PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	MEng
4	**Programme Title**	Materials and Process Engineering
5	**UCAS/Programme Code**	HJ8M
6	**Programme Accreditation**	None
7	**QAA Subject Benchmark(s)**	Engineering
8	**FHEQ Level**	M
9	**Date written/revised**	March 2008

10 Programme Aims

1. To produce graduates with a good grasp of the fundamentals of chemical engineering, plus a more advanced knowledge of contemporary materials science and engineering, with an emphasis on the process technology underpinning both these disciplines. Graduates should be capable of either becoming professional chemical and/or professional materials engineers in industry, or following postgraduate routes into a research, industrial or academic career

2. To familiarise students with relevant practical techniques and enable them to develop transferable skills, such as information processing, data analysis, problem solving, teamwork and communication skills;

3. To provide opportunities for students to acquire further knowledge to deal with complex engineering issues, demonstrate self-direction and originality so that they can act autonomously in planning a programme of work or problem solving in this field.

4. To encourage students to develop responsible attitudes toward the needs of society and the environment as regards the production and disposal of chemical/materials and to ensure that they have especial regard for the importance of safety in their future industrial career

5. To equip students with the academic credentials to continue and become Chartered Engineers, and to develop appropriate attitudes towards their future professional development.

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 acquired:

A1. Knowledge of he basic mathematics, physics and chemistry relevant to materials science and process engineering, supplemented by the appropriate engineering science principles operative in these disciplines.

A2. Background knowledge and understanding up to the M level in the process and materials engineering fields. An awareness of the importance of the properties of engineering materials.

A3. Knowledge of IT and relevant software packages applied to materials science/chemical engineering and especially those used in design (including relevant codes of practice), and the development of a critical approach to the use of these tools.

A4. Knowledge of business and management procedures applicable to chemical, process and materials engineering; an awareness of professional and ethical responsibilities.

A5. An awareness of requirements for safe usage and handling of materials, chemicals and processes; risk assessment applied to processes and industrial plants. Environmental and legal implications and design for sustainability.

Teaching and Learning Methods

Teaching Strategy

A1 is communicated through a combination of lectures, tutorials, example classes, laboratory experiments, coursework and projects. A2 again is communicated mainly by lectures, but also through coursework and Case Studies – especially in Stages 2 and 3 of the programme. Students enter with a basic knowledge of IT (A3), which is developed in Stage 1 by specific modules, and then more dedicated information is given in later years in the context of specific applications. A4 is taught through lectures, some of which are given by visiting speakers from industry. Safety procedures (A5) are emphasised to students on arrival in Stage 1 and are reinforced in laboratory classes at all stages of the programme. Risk assessment and environmental and sustainability issues are taught in lectures in the later stages of the programme.

Learning Strategy

Throughout the programme students are encouraged to undertake independent learning to deepen, supplement and consolidate what is being taught through lectures and to broaden their individual knowledge and understanding of the subject. In the final two years, students are given guidance and directed to engineering literature related to their individual and group projects and also for Case Study presentations. Feedback on essays, laboratory and project reports allows students to refine their presentational techniques in these areas, and to assess their level of knowledge and understanding.

Assessment Strategy

Testing students' knowledge is carried out through a combination of unseen written examinations and assessed coursework in the form of laboratory experiment write-ups, coursework reports, project reports and presentations. Some students may be examined orally by the external examiner.

Intellectual Skills

On completing the programme students should be able to:
B1. Apply mathematical methods and the principles of materials science /chemical engineering to obtain solutions to problems in the materials and process industries.

B2. Safely carry out experiments using laboratory equipment to generate data, which is analysed using computational tools and packages as appropriate, from which conclusions are drawn whose strength and validity is then critically assessed.

B3. Generate new ideas for the design of new materials, components or processes (and their improvement), including considerations of cost, quality, safety, reliability, fitness for purpose and environmental impact, and to evaluate the outcome of the final design as compared with the original specification.

B4. Understand the limitations of materials and their application and use in the chemical and process industries.

B5. Manage tasks, including the planning and carrying out of a programme of original research, involving the critical use of scientific literature, and a comprehensive understanding of relevant analytical techniques used in this field.

B6. Prepare technical reports and specifications, and give technical presentations.

Teaching and Learning Methods

Teaching Strategy

B1 skills are developed by a series of calculations sheets handed out mainly in the first two years of the programme. B2 is acquired through laboratory experiments, project work and design exercises throughout all four stages of the programme. These exercises all contribute towards developing B6, which is most strongly developed through the writing up of dissertations associated with the project work carried out in the final two Stages of the programme. Lectures, tutorials, case studies and seminars all contribute to the development of skills B3 and B4. The individual project, carried out in the final year of the programme, very effectively develops skill B5.

