UNIVERSITY OF NEWCASTLE UPON TYNE

FACULTY OF SCIENCE, AGRICULTURE & ENGINEERING

DEGREE PROGRAMME SPECIFICATION

UNIVERSITY OF NEWCASTLE

1.	**Awarding Institution**	University of Newcastle upon Tyne
2.	**Teaching Institution**	University of Newcastle upon Tyne
3.	**Final Award**	B.Eng.(Hons.)
4.	**Programme Title**	Bachelor of Engineering with Honours in Mechanical Engineering (Ref: Degree Programme Handbook: http://www.ncl.ac.uk/mech/undergrad/programme)
5.	**Programme Accredited by:**	I.Mech.E., I.E.E.,
6.	**UCAS Code**	B.Eng. with Honours in Mechanical Engineering H300 Foundation Year entry: (Ref: UCAS2004) H304
7.	**QAA Benchmarking Group(s)**	Engineering Benchmark (Benchmark Statements, QAA, Gloucester, 2002)
8.	**Date of production/revision**	(January 2002) revised April 2004, October 2004

9. Educational Aims of the Programme

The B.Eng. Honours programme aims to:

- provide early exposure to engineering science, manufacturing, materials and design.
- in the later stages, specialise in mechanical, manufacturing or design engineering.
- enable Graduates to be accredited at the appropriate level to develop into Chartered Engineers, but maintain the flexibility to move into other careers such as IT, management or consultancy.
- provide a qualification which meets the designated learning outcomes at level 3 (Honours - level) of the National Qualifications Framework and the QAA Benchmarks in Engineering

10. Intended Learning Outcomes; Teaching and Learning Strategies and Methods; Assessment Strategies and Methods

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

A. Knowledge & Understanding

A.1. Mathematical methods appropriate to Mechanical Engineering and related fields;
A.2. Core Engineering science with depth in selected areas consistent with an Honours degree;
A.3. Principles of IT with specific applications to selected fields of study;
A.4. Principles of Engineering Design including awareness of Codes of Practice;
A.5. Specific examples of Mechanical Engineering design and where appropriate design in other selected specialist fields;
A.6. Properties and characteristics of engineering materials and components;
A.7 Management principles and business practices;
A.8 Professional and ethical responsibilities;
A.9. Manufacturing practice and awareness of requirements for safe operation.

Teaching/learning methods and strategies:

Acquisition of A.1 and A.2 is through a combination of lectures, tutorials, example classes, laboratory activities and coursework.
Outcome A.3 is achieved by lectures, tutorials and, where appropriate, hands-on computer exercises.
Acquisition of A.4 and A.5 is partly by lecture and tutorial, but depends on case studies, student investigations, group tasks and presentations. Individual studies to greater depth are frequently needed during the Stage 3 and 4 projects.
Outcome A.6 depends primarily on lectures and tutorial studies.
The broader professional outcomes, A.7, are taught by lectures and coursework studies.
Outcomes A.8 and A.9 are formally taught in lectures, but is also central to experimental project investigations.

Assessment:

Formative assessment occurs through tutorial examples and coursework. The primary means of assessing factual knowledge is the closed book examination. This is supported by assessed coursework and case studies, which involve both written and oral presentations. In depth individual learning frequently forms part of the project, which is assessed by dissertation and viva voce examination.

B. Intellectual Abilities

B.1. Ability to select and apply appropriate mathematical methods for modelling and analysing relevant problems;
B.2. Use of scientific principles in the development of engineering solutions to practical problems in selected fields of study;
B.3. Use of scientific principles in the modelling and analysis of engineering systems, processes and products;
B.4. Ability to select and apply appropriate computer based methods for modelling and analysing problems in selected fields;
B.5. Analysis of systems, processes and components requiring engineering solutions;
B.6. Creation of new processes or products through synthesis of ideas from a wide range of sources;
B.7. Commercial risk evaluation;
B.8. Ability to produce solutions to problems through the application of engineering knowledge and understanding;
B.9. Ability to undertake technical risk evaluation.

