PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	MChem Hons
4	**Programme Title**	Chemistry Chemistry with Industrial Training Chemistry with Study Abroad
5	**Programme Code**	F103, F106, F107
6	**Programme Accreditation**	RSC
7	**QAA Subject Benchmark(s)**	Chemistry
8	**FHEQ Level**	Level 7
9	**Last updated**	September 2024

10 Programme Aims

1 to enthuse students to chemistry by educating them with a thorough understanding of organic, inorganic and physical chemistry, including importance and sustainability of the chemical sciences in an industrial, academic, economic, environmental and social context;
2 to demonstrate how chemical principles can be applied to processes and systems;
3 to equip students with the skills to do research at both experimental and theoretical levels through extended comprehension of key chemical concepts and in depth understanding of specialised areas;
4 to provide training in problem solving, communication skills, numeracy and information technology; to apply methodology to the solution of unfamiliar problems;
5 to equip students with skills that enable them to pursue careers in chemistry, chemistry-related disciplines or other professions, including critical awareness of recent advances in the chemical sciences;
6 to develop students' practical skills including assessing risks so they can work in the laboratory safely.

For students on the Industrial Training programme:

13 Provide students with the experience of seeking and securing a position with an employer.
14 Facilitate independent self-management and proactive interaction in a non-university setting.
15 Provide a period of practical work experience that will benefit current academic study and longer term career plans.
16 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.

For students on the International Study Abroad programme:

17 Offer students the opportunity to develop graduate attributes which increase employability, particularly communication and (where applicable) language skills, intercultural competencies, adaptability, resilience and global awareness.
18 Gain insight into international Higher Education and experience differences in academic approach and learning environment.
19 Provide the opportunity to experience new areas of study outside of their usual programme of study at Newcastle University.

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 chemistry.

Knowledge and Understanding

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

A1 The three main branches of chemistry (inorganic, physical and organic)
A2 Practical laboratory chemistry
A3 Data analysis and numeracy
A4 Spectroscopy and chemical characterisation
A5 Specialist aspects of chemistry
A6 Research methods
A7 Chemistry related issues with an awareness to other disciplines
A8 Some aspects of industrial chemistry

For students on the Industrial Placement Year programme:

A9 Apply personal and professional development strategies to prioritise, plan and manage their own skills, development and training

A10 Research, select and apply relevant knowledge aimed at enhancing their own skills and effectiveness in specific duties at their placement

A11 Demonstrate an understanding of a work environment, how it functions and their contribution to it

A12 Relate their work-based learning to other areas of personal development including academic performance

For students on the International Study Abroad programme:

A13 Demonstrate the ability to adapt to different learning environments.

Teaching and Learning Methods

Students acquire understanding and knowledge (the complexity of which increases as the course progresses) through lectures, tutorials and workshops (**A1, A5**). At Stage 1, students learn basic, and at Stage 2 more sophisticated, technical procedures by performing carefully designed and tested experiments. In the lab classes they also consolidate the learning started in lectures (**A1**, **A2**, **A4**) and improve on skill **A3**. At Stage 3 the students learn advanced practical methods and specialist theoretical material (**A1**-**A4**). Stage 3 students out on placement learn core chemistry by distance learning modules and **A6** through the training sessions as part of the Research Project in Industry. On placement the students learn **A7-A12**. At Stage 4 the students learn further advanced practical methods through a project and specialist theoretical material (**A1**- **A4**). Throughout the period of the degree the student is expected to read around the taught material to supplement and strengthen the taught/learnt work. Reading lists are provided to facilitate this. They develop **A7** in modules throughout this programme, particularly related to biology, medicine and materials. Specialist aspects are covered at Stages 3 and 4.

Assessment Strategy

Knowledge and understanding is assessed through unseen written examinations and in-course assessments (**A1**, **A3** – **A5, A7**), answers to questions in practical reports (**A2**), the Stage 3 project **(A6)** and oral examinations e.g. in the Stage 4 project (**A2, A6, A7**).

