

## PROGRAMME SPECIFICATION



<b>1</b>	<b>Awarding Institution</b>	Newcastle University
<b>2</b>	<b>Teaching Institution</b>	Newcastle University
<b>3</b>	<b>Final Award</b>	BEng Hons
<b>4</b>	<b>Programme Title</b>	Chemical Engineering
<b>5</b>	<b>UCAS/Programme Code</b>	H810, H814 BEng Foundation
<b>6</b>	<b>Programme Accreditation</b>	IChemE, Energy Institute
<b>7</b>	<b>QAA Subject Benchmark(s)</b>	Engineering
<b>8</b>	<b>FHEQ Level</b>	Honours
<b>9</b>	<b>Date written/revised</b>	Sept 2007

### **10 Programme Aims**

The aim of the Degree programme is to produce graduates who have a coherent understanding of chemical engineering, combining a sound theoretical grasp of the subject with practical experience and an awareness of their responsibilities to society and the environment. Graduates should be capable of becoming professional chemical and process engineers in industry or of following a postgraduate route into a research, industrial or academic career. In order to meet this aim, the Degree programme has the following objectives:-

- 1) To recruit good students from a range of geographical, social and academic backgrounds.
- 2) To produce graduates who have vision and the ability to address the challenges posed by society through the deployment of the skills and knowledge gained during their Degree course.
- 3) To equip students with a knowledge and understanding of the subject, including the core material specified by the accrediting professional institutions (The Institution of Chemical Engineers and the Energy Institute)
- 4) To provide opportunities for students to acquire further knowledge, both in breadth and depth, and to specialise according to their own interests as they develop over the duration of the programme.
- 5) To enable students to eventually meet the requirements of the accrediting Institutions for Chartered Membership
- 6) To equip students with appropriate practical skills in information processing, data analysis, problem solving, teamwork, and communication skills.
- 7) To encourage students to develop responsible attitudes towards the needs of society and the environment in the application of their engineering and economic knowledge and to ensure that they have particular regard for the importance of safety in their industrial life.
- 8) To encourage students to develop appropriate attitudes towards their own future professional development.
- 9) To provide an environment within the School such that students enjoy the University learning experience sufficiently to want to maintain contact with the School in its future recruiting, teaching, research and social activities.
- 10) To provide a programme of study which meets the FHEQ Honours level and which also takes account of the subject benchmarks in QAA Engineering and UK-Spec professional standards.

### **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 Engineering.

### **Knowledge and Understanding**

On completing the programme students should have appropriate knowledge and understanding of:

- A1** Background Mathematics, Statistics and Chemistry that are relevant to Chemical and Process (C&P) Engineering.
- A2** The fundamental concepts, principles and theories of C&P Engineering.
- A3** Business and management techniques relevant to C&P engineering and Chemical Engineers.
- A4** The role of chemical engineers in society and the constraints within which their engineering judgement will be exercised, including the professional and ethical responsibilities of chemical engineers.
- A5** The environmental and safety issues that affect C&P engineering and the issues associated with sustainable engineering solutions.
- A6** Conceptual, elemental and detailed design of processes and process plant.
- A7** Safe operation of processes and plant, including the use of IT for design, control and management.
- A8** Codes of practice, design, the assessment of safety and environmental risks, and the legislative framework for safety.

### **Teaching and Learning Methods**

Knowledge and understanding is primarily imparted through a combination of lectures, tutorials, example classes, case studies, laboratory experiments, coursework and projects in all Stages. In some cases, the formal lectures are supplemented by computer assisted learning (CAL). A number of visiting lecturers and professors contribute to A5, A6, A7 and A8. Throughout the course, learners are encouraged to undertake independent reading to deepen, supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject. In the final year students are given guidance and are directed to engineering literature related to their design projects. Feedback on essays, laboratory and project reports allows students to refine their presentation techniques in these areas, and to assess the level of their knowledge and understanding.

### **Assessment Strategy**

Testing the knowledge base is through a combination of unseen written examinations and assessed coursework in the form of laboratory experiment write-ups, coursework reports, project reports and presentations. The proportion of in-course and written examination towards the final module assessment is usually 25 / 75 although this can vary as appropriate for the module and level of study.