Teaching/learning methods and strategies:

Where appropriate, B.1. is reinforced in lectures, but learning is principally in tutorials and assignments.
Outcomes B.2 – B.4. are initially encountered in lectures and practical classes, but are developed principally during the research project.
Acquisition of B.5. occurs through lectures and design studies and may form a major part of projects.
B.6. is introduced in lectures and developed through tutorials, design studies and the project.
Outcome B.7. is included in some optional lectures, but is primarily taught on an individual basis as part of the project supervision.

Assessment:

Unseen and open-book examinations are used to assess intellectual abilities.
Assessed coursework provides further opportunities to demonstrate intellect and ability.
The project, which is assessed by dissertation and viva voce examination, provides final evidence of the levels attained.

C. Practical Skills

C.1. Skill in the use of appropriate mathematical methods for modelling and analysing engineering problems in selected fields;
C.2. Use of relevant test and measurement equipment;
C.3. Experimental laboratory work;
C.4. Use of engineering IT tools in selected fields;
C.5. Ability to design a system, component or process in selected fields;
C.6. Practical testing of design ideas through laboratory work or simulation with technical analysis and critical evaluation of results;
C.7. Ability to search for information and develop ideas further;
C.8. Ability to apply engineering techniques taking account of industrial and commercial constraints;
C.9. Project Management.

Teaching/learning methods and strategies:

Outcomes C.1-C.3. are acquired principally through experience of the project.
Acquisiton of C.4. is initially through lectures, developed through hands-on exercises and assignments. Further individual learning may also form a significant part of the project.
C.5. is introduced through lectures and developed through case studies and design activities. It will frequently form a central part of the project.
Laboratory classes provide initial experience of C.6. and C.7., but the project forms the principal vehicle for their acquisition.
Outcome C.8. is introduced through lectures and developed by case studies. Some projects may require further individual learning in this area.
C.9. is introduced in lectures and developed through application to projects throughout the course.

Assessment

Outcomes C.1-C.8 are not explicitly assessed, but are necessary to complete successfully coursework and project requirements.

D. General Transferable Skills

D.1. Manipulation and sorting of data;
D.2. Presentation of data in a variety of ways;
D.3. Use of scientific evidence based methods in the solution of problems;
D.4. Use of general IT skills;
D.5. Use of creativity and innovation in problem solving;
D.6. Working with limited or contradictory information;
D.7. Effective communication;
D.8. Life long learning;
D.9. The Engineering approach to the solution of problems;
D.10. Time and resource management;
D.11. Teamwork and leadership.

Teaching/learning methods and strategies:

Outcomes D.1-D.7. may be introduced through examples in lectures. D.1-D.5 are developed further through assignments, laboratory exercises and design studies. Subsequently, the principal development of transferable skills occurs through involvement in the project.
D.8, D.9 and D.10 are implicit in much of the course, while D.11 is developed in design groups and laboratories.

Assessment

Skills D.1-D.3 are essential to complete examination and assignments to a satisfactory standard.
Acquisiton of D.4. and D.5. is demonstrated during the assessment of problems, case studies and the project.
Outcomes D.6 and D.7. are essential to complete satisfactorily the dissertation and project, which also requires command of outcomes D.1-D.5.

The above Learning Outcomes have been compared with the QAA Framework for Higher Education Qualifications Descriptor for a qualification at Honours degree level. They are believed to meet or exceed the requirements of that Descriptor.

11 Programme Features, Structure and Curriculum

The normal Undergraduate year is approximately 31 weeks, arranged in three terms and currently divided into two Semesters.

Every Honours student studies 120 credits in each Stage (or year). B.Eng. candidates conclude after Stage 3 (360 credits). Candidates must complete one Stage before proceeding to the next; the only part-time study is limited provision for the repetition of failed modules.

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

(Ref: Undergraduate Progress Regulations, Degree Programme Handbook: http://www.ncl.ac.uk/mech/undergrad/programme/)

Stages 1 and 2 of all Honours programmes are common. Modules are compulsory, except for provision to study a European language.

