

**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 Chemical Engineering 1147U Chemical Engineering with Placement Year
<b>6</b>	<b>Programme Accreditation</b>	IChemE, InstMC
<b>7</b>	<b>QAA Subject Benchmark(s)</b>	Engineering
<b>8</b>	<b>FHEQ Level</b>	6
<b>9</b>	<b>Date written/revised</b>	May 2021

**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. 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.
- 2) 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 Institute of Measurement and Control).
- 3) 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.
- 4) To enable students to eventually meet the requirements of the accrediting Institutions for Chartered Membership
- 5) To equip students with appropriate practical skills in information processing, data analysis, problem solving, teamwork, and communication skills.
- 6) 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.
- 7) To encourage students to develop appropriate attitudes towards their own future professional development.
- 8) 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.

- 9) To provide a programme of study which meets the FHEQ level 6 and which also takes account of the subject benchmarks in QAA Engineering and UK-Spec professional standards.

For students on the Placement Year programme:

- 10) Provide students with the experience of seeking and securing a position with an employer.
- 11) Facilitate independent self-management and proactive interaction in a non-university setting.
- 12) Provide a period of practical work experience that will benefit current academic study and longer term career plans.
- 13) Enable students to ethically apply their knowledge and skills in the work place, reflect upon their development and effectively evidence and articulate their learning in relevant future settings.

### **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.

<p><b>Knowledge and Understanding</b></p> <p>On completing the programme students should have:</p> <p><b>A1</b> Background Mathematics, Statistics and Chemistry that are relevant to Chemical and Process (C&amp;P) Engineering.</p> <p><b>A2</b> The fundamental concepts, principles and theories of C&amp;P Engineering.</p> <p><b>A3</b> Business and management techniques relevant to C&amp;P engineering and Chemical Engineers.</p> <p><b>A4</b> 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.</p> <p><b>A5</b> The environmental and safety issues that affect C&amp;P engineering and the issues associated with sustainable engineering solutions.</p> <p><b>A6</b> Conceptual, elemental and detailed design of processes and process plant.</p> <p><b>A7</b> Safe operation of processes and plant, including the use of IT for design, control and management.</p> <p><b>A8</b> Codes of practice, design, the assessment of safety and environmental risks, and the legislative framework for safety.</p> <p>For students on the Placement Year programme:</p> <p><b>A9</b> Apply personal and professional development strategies to prioritise, plan, and manage their own skills development and learning.</p> <p><b>A10</b> Research, select and apply relevant knowledge aimed at enhancing their own skills and effectiveness in specific duties at their placement.</p> <p><b>A11</b> Demonstrate an understanding of a work environment, how it functions and their contribution to it.</p> <p><b>A12</b> Relate their work based learning to other areas of personal development, including academic performance.</p>
<p><b>Learning and Teaching Methods</b></p> <p>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.</p> <p>Throughout the course, learners are encouraged to undertake independent reading to deepen, supplement and consolidate learning and teaching 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.</p>
<p><b>Assessment Strategy</b></p> <p>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.</p>
<p><b>Intellectual Skills</b></p> <p>On completing the programme students should be able to:</p>

<p><b>B1</b> Select and apply appropriate scientific principles, mathematical methods and computer based methods for modelling and analysing engineering problems</p> <p><b>B2</b> Analyse experimental or computational results and determine their strength and validity.</p> <p><b>B3</b> Analyse systems, processes and components requiring engineering solutions and to produce a conceptual or elemental design to a specification.</p> <p><b>B4</b> Use the scientific literature effectively and to search for information to develop concepts.</p> <p><b>B5</b> Produce a full design specification for a process or process plant.</p> <p><b>B6</b> Identify the required cost, quality, safety, reliability, appearance, fitness for purpose and environmental impact of the application of the design and assess commercial risk.</p> <p><b>B7</b> Project manage a task.</p> <p><b>B8</b> Determine the criteria for evaluating a design solution and evaluate an outcome of the design against the original specification</p>
<p><b>Learning and Teaching Methods</b></p> <p>Subject-specific/professional skills are developed through laboratory experiments and project work (B1-B4), case study/design exercises throughout Stages 1, 2 and 3 (B5-B8). Lectures, tutorials, case studies and seminars of specific modules develop skills B1, B3, B5 (Safety &amp; Engineering Practice, Computer Applications), B5-B6 and B8 (Plant Design) and B7 (Safety &amp; Engineering Practice, Process Business Operations). From the first year, students are required, after appropriate guidance and with proper resources provided through Blackboard VLE, 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.</p>
<p><b>Assessment Strategy</b></p> <p>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.</p>
<p><b>Practical Skills</b></p> <p>On completing the programme students should be able to:</p> <p><b>C1</b> Plan, conduct and report a programme of investigative work.</p> <p><b>C2</b> Analyse and solve engineering problems.</p> <p><b>C3</b> Design a process or process plant to meet a need.</p> <p><b>C4</b> Be creative in the solution of problems and in the development of designs.</p> <p><b>C5</b> Evaluate designs and make improvements.</p> <p><b>C6</b> Integrate and evaluate information and data from a variety of sources.</p> <p><b>C7</b> Take a holistic approach to solving problems and designing systems, applying professional judgements to balance risks, costs, benefits, safety, reliability, aesthetics and environmental impact.</p>
<p><b>Learning and Teaching Methods</b></p> <p>Analysis and problem solving skills are developed through example classes, tutorials, coursework and project work. Experimental, research and design skills are developed</p>

