Programme Specification: Undergraduate

For Academic Year 2026/27

1. Course Summary

Names of programme and award title(s)	Master in Chemistry with Mathematics (MChem) Master in Chemistry with Mathematics (MChem) with International Year Master in Chemistry with Mathematics (MChem) with Work Placement Year
Award type	Single Honours (Masters)
Mode of study	Full-time
Framework of Higher Education Qualification (FHEQ) level of final award	Level 7
Normal length of the programme	4 years; 5 years with either the International Year or Placement Year between years 2 and 3
Maximum period of registration	The normal length as specified above plus 3 years
Location of study	Keele Campus
Accreditation (if applicable)	All Master in Chemistry with Mathematics (MChem) combinations, including the 'with International Year' and 'with Work Placement Year' options, will be submitted for accreditation to the Royal Society of Chemistry (RSC) once the integrated masters variant of the programme is established.
Regulator	Office for Students (OfS)
Tuition Fees	**UK students:** Fee for 2026/27 is £9,790* **International students:** Fee for 2026/27 is £18,200** The fee for the international year abroad is calculated at 15% of the standard year fee The fee for the work placement year is calculated at 20% of the standard year fee

How this information might change: *Please read the important information at http://www.keele.ac.uk/student-agreement/. This explains how and why we may need to make changes to the information provided in this document and to help you understand how we will communicate with you if this happens.*

** These fees are regulated by Government. We reserve the right to increase fees in subsequent years of study in response to changes in government policy and/or changes to the law. If permitted by such change in policy or law, we may increase your fees by an inflationary amount or such other measure as required by government policy or the law. Please refer to the accompanying Student Terms & Conditions. Further information on fees can be found at http://www.keele.ac.uk/studentfunding/tuitionfees/*

*** These fees are for new students. We reserve the right to increase fees in subsequent years of study by an inflationary amount. Please refer to the accompanying Student Terms & Conditions for full details. Further information on fees can be found at http://www.keele.ac.uk/studentfunding/tuitionfees/*

2. What is an Integrated Master's programme?

The Master's level programme described in this document allows you to focus exclusively on the study of Chemistry and Mathematics. The Master's level programme described in this document allows you to take modules from both the Chemistry and the Mathematics programmes. Integrated master's awards are delivered through a programme that combines study at a bachelor's degree with honours with study at master's level. As such, you will graduate with an integrated master's degree after a single four-year programme of study. The Integrated Masters programme described in this document will allow you to gain enhanced skills and knowledge to master's level.

3. Overview of the Programme

Chemistry is the science which bridges the fundamental atomic building blocks of the universe to the complexity of the living world. The impact of chemistry on modern life ranges from the advanced materials powering our devices, to the sustainable production and re-use of resources, the key processes which influence our environment and climate, and the life-saving drugs essential to modern medicine. Our programmes explore the pivotal role of chemistry as a tool to address global, economic and environmental challenges, threading sustainability and industrial chemistry through traditional chemical principles and theories. The natural incorporation of mathematics into this programme will not only give you a breadth of knowledge, but more importantly will enable you to fully develop skills on problem solving, mathematical validation, logical arguments and abstraction, key for many scientific endeavours and some of the most pressing chemical challenges. You will have opportunities for individual advanced project work, collaborative learning, work and educational placements, and to explore frontier topics guided by our world-leading researchers.

In the first two years of study, you will be taught the core concepts in the fundamental areas of inorganic, organic, physical and analytical chemistry. You will develop pure mathematical knowledge and skills, as well as fully understand their use in a chemical context. Your learning will be supported through interactive teaching, workshops and small group activities as well as frequent opportunities to apply key concepts in laboratory classes and other practical exercises. In your third and fourth years, you will complete your education as a scientist, developing a toolkit of chemistry and mathematical skills. You will be able to tailor your learning to include topics of interest across chemistry, including some at the forefront of modern chemical sciences research. You will be able to tailor your learning to include topics of interest from the full range of chemistry, including some at the forefront of modern chemical sciences research. You will also conduct an in-depth literature review, giving you the opportunity to delve into an area of your own personal interest which you may connect to your research project, or diversify into another area.

Your development as an independent researcher is a central theme throughout the degree. Group-based investigative project work in 1st and 2nd year provides a structured approach to developing your skills and expertise. An individual independent research project at 3rd year prepares you for the highlight of your whole degree: a year-long research project in a research area where advanced mathematical tools and concepts intersect with an area at the forefront of chemistry research. This MChem project will advance knowledge and tackle a new question, working towards contributing your own findings to the international scientific literature in your field. Both of your individual projects can be aligned to your own interests and career goals, allowing you to focus and fully immerse yourself at the forefront of your field, develop your skills of scientific inquiry and make an impact as a researcher.

You will have hands-on access throughout your degree to sector-leading laboratory facilities and gain individual, practical confidence using specialist computational tools and research-grade instrumentation. Employability and transferrable skills are embedded and developed throughout the curriculum with problem-solving, communication, independent learning and inquiry, as well as dedicated career-focused sessions and workshops. Your understanding and skills will be assessed through a diverse range of authentic activities which will develop your specialist and transferrable skills and prepare you for your future career. You will receive personalised and comprehensive feedback and formative opportunities on assessed work in various formats. If you take advantage of the full range of opportunities the programme offers, you will have acquired the knowledge and skills to confidently pursue a fulfilling and impactful career and make your mark on the world.