Stage 1

Module code	Credit	Descriptive Title
EEE135	10	Electrical Engineering I
ENM105	20	Engineering Mathematics I
MMM111/123	15	Fundamentals of Thermofluid Dynamics
MMM114	10	Materials Science I
MMM122/162	20	Design I (inc study skills)
MMM151/124	15	Mechanics I
MMM159	10	Manufacturing Technology & Management
Either:		
ENG101	10	Introductory Computing for Engineers
And MMM120	10	Fundamentals of Engineering Modelling
Or:		
LC*	20	Modern European Language (French, German or Spanish)

A substantial mathematical base (A.1) is provided in ENM105, together with a range of modules providing core Engineering knowledge (A.2-A.4,A.5,A.6,A.7 and A.9). The more analytical subjects also address intellectual abilities (B.2,B.4) and transferable skills (D.2). Laboratory classes cover both practical (C.1,C.2,C.3,C.5) and transferable (D.1-D.6) skills. Design provides a first exposure to a wide range of learning outcomes, generally including elements of new knowledge (A.4-A.8) and a broad range of intellectual activities (B.1-B.6)

Stage 2

Module code	Credit	Descriptive Title
MMM225	20	Analytical & Statistical Techniques
EEE235	10	Electrical Engineering II
MMM231/261	15	Mechanics of Solids II
MMM232	20	Applications of Thermo-fluid Dynamics II
MMM235/265	15	Engineering Design II
MMM251	10	Dynamics & Control II
MMM213	10	Manufacturing Technology
MMM211	10	Materials Science II
MMM214	10	Manufacturing Systems II & Professional Studies

Stage 2 continues the approach established in Stage 1. Mathematical knowledge is developed for higher level study in MMM226. Technical modules extend both analytical and qualitative knowledge and engineering science (A.2,A.4,A.7,A.9,B.2). Design is also a significant theme and continues to develop learning outcomes, as in Stage 1.

Stage 3

Compulsory Modules

Module Code	Credit	Descriptive Title
BUS310	10	Innovation & Technology Management
ENG201	10	Introduction to Business Management
MMM331	10	Dynamics & Control III
CPE301	15	Materials & Tribology
MMM399	30	Project

Optional Modules

Stream A (Automotive)

Module Code	Credit	Descriptive Title
MMM301	15	Stress Analysis
MMM302	15	High Speed IC Engines
MMM332	10	Industrial Thermofluid Dynamics
Choose only ONE Module from the following:		
ENM309	5	Design of Experiments
ENM313	5	Numerical Methods
ENM319	5	Optimization

Stream B (Design)

Module Code	Credit	Descriptive Title
MMM301	15	Stress Analysis
MMM330/390	15	Sensors and Actuators
MMM338/388	15	Design for Production

Stream C (Mechatronics)

Module Code	Credit	Descriptive Title
EEE335	10	Applied Electronics
MMM320/380	15	Mechatronics Design
MMM330/390	15	Sensors and Actuators
Choose only ONE Module from the following:		
ENM309	5	Design of Experiments
ENM313	5	Numerical Methods
ENM319	5	Optimization

Stream D (Manufacturing)

Module Code	Credit	Descriptive Title
ENM309	5	Design of Experiments
ENM313	5	Numerical Methods
ENM319	5	Optimization
MMM300	15	Manufacturing Systems III
MMM338/388	15	Design for Production

Stream E (Engineering Science)

Module Code	Credit	Descriptive Title
MMM301	15	Stress Analysis
MMM332	10	Industrial Thermofluid Dynamics III
MMM336/386	15	Computational Fluid Dynamics
Choose only ONE Module from the following:		
ENM309	5	Design of Experiments
ENM313	5	Numerical Methods
ENM319	5	Optimization

And 40 compulsory modules relevant to the chosen specialist stream (see appendix 1).

Stage 3 contains a significant project, as befits the candidates' greater maturity and independence. The project addresses many learning outcomes including acquisition of new knowledge (A.3-A.9), intellectual abilities (B.1-B.7), practical skills (C.3-C.9) and transferable skills (D.1-D.7). Modules for a range of appropriate technical studies develop understanding to level 3 (A.1,A.2,A.4,A.7,A.8 and, where relevant, A.9) Management training also continues with ENG201 and BUS310.

See Appendix 1 for a matrix of the learning outcomes assessment strategy.

12 Criteria for Admission:

Admission offers normally conform to the UK Engineering Council "SARTOR" minimum requirements for M.Eng. and B.Eng with Chartered Engineer status (i.e. UK GCE A-level grades ABB and BCC respectively (both including Mathematics excluding General Studies) 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 (from March 2004 UKSPEC came into effect. UKSPEC will not specify entry requirements, however, the school intends to continue with the existing SARTOR level entry requirements). 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 encouraged to attend for interview whenever possible.