Intellectual Skills

On completing the programme students should be able to:

B1 Critically evaluate data, including using computer software and models.
B2 Apply learnt knowledge to unseen problems
B3 Analyse and interpret data objectively in terms of current underlying theory.
B4 Independently plan and undertake a practical and research project including accessing relevant literature and awareness of recent technical and theoretical advances which could be applied.

Teaching and Learning Methods

Intellectual skills are developed by means of the teaching and learning programme outlined above. Students apply the concepts learnt in lectures to problems in laboratory work, seminars and tutorials. **B2** and **B3** are progressively developed and enable the students to solve challenging problems (Stage 1 in General Chemistry, Stage 2 in Sustainable Solutions and Stage 3 Analytical Chemistry in Practice and Professional Development and Employability Skills for Chemists) which cross the boundaries of the chemistry modules studied earlier. Tutorials facilitate individual and group participation in answering problems. Students develop skills **B1** and **B4** during their Stage 3 Advanced Practical Chemistry sessions and Stage 4 project work, they learn how to work in a team and apply advanced techniques to solving research problems. Students develop skills **B1** and **B4** during their Stage 3 project work while in Industry or in a chemistry research laboratory abroad.

Assessment Strategy

Problem solving based examinations and oral responses to either problems or tasks (tutorials) are used to test skills **B1** - **B3**. Laboratory reports assess **B3**. Write up of independent components of Stage 3 Advanced Practical sessions and the Stage 4 project allows students to demonstrate and be assessed in cognitive skills **B1** - **B4.**

Practical Skills

On completing the programme students should be able to:

C1 Work safely and independently in a chemistry laboratory
C2 Plan and undertake an advanced practical course
C3 Plan and undertake a research project evaluate risks in experiments, understand the limits of accuracy of the data and how to improve it
C4 Work on a project in an industrial environment or in a research laboratory abroad.

Teaching and Learning Methods

Students receive close supervision from postgraduate demonstrators or members of staff in the laboratory when performing experiments to enable them to develop safe working practices and good techniques. Formative feedback is used to enable progressive development of these skills (**C1**). At Stages 1 and 2 detailed experimental procedures are presented in laboratory manuals. At Stage 3 the students learn aspects of planning and designing experiments for themselves (**C2**), they work with a greater level of independence and perform more technically demanding procedures. While in Industry, abroad and in Stage 4 the students learn to plan and design the experiments for themselves (**C2**, **C3** and **C4**). At Stage 4 students work with a greater level of independence and perform more technically demanding procedures. They are able to work independently in a research laboratory and demonstrate competence in advanced laboratory techniques (**C3**).

Assessment Strategy

The skill **C1** is assessed by laboratory write-ups at Stages 1 and 2. At Stage 3 the student's practical competence is tested in the Advanced Practical laboratory sessions and (**C2**). At Stage 4 students are assessed in the Stage 4 Research Project module by oral presentation and examination, and writing-up of the project report **(C3)**. **C3** and **C4** are assessed through the placement in Industry or in a research laboratory abroad.

Transferable/Key Skills

On completing the programme students should be able to:

D1 Communicate and express clearly ideas both orally and in writing
D2 Work in a group environment
D3 Manage time and complete work to deadlines
D4 Assess and form an opinion of other people's work
D5 Find information from a range of sources
D6 Be self-reliant
D7 Critically evaluate data to solve chemical problems of an unfamiliar nature.