### **Intellectual Skills**

On completing the programme students should be able to:

- B1** Select and apply appropriate scientific principles, mathematical methods and computer based methods for modelling and analysing engineering problems
- B2** Analyse experimental or computational results and determine their strength and validity.
- B3** Analyse systems, processes and components requiring engineering solutions and to produce a conceptual or elemental design to a specification.
- B4** Use the scientific literature effectively and to search for information to develop concepts.
- B5** Produce a full design specification for a process or process plant.
- B6** Identify the required cost, quality, safety, reliability, appearance, fitness for purpose and environmental impact of the application of the design and assess commercial risk.
- B7** Project manage a task.
- B8** Determine the criteria for evaluating a design solution and evaluate an outcome of the design against the original specification

### **Teaching and Learning Methods**

Subject-specific/professional skills are developed through laboratory experiments and project work (B1-B4), design exercises throughout Stages 1, 2 and 3 (B5-B8). Lectures, tutorials, case studies and seminars of specific modules develop skills B1, B3, B5 (Process Design, Computer Applications), B5-B6 and B8 (Plant Design) and B7 (Process Design, Economics and Project Management). From the first year, students are required, after appropriate guidance, to search the literature for information and submit all written work in an appropriate scientific and engineering format so that B1-B4 are thoroughly integrated into all submitted work by the final Stage. Students are encouraged to develop appropriate professional and practical skills (B1-B4) by monitored attendance at laboratory sessions during all stages of

their studies. Feedback on all submitted work enhances learning of the skills B5-B8 culminating in the Stage 3 design projects. Some projects are carried out in small groups (4-5) and some individually. All are monitored by an academic supervisor and in some cases an industrial supervisor provides additional support.

**Assessment Strategy**

Practical skills are assessed through laboratory experiment write-ups, coursework and project reports, presentations, group oral discussions, and unseen written examinations. Skills B5-B8 form a major part of the assessment of the Stage 3 design project.

**Practical Skills**

On completing the programme students should be able to:

- C1** Plan, conduct and report a programme of investigative work.
- C2** Analyse and solve engineering problems.
- C3** Design a process or process plant to meet a need.
- C4** Be creative in the solution of problems and in the development of designs.
- C5** Evaluate designs and make improvements.
- C6** Integrate and evaluate information and data from a variety of sources.
- C7** Take a holistic approach to solving problems and designing systems, applying professional judgements to balance risks, costs, benefits, safety, reliability, aesthetics and environmental impact.

**Teaching and Learning Methods**

Analysis and problem solving skills are developed through example classes, tutorials, coursework and project work. Experimental, research and design skills are developed through coursework activities, laboratory experiments, and design projects. Individual feedback is given to students on all work produced. Students in all years are encouraged, following appropriate guidance, to plan and carry out their investigative work and analyse the experimental data in critical manner. Feedback provided on all submitted work provides opportunities for students to improve their skills. In particular, project work provides the opportunity to develop skills C1-C7.

**Assessment Strategy**

Analysis and problem solving skills are assessed through unseen written examinations and coursework. Experimental, research and design skills are assessed through laboratory experiment write-ups, coursework reports and project reports, presentations and unseen written examinations. Creative and design skills are assessed through design project reports and design presentation.

**Transferable/Key Skills**

On completing the programme students should be able to:

- D1** Communicate effectively (orally and in writing).
- D2** Apply mathematical skills through modelling and analysis.
- D3** Work as a member of a team (an interdisciplinary team where appropriate).
- D4** Develop ideas and solutions to engineering problems.
- D5** Use information and communications technology.
- D6** Manage resources and time, plan, organise and prioritise work effectively to meet deadlines.
- D7** Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry.
- D8** Learn effectively for the purpose of continuing professional development and in a wider context throughout their career.

**Teaching and Learning Methods**

Transferable skills are developed through the teaching and learning programme outlined above (and in section 11). Basic communication skills D1 are acquired through a dedicated module (CME1010 Communications Skills) as well as individual and team projects throughout other modules (e.g. CME2002) and the design projects in each Stage. These are then developed through feedback on written reports and presentations made as part of coursework assignments. Skills D1-D3 are formally taught in specific skills modules (e.g. CME1010 Communications Skills, Process Design modules) and the students obtain feedback to enhance their learning as parts of those modules. Additionally, transferable skills are also applied in many subject-specific modules with students required to find information and give oral and/or written presentations throughout all years of study. Deadlines for submission of coursework are enforced, encouraging students to develop D6 and this is supported by guidance provided during Induction week at each Stage of the programme. Design problems

at each stage provide an opportunity to develop skills D3-D8.

### **Assessment Strategy**

Transferable and communication skills are assessed through coursework reports, presentations and oral examinations in a number of compulsory and optional modules throughout all stages. The assessment of Stage 3 and Stage 4 major projects includes assessment of key skills.