Learning Strategy

Students are encouraged to develop appropriate professional and practical skills (B2) by monitored attendance at laboratory sessions during the early stages of their studies. From the first year onwards, all written work must be submitted in an appropriate scientific and engineering format and feedback on this work enhances the learning of skills B1, B2 and B6, culminating in the Stage 3 and Stage 4 projects, which usually involve all skills (B1 – B6). All project work is monitored by an academic supervisor, whose guidance is an integral part of the students acquiring these skills.

Assessment Strategy

Practical skills are assessed through laboratory experiment write-ups, coursework and project reports, presentations, group oral discussions and unseen written examinations. All skills B1-B6 form a major part of the assessment of project work.

Practical Skills

On completing the programme students should be able to:
C1. Plan, manage, safely conduct and report a programme of investigative work, including both self-direction and originality.

C2. Apply IT tools to obtain data from a wide variety of sources and integrate this with data generated experimentally or computationally, in order to find solutions to engineering problems and assess their reliability.

C3. Be creative in the solution of problems and applying design procedures to new materials, components or processes.

C4. Take an 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

Teaching Strategy

Cognitive skills are developed systematically through the teaching and learning programme. Analysis and problem solving skills are mainly developed through calculation exercises and other coursework and the associated tutorials. Experimental, design and research skills are further developed through coursework activities in the later years of the programme, including the two major items of project work. Individual feedback is given to students on all work produced.

Learning Strategy

Students in all years are encouraged, with appropriate guidance, to plan and carry out their investigative work and analyse experimental data in a critical manner. Feedback provided on submitted work provides the opportunity for students to improve their intellectual skills. In particular, project work provides the opportunity to develop all the skills C1 – C4

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 presentations.

Transferable/Key Skills

On completing the programme students should be able to:
D1. Communicate effectively (both orally and in writing, the latter including the effective use of IT); also involving taking a collection of scientific data and converting it into a logical story.

D2. Apply mathematical and experimental skills (including modelling and analysis) for problem solving – including the handling of contradictory and incomplete data.

D3. Work both individually and as part of a team, managing resources and time appropriately, and developing ideas and solutions to engineering problems.

D4. Develop skills for learning (a) independently, (b) open-mindedly, (c) critically and (d) for CPD purposes in later life.

Teaching and Learning Methods

Teaching Strategy

Basic communication skills (D1) are taught initially through a dedicated Stage 1 module and then in later stages by individual and team exercises in other modules and the individual group projects in the final Stages. Specific presentations are made as part of Case Study modules (CPE404, 405). The individual and group projects provide the main teaching vehicles for developing all the transferable skills listed above.

Learning Strategy

Students are given feedback in the Stage 1 Communication Skills module, as a result of which they can refine these skills. Also, many modules throughout the course include assessed work on which there is feedback from which students can refine their written (and oral) skills. Deadlines for submission of student work are enforced, encouraging students to develop the time aspect of D3.

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 include assessment of all the key skills listed above.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The MEng programme requires 4 years of full-time study. Every honours student must take 120 credits of study in each stage, thereby amassing 480 credits in total. Candidates not adequately qualified to embark on Stage 1 of the Degree Programme must take the Faculty Foundation Year programme (UCAS Code:H841). All modules in the first two stages of the programme are compulsory, but in Stages 3 and 4, there are two options, A and B, for candidates who (respectively) wish to elect for either a more materials or a more process-oriented emphasis.

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

The MEng programme in Materials & Process Engineering aims to synergise with the trends taking place in both the Materials and Chemical Engineering industries towards the production of smaller volume, high-tech products requiring dedicated production lines which are highly automated. The common ground between these two strands is in the area of processing, with materials engineers being more concerned to produce a solid object with a

specifically-designed final shape and properties, whereas chemical engineers are more interested in liquid based production lines, with the final product in either liquid or powder form. The programme of study therefore consists of a mix of modules relating to chemical engineering and materials science, underpinned by essential mathematics, physics and chemistry background material.

Programme regulations (link to on-line version)

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

13 Criteria for admission

Entry qualifications

The full entry policy is stated on page 14 of the Chemical Engineering and Advanced Materials Undergraduate Study Brochure.

All applicants are considered individually on the basis of past academic performance and, in particular, predicted achievement. For MEng degree, the normal offer is either AAB/ABB at A level in Maths, Chemistry and an appropriate third subject although, in practice, BBB or equivalent is the bottom line. For BEng degree, the normal offer is BBC/BCC with a bottom line of CCC.

There is more flexibility regarding the Foundation Year for which there are two categories of applicant: i) those with good grades in the wrong subjects for whom there is a bottom line of CCC or equivalent, and ii) those with poor grades in the right subjects for whom there is a bottom line of DDD or equivalent.

Admissions policy/selection tools

With effect from 2007, offers are made on the basis of applicants' UCAS forms after which they are invited to a post application open day (PAOD). During the course of the PAOD applicants have an informal meeting with a member of academic staff..

