

PROGRAMME SPECIFICATION

1	Awarding Institution	Newcastle University
2	Teaching Institution	Newcastle University
3	Final Award	MChem Hons
4	Programme Title	Chemistry with Medicinal Chemistry Chemistry with Medicinal Chemistry with Industrial Training Chemistry with Medicinal Chemistry with Study Abroad
5	Programme Code	F123, F124, F156
6	Programme Accreditation	RSC (Currently only applies to F123 and F124)
7	QAA Subject Benchmark(s)	Chemistry
8	FHEQ Level	Level 7
9	Last updated	May 2023

10 Programme Aims

- 1 to enthuse students to chemistry by educating them with a thorough understanding of organic, inorganic, medicinal, core physical and essential biological chemistry, to an advanced level by distance learning during the placement 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 independent 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 research, chemistry-related disciplines or other professions, including critical awareness of recent advances in the chemical sciences. To develop students' practical skills including assessing risks so they can work in the laboratory safely;
 - 6 to develop students' practical skills including assessing risks so they can work in the laboratory safely.
- For students on the Industrial Placement Year programme:
- 7 to provide the opportunity for students to apply their skills in an industrial environment.
 - 8 to provide students with the opportunity to study chemistry in a prestigious university in another country, and experience the culture of that country for a year.
 - 9 provide students with the experience of seeking and securing a position with an employer
 - 10 facilitate independent self-management and proactive interaction in a non-university setting
 - 11 provide a period of practical work experience that will benefit current academic study and longer term career place

- 12 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 Year programme:

- 13 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.
- 14 Gain insight into international Higher Education and experience differences in academic approach and learning environment.
- 15 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 learning
- 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 Year 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**. At Stage 4 the students learn further advanced practical methods through a research 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/learned 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 with Chemical Toxicology, Chemotherapy and Enzymology at Stage 3.

Specialist aspects related to their placement are covered during their year in industry (**A6, A8 and A9-12**).

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 Research Literature project (**A6**) and oral examinations e.g. in the Stage 4 project (**A2, A6, A7**).

A6 - A8 and A9-12 are also assessed through the Industry placement.

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 Analytical Methods and their Applications, Stage 2 in Professional Development and Employability Skills and Stage 3 Research Literature Project modules) 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 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 students' practical competence is tested in the Advanced Practical laboratory (**C1 - C3**). 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 Abroad 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 Organic Chemistry in the context of a series of problem sheets, a practical course (Stage 2 Organic), Structural Chemistry 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 delivered within the 3 major modules 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 Literature Project at Stage 3 and the Research Project at Stage 4 evaluate skills **D1 - D7**. Distance learning modules are assessed by unseen examinations.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The degree programme is offered full-time (4 years) and with Industrial Placement (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.

All placements will be undertaken in line with the University's placement policy
<http://www.ncl.ac.uk/ltads/assets/documents/qsh-workplacement-pol.pdf>

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

A special feature of the MChem Chemistry with Industrial Training and MChem Chemistry with Study Abroad course is that students spend the third year of the degree at a placement in Industry or at a host University abroad. A student with help find his/her own industrial 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 core to 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 2) 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.

Students on the Industrial Placement Year / International Study Abroad Year programmes will take their placement in the penultimate year of studies.

Programme regulations (link to on-line version)

F123: [-RF123](#)

F124: [-RF124](#)

F156: [-RF156](#)

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

n/a

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.