## **12 Programme Curriculum, Structure and Features**

### **Basic structure of the programme**

Design projects provide a central theme to each Stage. As well as technical competence, these offer a wide range of learning outcomes, generally including elements of new knowledge, a broad range of intellectual activities and significant Professional and Transferable skills. A substantial mathematical base is provided in each Stage, together with a range of modules providing core C&P engineering knowledge. The more analytical subjects also address intellectual abilities and transferable skills. Laboratory classes cover both practical and transferable skills. Stage 1 provides foundations of knowledge and understanding of fundamental C&P engineering issues such as energy and material balances, heat transfer and fluid properties. Foundations of chemistry, mathematics and computer applications are also provided. Safety and environmental impact are developed as a formal topic of study.

Stage 2 continues the approach established in Stage 1, with design and its wide range of outcomes remaining central to the course. Mathematical knowledge is developed for higher level study. Technical modules extend both analytical and qualitative knowledge of C&P engineering science. There is an option to study Business Management.

Stage 3 contains a major group process plant design project, as befits the candidates' greater maturity and independence. The project addresses many learning outcomes including acquisition of new knowledge, intellectual abilities, practical skills and transferable skills. Modules for a range of technical C&P engineering studies develop understanding towards graduate level. There is also a strong management strand to this Stage in CME3003 Process Design, Economics and Project Management.

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

The Undergraduate year is 31 weeks, arranged in three terms and currently divided into two Semesters and including an Induction week at the beginning of Semester 1.

The programme normally lasts three years. Every Honours student studies 120 credits in each Stage, resulting in BEng candidates completing 360 credits. These credits are a mixture of compulsory and optional modules with some modules designated "core" and having implications for student progress.

Progression from Stage 1 to Stage 2 depends upon student achieving at least 40% for all core module marks and at least a 40% overall Stage average. Limited compensation of marks of at least 35% is permitted for non-core module. Further details are contained in the University Examination Conventions.

Students may choose electives during Stages 2-3 to suit their interests and capabilities.

There is a Faculty Foundation Year for candidates not adequately qualified to embark on Stage 1 of Degree Programme (*H816 from September 2007*). – BEng?

Particular features of the programme are:

- High content of laboratory-based practical work
- High content of design-based work in teams and individually

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

[http://www.ncl.ac.uk/regulations/programme/2007-2008/programme/h800\\_with\\_foundation\\_year\\_h801.php](http://www.ncl.ac.uk/regulations/programme/2007-2008/programme/h800_with_foundation_year_h801.php)

### **13 Criteria for admission**

#### *Entry qualifications*

The full entry policy is stated on page 17 of the Undergraduate Chemical Engineering prospectus.

All applicants are considered individually on the basis of past academic performance and potential for achievement. For MEng, we normally expect ABB to BBB achievement at 'A' level in appropriate subjects, including Mathematics and Chemistry. We ask for BCC for intending MEng students with 'A' level subjects not matching the requirements who will progress to the Faculty Foundation Year. For BEng, we normally ask for a BBB to CCC performance for direct entry to both Stage 1 and the Foundation Year.

#### *Admissions policy/selection tools*

From 2004, we use interviews as part of the selection process, which take into account contextual factors which may affect the academic performance of individual applicants (such as attending a poorly performing School etc).

#### *Non-standard Entry Requirements*

Students who enter on the BEng stream may transfer to the MEng stream at the end of Stage 2 if they achieve a Pass with Merit for that stage. Pass with Merit is taken to be equivalent to a 2-1 standard.

Students are eligible to enter directly into the 2<sup>nd</sup> year of the degree programme if they hold diplomas in Chemical Engineering with suitable grades. Typically, we look for a final average of 60% or equivalent. Even then, all applications are considered on an individual basis, to ensure that the applicant has the necessary background to successfully complete Stage 2. Otherwise, the applicant will be offered entry into Stage 1.

#### *Additional Requirements*

#### *Level of English Language capability*

We comply with the standard University English Language requirement.

### **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.

#### *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.

Help with academic writing is available from the Writing Centre.

#### *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. In addition the University offers a range of

support services, including one-to-one counselling and guidance or group sessions/workshops on a range of topics, such as emotional issues eg. 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 Union Society 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 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.

#### *Learning resources*

The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

All new students whose first language is not English are required to take an English Language Proficiency Test. This is administered by INTO Newcastle University Centre on behalf of Newcastle University. Where appropriate, in-session language training can be provided. The INTO Newcastle University Centre houses a range of resources which may be particularly appropriate for those interested in an Erasmus exchange.

### **15 Methods for evaluating and improving the quality and standards of teaching and learning**

#### *Module reviews*

All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the 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. 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. With reference to the outcomes of the NSS and institutional student satisfaction surveys actions are taken at all appropriate levels by the institution. The University also operates campus-wide First and Second Year surveys.