Non-standard Entry Requirements

Students who enter on the BEng stream may transfer to the MEng stream at the end of Stage 2, or Stage 3 if they achieve an overall Stage average of 60%.

Students are eligible for direct entry into Stage 2 if they hold an appropriate Diploma in Chemical Engineering with suitable grades, typically an overall average of approx 60% or equivalent. Direct entry to Stage 2 (and indeed Stage 3) is also possible through accreditation of prior learning (APL). All such applications are considered on an individual basis: direct entry is only offered if there is a sufficient academic basis for confidence of successful completion of Stage 2.

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-sessional 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.

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
None carried out.

Additional mechanisms
None.

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 2,3 and 4 will contribute to the final classification of the degree
The weighting of marks contributing to the degree for Stages 2,3 and 4 is 30:35:35.

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

	Modules used for degree classification (DC)	**Modules not used for degree classification**
<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)

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

A1	Relevant supporting maths, physics and chemistry	CME1013, CME1014, CME1002, CME1003, ENG1001, CME2010, CME2012, ENG2002, ENG2007, CME3018
A2	Principles of materials science and process engineering; knowledge of properties of materials	CME1016, CME1006, CME1014, CME1012, CME2001, CME2006, CME2007, CME2008, CME2009, CME2010, CME2013, CME2014, CME2015, CME2016, CME3001,CME3004, CME3017, CME3018, CME3006, CME3015, CME3016, *CME3002*, CME3004, CME3005, CME8034, CME4001, CME4002, MEC4008, CME4003, CME4015, CME8002
A3	Familiarity with IT/software/design (including design code) procedures	CME1014, CME1006, CME1015, CME2007, CME2009, CME3006, CME3016, *CME3002*, CME4019
A4	Business/management procedures; professional/ethical responsibilities	CME1016, CME1013, CME1015, CME3006, ENG2001, BUS3010, ENG4002, CME8038, CME8002, CME8012
A5	Safety/risk assessment/environmental/legal/sustainability issues	CME1016, CME1013, CME1006, CME1002, CME1003, CME1014, CME2001, CME2008, CME2009, CME2010, CME3001, CME3003, CME3017, CME3018, CME3006, CME3015, CME3016, CME4019, CME8038, CME8012.
B1	Application of maths/engineering science to the solution of problems	CME1014, CME1006, ENG1001, CME2007, CME2012, CME2013, CME2014, ENG2002, ENG2007, CME3001, *CME3002*, *CME3095, CME4016, CME4002, CME4015.*
B2	Carrying out experimental work, deducing correct conclusions from data generated	CME1016, CME1013, CME1006, CME1002, CME1003, CME2001, CME2003, CME2010, CME3004, CME3018,
B3	Generating new ideas in design, and testing a final design	CME1013, CME1006, CME1015, CME1014, CME2007, CME2008, CME2014, CME2016, CME3001, CME3018, CME3006, *CME3002*, *CME3095, CME4016. ENG4002, CME4001, CME4003, CME4019, CME4096, CME4097.*
B4	Understanding the limitations of systems and materials	CME1013, CME1016, CME1012, CME2007, CME232, CME2009, CME3001, CME3005, CME3015, CME3017, CME3016, *CME3002*, CME4003, *CME4016.*
B5	Task management, especially as applied to project work	ENG2001, BUS3010, *CME3095*, CME4016, ENG4002, CME4096, CME4097.
B6	Preparation of technical reports, specifications and technical presentations	CME1015, CME1013, ENG2001, BUS3010, *CME3095, CME4016, CME4002, CME4003, CME4096, CME4097.*
C1	Planning a programme of work	CME1002, CME1003, CME2010, CME3018, *CME3095, CME4016, ENG4002*, CME4096, CME4097.
C2	Applying IT tools/integrating with other materials experimental data	CME1015, CME2010, CME3018, *CME3095*, CME4016, ENG4002, CME4096, CME4097.
C3	Creativity as applied to design of new materials, components or processes.	CME1013, CME1006, CME1014, CME2007, CME2008, CME2009, CME2015, CME3001, CME3017, CME3006, CME3016, *CME3002*, *CME3095, CME4016, MEC4008, CME4019, CME4096, CME4097, CME8002.*
C4	A holistic approach for problem solving	CME1016, CME1013, CME1006, CME2001, CME2007, CME2015, CME3004, CME3006, *CME3095*, CME4016, CME4096, CME4097.
D1	Good writing/oral communication skills	CME1015, CME1013, CME3006, *CME3095*, CME4016, CME4002, CME4003, CME4096, CME4097.
D2	Mathematical (analysis/modelling) and experimental skills.	CME1006, ENG1001, CME2007, CME2010, ENG2002, ENG2007, CME3018,
D3	Work individually or as a team, managing resources and time.	CME1013, *CME3095*, CME4016, CME4096, CME4097.
D4	Critical learning skills including the development of a CPD mentality.	CME1013, *CME3095*, CME4016, CME304, CME4096, CME4097.