PROGRAMME SPECIFICATION	Newcastle University

1 Awarding Institution	Newcastle University
2 Teaching Institution	Newcastle University
3 Final Award	MEng Hons
4, 5 Programme title and UCAS/Programme Code	Chemical Engineering with Honours in Industry – UCAS Code: H815 Chemical Engineering - UCAS Code: H813 Chemical Engineering with Placement Year (Year 4) - Code: 1149U Process Control - Code: 1632U Process Control with Placement Year - Code: 1150U Bioprocess Engineering - Code: 1631U Bioprocess Engineering with Placement Year - Code: 1154U Sustainable Engineering - Code: 1633U Sustainable Engineering with Placement Year - Code: 1156U Degree of Master of Engineering with Honours in Chemical Engineering Science – Code 1622U Chemical Engineering with Process Control - UCAS Code: H830 Chemical Engineering with Bioprocess Engineering - UCAS Code: H831 Chemical Engineering with Sustainable Engineering - UCAS Code: HH82
6 Programme Accreditation	H813, H830,HH82, 1149U, 1154U, 1150U, 1156U, 1631U, 1632U, 1633U, IChemE, InstMC H815 InstMC Only
7 QAA Subject Benchmark(s)	Engineering
8 FHEQ Level	7
9 Date written/revised	November 2024

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 research, industrial or academic career. In addition to a wide understanding of chemical and process engineering,

the MEng programme is designed to provide scope for students to develop their understanding in both breadth and depth. 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, Institute of Measurement and Control 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 level 7 and which also takes account of the subject benchmarks in QAA Engineering and UK-Spec professional standards.

For students on the Placement Year Programme:

11) Provide student with the experience of seeking and securing a position with an employer.
12) Facilitate independent self-management and proactive interaction in a non-university setting.
13) Provide a period of practical work experience that will benefit current academic study and longer-term career plans.
14) Enable students to ethically apply their knowledge and skills in the workplace, 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, integrate, practise 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:

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.

A9 Extended knowledge and understanding of the essential facts, concepts, principles and theories of C&P Engineering.

For students on the Placement Year programme:

A10 Apply personal and professional development strategies to prioritise, plan, and manage their own skills development and learning.

A11 Research, select and apply relevant knowledge aimed at enhancing their own skills and effectiveness in specific duties at their placement.

A12 Demonstrate an understanding of a work environment, how it functions and their contribution to it.

A13 Relate their work-based learning to other areas of personal development, including academic performance.

Learning and Teaching 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). Several visiting lecturers and professors contribute to A3, A5, A6, A7, A8 and A9. Teaching is enhanced by the provision of challenging open-ended tasks. 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 two years students are given guidance and directed to engineering literature related to their design and research 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. By exposure to industrial practice in stage 3 (H815), knowledge and understanding of A1-A9 is broadened.

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 Critically analyse experimental or computational results and determine their strength and validity.
B3 Critically 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
B9 Investigate specific aspects of design in depth
B10 Carry out a research programme in a chosen area

Learning and Teaching Methods

Subject-specific/professional intellectual skills are developed through laboratory experiments and research work (B1-B4, B10). Case study/design exercises throughout Stages 1, 2, 3 and 4 develop B5-B9. Lectures, tutorials, case studies and seminars in specific modules are used to develop skills B1–B10. 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 two Stages. Students are encouraged to develop their professional and practical skills by monitored attendance at laboratory sessions during all stages of their studies. Feedback on all submitted work particularly enhances learning of skills B5-B10, culminating in the Stage 3 Design and Stage 4 Research projects. Some projects are carried out in small groups (4-5 students) and some individually. All are monitored by an academic supervisor and in some cases an industrial supervisor provides additional support. During the year in industry (H815) all the intellectual skills, are developed by the projects undertaken whilst working for a company.

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-B10 form a major part of the assessment of project work, especially the major design project and the research project.

Practical Skills

On completing the programme students should be able to:

C1 Plan, conduct and report a programme of novel 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 Critically 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.
C8 Make engineering sketches and use computational tools and packages.
C9 Apply mathematical skills through modelling and analysis.

Learning and Teaching Methods

Analysis and problem-solving skills are developed through example classes, tutorials, coursework, project work and the projects undertaken whilst working in industry (H815). Experimental, research and design skills are developed through coursework activities, laboratory experiments, and research and design projects. 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-C9.

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 (orally and in writing).
D2 Prepare technical reports, specifications and give technical presentations.
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, D2 are formally taught in specific skills modules (e.g. Principles of Chemical Engineering, Safety & Engineering Practice) and 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-D7.

Students in industry receive training in using computers, report writing and presentations. Whilst working in a company they also have numerous opportunities to practice their key skills and receive feedback

Assessment Strategy

Transferable and communication skills are assessed through coursework reports, presentations and oral examinations in several 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 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. It is set as an open-ended problem, allowing for creative development and full application of acquired 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.

Stage 3 in industry contains a 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. It is set as an open-ended problem, allowing for creative development and full application of acquired skills. Two distance learning modules develop understanding towards graduate level.

Stage 4 is designed to complete a candidates' academic development towards Chartered Engineering status, which is endorsed by the IChemE and InstMC accreditation (see list in section 6). All students receive instruction in research methodology and then undertake an individual research project which enables them to demonstrate their full and final achievement of the learning outcomes for the course. Students also undertake an individual, in-depth study of a facet of a design or a design process, usually based on their Stage 3 Design Project. Technical modules, which are predominantly quantitative, develop scientific knowledge to levels consistent with the students' future professional careers.

Stage 4 students who have taken Stage 3 in industry take additional technical C&P Engineering modules to complete their understanding of C&P Engineering.

Students on the Placement Year programme will take their placement in the penultimate year of studies.

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

The Undergraduate year is 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 four years. Every Honours student studies 120 credits in each Stage, resulting in MEng candidates completing 480 credits.

Progression from Stage 1 to Stage 2 is subject to the University Taught programme regulations.

Progression from Stage 2 to Stage 3 of this programme requires that students achieve an overall performance in Stage 2 resulting in a 60% Stage average and do not fail any modules at first attempt. MEng candidates who do not achieve this level are required to transfer to Stage 3 of the corresponding BEng programme (H810). Students may progress from Stage 3 BEng programme into Stage 4 MEng if they achieve a stage average of 60% and fail no modules at first attempt.

Students may choose electives during Stage 4 to suit their interests and capabilities. However, to complete the programme for H830, H831, HH82, certain electives will become compulsory and the research project will be chosen so that they complement the theme of the MEng specialisation.

H815 provides the students with the option of doing stage 3 in industry. Progression from Stage 2 to Stage 3 of this programme requires that students achieve an overall performance in Stage 2 resulting in a 65% Stage average and do not fail any modules at first attempt. During the year in industry a student will complete technical Chemical Engineering modules and a substantial design project equivalent to that taken by Stage 3 students at the University.

Particular features of the programme are:

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

- Broadening and deepening of knowledge and skills
- An open-ended research project in Stage 4 that often contributes to the School's research programme
- An in-depth advanced study of a facet of a design or design process

Programme regulations (link to on-line version)

-RH813+.pdf

-RH815.pdf

13 Support for Student Learning

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

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.
Generic Information

Accreditation reports
H813, H830,HH82, 1149U, 1154U, 1150U, 1156U, 1631U, 1632U, 1633U only via IChemE, InstMC
H815 via InstMC only
Additional mechanisms

15 Regulation of assessment

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

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.