operating Systems
CSC305	10	Parallel Computation
CSC306	10	Graphics
CSC307	10	Human-Computer Interaction
CSC308	10	Software Project Management
CSC309	10	Distributed Systems
CSC310	10	Real-Time Systems
CSC311	10	Reliability and Fault-Tolerance
CSC325	10	Neural Networks
CSC326	10	Communication Protocols
CSC329	10	Advanced Computer Architecture
CSC331	10	System and Network Security
CSC332	10	Internet Technologies and Electronic Commerce
CSC334	10	Understanding Programming Languages
CSC335	10	Performance Evaluation
EEE301	10	Control Systems
EEE308	10	Digital Electronics III
EEE309	10	Industrial Automation
EEE314	10	Embedded Systems
EEE402	10	Design Tools for Digital Systems
EEE404	10	Design of VLSI Systems
EEE405	10	Image Processing and Machine Vision
EEE408	10	Telecommunications
EEE409	10	Optoelectronics
EEE411	10	Digital Control

In addition to the modules listed above, candidates may choose modules in Engineering Mathematics and a modern foreign language (selected according to qualifications and experience) or, with the approval of the Degree programme Director, alternative module. 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 computer systems 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.

Refs: http://www.newcastle.ac.uk/calendar/eng/menge.html for degree programme regulations
http://eee.ncl.ac.uk/teaching/ug/index.htm for links to relevant hanbook and module pages

12. Support for Students

Services and facilities available to students include the following:

- Personal Tutor;
- Degree Programme Director;
- Year Tutor (stage manager);
- Student/staff ratio of 14.65;
- Induction activities for each stage;
- Study skills instruction in Stage 1 and University Web based materials;
- Library visits and instruction;
- Web based information including, Degree Programme Handbook Degree Regulations and Module sheets;
- University Computing Service and facilities (including extensive PC and UNIX provision, software applications, e-mail and internet access);
- University (Robinson) Library, including search facilities and inter-library loans;
- Private study areas in Merz Court and Claremont Tower
- Extensive laboratories;
- University Housing Office (which makes an offer of University accommodation to each first year student);
- University Careers Service;
- University Counselling Service;
- University Language Centre;
- Students' Union services, including societies, refectories and Student Advice Centre, further student refreshment and social areas are available in Merz Court and Claremont Tower;
- Centre for Physical Recreation and Sport;
- Student Progress Office;
- International Office;
- University Chaplaincy;
- Saville Medical Practice.

Ref: Degree Programme Handbook: http://eee.ncl.ac.uk/teaching/ug/index.htm
Undergraduate Prospectus 2003: http://www.ncl.ac.uk/undergraduate/
Newcastle University and You: http://www.ncl.ac.uk/services/welfare/nu.and.you/
University Student Handbook 1999;
Student Welfare Handbook http://www.ncl.ac.uk/services/welfare/whb /
University Student Handbook International Supplement 1999;
International Students' Handbook
Destination Newcastle 1999;
Student Accommodation 1999/2000 http://www.ncl.ac.uk/services/accom/
Careers Service Guide 1999;
UCS: http://www.ncl.ac.uk/ucs/
The Language Centre http://www.ncl.ac.uk/langcen/
Newcastle University Library http://www.ncl.ac.uk/library
Tutor's Handbook: http://www.ncl.ac.uk/internal/thb

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 and applicants are required to attend for interview whenever possible.

Notwithstanding adherence to SARTOR standards, the Department 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 Department 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. Methods of evaluating and improving the quality and standards of teaching learning and assessment

Mechanisms for review

- Subject review
- Taught Programme Review
- Module Review (including University Questionnaire Service returns)
- Graduating Student Questionnaire.
- Graduate Questionnaire (sent out two years after graduation)
- Stage Review Meetings (including Stage questionnaires for each Semester)
- Annual Revision of Regulations
- Annual Revision of Module Sheets
- Accreditation Reports
- HEFCE/QAA Reports
- External Examiners' Reports to VC
- Student/Staff Committee
- Stage 1 Small Group Tutorials
- Industrial Advisory Board
- Staff Meetings
- Student Representation on Committees
- Board of Studies
- Personal Tutors
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Committees with responsibilities for quality and standards

- University Teaching Committee
- Faculty Teaching Committee
- Faculty Policy & Resources Committee (for resource issues)
- Board of Studies
- Departmental Teaching Committee
- Departmental Policy & Resources Committee (for resource issues)
- Departmental Staff/Student Committee
- Board of Examiners
- University Staff/Student Committee

Staff Development activities

- All new staff complete Certificate in Learning & Teaching
- Biennial Appraisal linked to staff development
- Annual Board of Studies review of module delivery
- Annual Peer Review of Lecture Presentation

The following internal documentation is maintained:

: Preparing for Subject Review
: Guidelines for Taught Programme Review 1999
: Module Boxes,
: DTC minutes,
: Web based documentation, http://eee.ncl.ac.uk/
: I.E.E. Accreditation report, 1998
: HEFCE Quality Assessment Report 1997
: FTC Minutes
: FP&RC confidential Minutes, maintained by Faculty Asst. Registrar
: BoS. Minutes file,
: Staff/Student Minutes
: Exam. Board Minutes.

15. Regulation of Standards

Assessment rules

- The Assessment rules are given in the "Undergraduate Examination Conventions".
- The minimum pass mark is normally 40%.
- There is limited compensation for marks of 35-40% at all but the final Stage.
- Candidates for all but the final Stage may normally sit assessments on up to three occasions.
- All Honours candidates must complete a Stage before proceeding to the next.