For students on the Industrial Placement Year programme:

D8 Reflect on and manage own learning and development within the workplace

D9 Use existing and new knowledge to enhance personal performance in a workplace environment, evaluate the impact and communicate this process

D10 Use graduate skills in a professional manner in a workplace environment, evaluate the impact and communicate the personal development that has taken place

For students on the International Study Year programme:

D11 Adapt and operate in a different cultural environment

Teaching and Learning Methods

The laboratory courses require the students to produce regular written work which is submitted to deadlines (**D1**, **D3**). Marked work is discussed with the students to develop their understanding as well as their powers of expression. A key skills module, 'Professional Development and Employability Skills' specifically addresses learning from, and working as part of, a group (**D2**). This module also includes information retrieval from a variety of sources and its evaluation, communication and presentation skills, assignments and reports (**D1, D3, D5**). Peer assessment is introduced in stage 1 as part of the Chemical Skills and Professionalism module, and Professional Development and Employability Skills (**D4**). Students further develop skills **D1, D3 – D5** and practise skills **D6** and **D7** during the Stage 3 Advanced Practical laboratory sessions s and Stage 4 projects. Solving challenging unseen problems at Stage 3 and the Research Project in Stage 4 develops skill **D7**.

Students further develop skills **D1 - D3** and **D5** - **D10** when on placement in Industry or in a research laboratory abroad.

Assessment Strategy

Written work and oral examinations are used to assess skill **D1**. Many of the skills are assessed in written examinations by both the answers and the approach to question answering. Key skills **D1, D2, D5** are addressed in the 'Professional Development and Employability Skills' module by peer assessment of individual contributions to the group effort and of a group presentation. The Research Project at Stage 4 evaluate skills **D1** - **D7**. Distance learning modules are assessed by unseen examinations. D8-D10 are assessed by a project report, presentation and the industrial supervisor.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The degree programme is offered full-time (4 years) and with Industrial Placement and Study Abroad (if chosen). Students have to take 120 credits at each stage for a total of 480 credits. All students take the compulsory modules outlined in each year.

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

A special feature of the MChem Chemistry course is that students undertake research training and a research project in an area of chemistry of their choosing at Stage 4. More advanced chemistry topics are taught at Stage 4. Modules are designed to allow students to "self-learn" by reading of literature material and advanced problem solving. More

advanced chemistry topics are taught at Stage 4 with modules including Selectivity and Stereocontrol in Organic Synthesis, and Advanced Methods in Drug Discovery.

A special feature of the MChem Chemistry with Industrial Training course or the MChem Chemistry with Study Abroad is that students spend the third year of the degree at a placement in Industry or at a prestigious University abroad. The year out is accredited and is assessed on the basis of the research project, as well as by material delivered by distance learning. For the Industrial placement the student with help find his/her own placement on a competitive basis and obtain the position by interview with a company.

A number of modules at Stage 1 allow students to take subjects that they have not studied before at A-level (or equivalent). Specific modules are compulsory for all the chemistry degrees and allow a student to transfer from one degree programme to another. For example, transfer to Chemistry with Medicinal Chemistry programme is possible at the end of Stage 1. Students may also transfer into the MChem with Industrial Training at the start of Stage 2. All transfers are subject to a student's academic performance.

The Professional Development and Employability Skills (Stage 3) module encourages the development of team-work and allows students the freedom to produce their own work on a chemistry-related topic. Peer-assessment is an integral part of the module. A major part of the Structural Chemistry module (Stage 2) is based on X-ray crystallography and the solving of actual structures. Problem solving is an integral part of many modules and at Stage 3 there is a dedicated module in which students write an advanced tutorial review on a topic of current research interest. The Advanced Practical Laboratory (Stage 3) contains open-ended experiments and introduces students to new chemistry practice. For example, the use of liquid ammonia as a solvent is introduced in the Inorganic Practical and dye sensitized solar cells in the Physical Practical.

Students on the Industrial Placement Year / International Study Abroad Year programmes will take their placements in the penultimate year of study (year 3).

Programme regulations (link to on-line version)

F103: F103

F106: F106

F107: F107

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 teaching and learning

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

Accreditation reports

Royal Society of Chemistry

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: Find a Degree | Undergraduate | Newcastle University (ncl.ac.uk) Degree Programme and University Regulations: University Regulations | University Regulations | Newcastle University (ncl.ac.uk)

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.