#### *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. Every five years degree programmes in each subject area are subject to periodic review. This involves both the detailed consideration of a range of documentation, and a two-day review visit by a

review team which includes an external subject specialist in addition to University and Faculty representatives. Following the review a report is produced, which forms the basis for a decision by University Teaching and Learning Committee on whether the programmes reviewed should be re-approved for a further five year period.

*Accreditation reports*

*Additional mechanisms*

All staff are subject to periodic peer observation of their teaching. Any issues arising are dealt with by the School Teaching & Learning Committee.

## **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 and Undergraduate Examination Conventions. 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 2:3 is 1:2

*Common Marking Scheme*

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

	<b>Modules used for degree classification (DC)</b>	<b>Modules not used for degree classification</b>
<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/> or <http://www.ncl.ac.uk/postgraduate/>)

The School Brochure (contact [enquiries@ncl.ac.uk](mailto: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.



## Mapping of Intended Learning Outcomes onto Curriculum/Modules

Intended Learning Outcome	Module codes (Compulsory in Bold)
A1	<b>CME1002/1003,CME1011,CME1012,ENG1001,ENG2007, ENG2002, CME2012,CME3010,CME3021</b>
A2	<b>CME1001,CME1004,CME1005,CME1006,CME1011,CME1007, CME2002,CME2003,CME2004,CME2005,CME2013,CME2015,CME2016, CME3004,CME3005,CME3006,CME3006,CME3007,CME3008, CME2006,CME3011,CME3022,CME2001,</b>
A3	<b>CME3003,CME3009,ENG2001,ENG4002,</b>
A4	<b>CME1001,CME1004,CME1007,CME2007,CME3013, CME3009,CME8037/38,ENG4002</b>
A5	<b>CME1001,CME1004,CME1007,CME4011,CME3009, CME3022</b>
A6	<b>CME1001,CME1004,CME1008,CME1011,CME1012,CME2013, CME2005, CME2007,CME2014,CME2015,CME3003, CME3004,CME3005, CME3009,CME3013,CME2006,CME3022</b>
A7	<b>CME1001,CME1008,CME1009,CME2007,CME2014,CME2016, CME3003,CME3004,CME3006,CME3008, CME3009, CME3010,CME3011,CME3012</b>
A8	<b>CME1001,CME1007,CME1012,CME2015,CME3003,CME3013, CME4011,CME3009</b>
B1	<b>CME1008,CME1009,CME2014,CME2016,CME3003,CME3004, CME3008,CME3013,CME3009, CME2012,CME3010,CME3021,CME3022</b>
B2	<b>CME1002/1003,CME1008,CME1009,CME1012,CME2013,CME2002, CME2004, CME3004,CME3006,CME3008,CME3013,CME3019,CME2006</b>
B3	<b>CME2014,CME3003, CME3009</b>
B4	<b>CME1004,CME1010,CME2013, CME2002,CME3005,CME3006, CME3009</b>
B5	<b>CME1004,CME1008,CME1011,CME2014,CME3003,CME3013,</b>
B6	<b>CME1001,CME1007,CME1011,CME2013,CME2014,CME3009</b>
B7	<b>CME3009</b>
B8	<b>CME1004,CME1011,CME2013,CME2014,CME3006, CME4011,CME4016, ENG4001,ENG4002,</b>
C1	<b>CME1002/1003,CME1004,CME1008,CME1010,CME2002,CME2004, CME2013,CME2014,CME3003,CME3004,CME3008,CME3013,CME3021,</b>
C2	<b>As A2 and A4 + CME3019</b>
C3	<b>CME1004,CME1011,CME2013,CME2014,CME3003,CME3005,CME3013</b>
C4	<b>CME1004,CME1008,CME1011,CME2013,CME2014,CME3003,CME3007</b>
C5	<b>CME1004,CME1011,CME2013, CME3003,CME3006</b>
C6	<b>All modules</b>
C7	<b>CME3003,CME3006</b>
D1	<b>CME1004,CME1010,CME2002,CME2014,CME3003,CME3013, CME3022, NCL2011/2</b>
D2	<b>CME3002, CME2012,CME3010,CME3021</b>
D3	<b>CME1004,CME1008,CME2002,CME2013,CME2014,CME3003,ENG2001,</b>

	<b>NCL2011/2</b>
D4	<b>As A4</b>
D5	<b>All modules</b>
D6	<b>All modules with in course assessment and project work +NCL2011/2</b>
D7	<b>All modules</b>
D8	<b>All modules</b>