Honours Classification

- Stages 2 and 3 contribute to the Honours classification in the ratio 25:75.
- The rules for the award of Honours are given in the "Undergraduate Examination Conventions"
- The Faculty awards degrees by *The Averaging Method* as specified in the Undergraduate Examination Conventions. Subject to the other provisions of those Conventions, the link between marks and classification is as given below:

Mark	Class of Honours
<40	Fail
40-49	Third Class
50-59	Second Class, Second Division
60-69	Second Class, First Division
70+	First Class

Role of the External Examiner

The External Examiners are involved in all Stages of assessment.

- Approval of Examination Papers
- Vetting in-course assessments and examination scripts
- Interviewing a selection of candidates prior to the June Examination Board
- Attending the June Board and participating in its deliberations
- Reviewing any subsequent special cases, either by correspondence or in special circumstances by subsequent visits to Newcastle.
- Returning a confidential report to the VC.

16.Indicators of Quality and Standards

- Annual External Examiners' Reports (Departmental and FTC reviews)
- Accreditation Reports
- Annual review of student destinations
- Annual Module and Stage Review process reported to Board of Studies
- Staff / Student Committee Minutes reviewed by Board of Studies
- Annual FTC review of Faculty intake (by Department) against SARTOR standards
- Annual FTC review of Faculty Stage 1 progression (by Department)
- Annual FTC review of student feedback questionnaires
- Biennial UTC "Taught Programme Review"
- Quinquennial UTC "Subject Review"

Warning

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve if they take advantage of the opportunities provided. More detailed information on the specific learning outcomes, indicative content and teaching, learning and assessment can be found in the Degree Programme Handbook and other University documentation.

The information from this document may be selectively extracted and included in documents that are more appropriate for non-academic audiences, for example, students, intending students and employers.

Module Matrix: BEng(Hons) in Computer Systems Engineering

Stage 1

Module code	Credit	Descriptive Title	Know.	Intell. Abilities	Practical skills	Transf. Skills
CSC131	20	Introduction to Programming & Software Eng. In Java	O	O	O	O
CSC132	20	Algorithms and Data Structures in Java	O	O	O	O
EEE102	10	Circuit Theory	O	O	O	O
EEE103	10	Analogue Electronics I	O	O	O	O
EEE106	10	Digital Electronics I	O	O	O	O
EEE107	10	Linear Systems and Signals I	O	O	O	O
EEE122	5	Computer Engineering I	O	O	O	O
EEE110	5	BMT for Microelectronics	O	O	O	O
EEE121	5	Communication Studies	O		O	O
MAS164	10	Discrete Mathematics for Computing Science	O	O		O
ENM107	15	Engineering Mathematics IM	O	O		O

Stage 2

Module code	Credit	Descriptive Title	Know.	Intell. Abilities	Practical skills	Transf. Skills
CSC125	10	Software Engineering	O	O	O	O
CSC251	10	Object-oriented Design and Programming	O	O	O	O
CSC222	10	Concurrent and Event-driven Programming	O	O	O	O
CSC225	10	Hardware-Software Interface	O	O	O	O
CSC234	10	Computer Networks and Communications	O	O	O	O
CSC235	5	Professional Issues	O	O	O	O
EEE202	10	Linear Systems and Signals II	O	O	O	O
EEE204	10	Digital Electronics II	O	O	O	O
EEE205	10	Automatic Control	O	O	O	O
EEE207	10	Communications	O	O	O	O
EEE214	15	Microprocessor System Design and Project	O	O	O	O
EEE212	5	Project management	O	O	O	O
ENM226	5	Discrete Transforms	O	O		O

Stage 3

Module code	Credit	Descriptive Title	Know.	Intell. Abilities	Practical skills	Transf. Skills
EEE391	40	Individual project and Dissertation including exercises in Communication Skills	O	O	O	O
ENG201	10	Introduction to Business Management	O	O	O	O
EEE203	10	Analogue Electronics II	O	O	O	O
EEE301	10	Control Systems	O	O		O
EEE305	10	Digital Signal Processing	O	O		O
EEE308	10	Digital electronics III	O	O	O	O
EEE309	10	Industrial Automation	O	O	O	O
EEE402	10	Design Tools for Digital Systems	O	O		O
EEE404	10	Design of VLSI Systems	O	O		O
EEE405	10	Image Processing and Machine Vision	O	O	O	O
EEE408	10	Telecommunications	O	O		O
EEE409	10	Optoelectronics	O	O		O
EEE410	10	Satellite Engineering	O	O		O
EEE411	10	Digital Control	O	O		O
CSC227	10	Formal Specification of Software	O	O	O	O
CSC229	10	Databases	O	O	O	O
CSC301	10	Operating Systems	O	O	O	O
CSC305	10	Parallel Computation	O	O	O	O
CSC306	10	Graphics	O	O	O	O
CSC307	10	Human-Computer Interaction	O	O	O	O
CSC308	10	Software Project Management	O	O	O	O
CSC309	10	Distributed Systems	O	O	O	O
CSC310	10	Real-Time Systems	O	O	O	O
CSC311	10	Reliability and Fault-tolerance	O	O	O	O
CSC325	10	Neural Networks	O	O	O	O
CSC326	10	Communication Protocols	O	O	O	O
CSC329	10	Advanced Computer Architecture	O	O	O	O
CSC331	10	System and Network Security	O	O	O	O
CSC332	10	Internet Technologies and Electronic Commerce	O	O	O	O
CSC334	10	Understanding Programming Languages	O	O	O	O
CSC335	10	Performance Evaluation	O	O	O	O