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.

For students on the Placement Year programme:

- D9** Reflect on and manage own learning and development within the workplace.
- D10** Use existing and new knowledge to enhance personal performance in a workplace environment, evaluate the impact and communicate this process.
- D11** Use graduate skills in a professional manner in a workplace environment, evaluate the impact and communicate the personal development that has taken place.

#### **Learning and Teaching Methods**

Transferable skills are developed through the learning and teaching programme outlined above (and in section 11). Basic communication skills D1 are acquired within an introductory module (Principles of Chemical Engineering) as well as through individual and team projects throughout other modules and the case study/design projects in each Stage. These are then developed through feedback on written reports and oral presentations made as part of coursework assignments. Skills D1-D3 are formally taught in specific skills modules (e.g. Principles of Chemical Engineering, Safety & Engineering Practice) 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 in compliance with University regulations, 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.

<b>Assessment Strategy</b>
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 the Stage 3 Design Project includes assessment of key skills.

<b>12 Programme Curriculum, Structure and Features</b>
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<b>Basic structure of the programme</b>
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Design and case study 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/biochemistry, mathematics and computer applications are also provided. Safety and environmental impact are developed as a formal topic of study. Links between subject areas are strengthened by a number of case studies/design project problems drawing on student's understanding, developing problem solving further and requiring practical skill application.

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.

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 Process Business Operations.

Students on the Placement Year programme will be on placement year between Stages 2 and 3 of their programme.

<b>Key features of the programme (including what makes the programme distinctive)</b>
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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.

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

There is a Faculty Foundation Year (*H814*) for candidates not adequately qualified to embark on Stage 1 of Degree Programme.

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)**

[https://teaching.ncl.ac.uk/docs/regsdocs2021/documents/-RH810\\_1147U.pdf](https://teaching.ncl.ac.uk/docs/regsdocs2021/documents/-RH810_1147U.pdf)

**13 Support for Student Learning**

Generic information regarding University provision is available at the following link.

[https://www.ncl.ac.uk/ltds/assets/documents/qsh\\_progspec\\_generic\\_info.pdf](https://www.ncl.ac.uk/ltds/assets/documents/qsh_progspec_generic_info.pdf)

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

Generic information regarding University provision is available at the following link.

[https://www.ncl.ac.uk/ltds/assets/documents/qsh\\_progspec\\_generic\\_info.pdf](https://www.ncl.ac.uk/ltds/assets/documents/qsh_progspec_generic_info.pdf)

*Accreditation reports*

Available.

*Additional mechanisms*

All staff are subject to periodic peer observation of their teaching. Any issues arising are dealt with by the Board of Studies.

**15 Regulation of assessment**

Generic information regarding University provision is available at the following link.

[https://www.ncl.ac.uk/ltds/assets/documents/qsh\\_progspec\\_generic\\_info.pdf](https://www.ncl.ac.uk/ltds/assets/documents/qsh_progspec_generic_info.pdf)

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

The University Prospectus: <http://www.ncl.ac.uk/undergraduate/degrees/#subject>  
Degree Programme and University Regulations: <http://www.ncl.ac.uk/regulations/docs/>

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.