UK Engineering degrees are demanding and most have high drop-out rates. The School, therefore, assesses suitability by a "biodata" questionnaire: a technique widely used in industrial recruitment at professional and managerial level.

Notwithstanding adherence to SARTOR standards, the School is committed to widening access, particularly for mature candidates and those from state schools and disadvantaged areas. 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, but the School does not normally take 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 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 a 60% + average" may enter Stage 3 M.Eng..

13 Support for Students and their Learning:

Induction
The first week of the first term/semester is an Induction Week with no formal teaching. During this period all students will be given detailed programme information relating to their Stage and the timetable of lectures/practicals/labs/ tutorials/etc. In particular all new students will be given general information about the School and their course, as described in the Degree Programme Handbook. The International Office offers an additional induction programme for overseas students (see http://www.ncl.ac.uk/international/coming_to_newcastle/orientation.phtml).

During the Induction week, Diagnosys sessions are used to test basic maths and basic mechanics knowledge of Stage 1 students and where appropriate students are guided to attend remedial/revision support classes for mathematics during their first year.

Study skills support
Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in this 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 Student Counselling Service, the Mature Student Support Service, and a Childcare Support Officer, see http://www.ncl.ac.uk/undergraduate/support/welfare.phtml.

Support for Special Needs
Support for students with special needs is provided as required and the University's Disability Support Service can be consulted where appropriate. For further details see http://www.ncl.ac.uk/undergraduate/support/disability.phtml.

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 exchanges. See
http://www.ncl.ac.uk/undergraduate/support/langcen.phtml.

14 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 School Teaching and Learning Committee and 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 under Reserved Business, in the absence of the student representatives. The Board responds to these reports through Faculty Teaching and Learning Committee.

Accreditation reports
This programme is accredited by the Institute of Mechanical Engineers and the Institute of Electrical Engineers.

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.

Feedback mechanisms
Feedback to students is effected 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 programme, see
http://www.ncl.ac.uk/internal/academic-quality/qualityhome.htm#2.

15 Regulation of Assessment:

Pass Marks
The pass mark, as defined in the University's Undergraduate Examination Conventions (http://www.ncl.ac.uk/calendar/university.regs/ugexamconv.html), is 40.

Course Requirements
Progression is subject to the University's Undergraduate Progress Regulations (http://www.ncl.ac.uk/calendar/university.regs/ugcont.html) and Undergraduate Examination Conventions (http://www.ncl.ac.uk/calendar/university.regs/ugexamconv.html). In summary, students must pass 120 credits at each Stage. Limited compensation down to 35 is possible at each Stage and there are resit opportunities, with certain restrictions.

Weighting of Stages
Modules taken at Stages 2 and 3 are Honours modules and the two stages contribute to the award of the final degree in the ratio 30:70.

Common Marking Scheme
The University employs a common marking scheme, which is specified in the Undergraduate Examination Conventions (http://www.ncl.ac.uk/calendar/university.regs/ugcont.html), 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 June Board of Examiners
Report to the University on the standards of the programme

16 Indicators of Quality and Standards:

Professional Accreditation Reports
These programme was accredited by the IMechE and IEE in Spring 2001. Accreditation is for 5 years and a re-accreditation is due in Spring 2006.

Internal Review Reports
This programme is due for Internal Subject Review in Spring 2005
See the timetable at http://www.ncl.ac.uk/internal/academic-quality/schdlisr.doc

Previous QAA Reports
The Mechanical Engineering subject discipline at the University of Newcastle Upon Tyne received a QAA Subject Review in May 1993 and was judged to be Satisfactory.

17 Other Sources of Information:

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

The Departmental Prospectus (see http://www.ncl.ac.uk/undergraduate/subjects/mecheng)

The University and Degree Programme Regulations (see http://www.ncl.ac.uk/calendar/pdf/uniregs.pdf and http://www.ncl.ac.uk/calendar/sae/school.html?school=MECH)

The Degree Programme Handbook (see http://www.ncl.ac.uk/mech/undergrad/programme)
QAA Subject Review Report Q22/93, May 1993.