4. Aims of the programme

The broad aims of the programme are to enable you to:

- A depth and breadth of fundamental and applied knowledge from across the chemical sciences, both through guided learning and by creating new knowledge through scientific research.
- Professional skills and competencies in practical chemistry, instrumental analysis, safe working practices, and the design and execution of original research.
- Knowledge, understanding and skills relevant to mathematics, including logical argument, problem solving, and mathematical modelling
- An understanding of the interdisciplinary nature of science, particularly in the intersection between mathematics and chemistry, ethical practices, and wider societal challenges
- Transferrable skills in problem solving, communication, digital tools and independent open-ended scientific

investigation applied to an original scientific research project.

5. What you will learn

The intended learning outcomes of the programme (what students should know, understand and be able to do at the end of the programme), can be described under the following headings:

- Subject knowledge and understanding
- Subject specific skills
- Key or transferable skills (including employability skills)

Subject knowledge and understanding

Successful students will be able to:

- A broad range of chemical concepts spanning the full breadth of chemistry (**Chemistry Knowledge)**
- The role of logical mathematical argument and deductive reasoning, and the application of mathematical modelling techniques to the solution of real-world problems **(Mathematics Knowledge and Skills)**
- How chemical and mathematical concepts can be applied to solve problems **(Problem Solving)**
- An awareness of the impact of chemistry and mathematics in current global challenges **(Global Awareness)**
- The application of chemistry and mathematics to interdisciplinary areas **(Interdisciplinarity)**

Subject specific skills

Successful students will be able to:

- Work safety and ethically, managing documentation including COSHH and risk assessments **(Safety and Ethics)**
- Demonstrate practical competence in laboratory techniques including operation of a range of instrumentation **(Practical Competence)**
- Comprehend problems, abstract their essentials and formulate them in symbolic form to understand how mathematical processes may be applied to facilitate their analysis and solution **(Conceptual Mathematical Modelling)**
- Formulate, test and refine chemical hypotheses through scientific Investigation **(Scientific Investigation)**
- Process, transform and critically evaluate qualitative and quantitative datasets **(Data Analysis and Literacy)**

Key or transferable skills (including employability skills)

Successful students will be able to:

- Conduct research, engaging with chemical literature to source, interpret, collate and cite relevant information **(Research Skills)**
- Demonstrate numeracy and digital skills, working confidently with mathematical concepts and employing a range of computational tools including specialist scientific software **(Numeracy and Data Skills)**
- Communicate scientific information and ideas though oral and written methods as appropriate to a range of different audiences **(Scientific Communication)**
- Display reflective practice and professionalism through self-direction and collaborative work, developing and sustaining effective approaches to learning and study, including time management, organisational skills, flexibility, creativity and intellectual integrity **(Reflective Practice and Professionalism)**
- Additional learning outcomes specific to the MChem Chemistry with Mathematics with International Year or Work Placement Year (see annexes below)

The development of these programme learning outcomes, as appropriate for each level of study, is described in the Learning Outcome tables in section 8.

Keele Graduate attributes

The Keele Graduate Attributes are the qualities (skills, values and mindsets) which you will have the opportunity to develop during your time at Keele through both the formal curriculum and also through co- and extra-curricular activities (e.g., work experience, and engagement with the wider University community such as acting as ambassadors, volunteering, peer mentoring, student representation, membership and leadership of clubs and societies). Our Graduate Attributes consist of four themes: **academic expertise, professional skills, personal effectiveness, and social, environmental and ethical responsibility**. You will have

opportunities to engage actively with the range of attributes throughout your time at Keele: through your academic studies, through self-assessing your own strengths, weaknesses, and development needs, and by setting personal development goals. You will have opportunities to discuss your progress in developing graduate attributes with, for example, Academic Mentors, to prepare for your future career and lives beyond Keele.

6. How is the programme taught?

Our chemistry with mathematics programme is delivered with an emphasis on live, in-person, interactive sessions, supported by online materials on the Keele Learning Environment (KLE) allowing flexible engagement. Students are also provided with regular opportunities to talk through particular areas of difficulty, and any special learning needs they may have, with their Academic Mentors or module lecturers on a one-to-one basis.

1st Year:

Chemistry content is predominantly taught through **interactive lectures** consisting of a mixture of presentation and interactive activities. Activities include guided problem solving, worked examples and student response polls facilitated by digital tools such as mentimeter or padlet. Global awareness and sustainability goals are drawn out through elements of **group discussion** incorporated in teaching sessions and through discussion boards. Lectures are supported by **workshops** and **problem classes** incorporating **small group learning** approaches such as **Team Based Learning** (TBL). **e-Portfolios** are used to scaffold the development of problem solving and information literacy skills with **reflective exercises** helping you learn to make effective use of **feedback**. **Practical classes** include weekly **laboratory sessions** following scripted labs to teach fundamental practical skills and **PC labs** to enable hands-on training in information retrieval, data analysis and programming techniques. You will apply these skills to collaborative open ended **investigative practical work** towards the end of the year.

2nd Year:

Teaching styles continue from first year with **interactive lectures** supported by **problem classes**, **workshops**, **TBL sessions** and **tutorials**. **Practical classes** include scripted **laboratory sessions** developing more advanced techniques and hands-on experience of a range of analytical instruments. **Investigative group work** is developed through an analytical project. Professional skills are developed with a focus on industrial chemistry and **reflective development** of employability skills including an industrial themed **group project**. There is a greater emphasis on the use of scientific software in **PC labs** to support chemical understanding and the processing of data, including statistical consideration of accuracy.

From second year, you are also invited to attend our **Chemical Sciences Seminar Series** in which you will experience speakers from academia and industry presenting material at the forefront of current scientific knowledge.

3rd Year:

A highlight of our 3rd year is the independent research project. Rather than scripted labs, you will collaborate with an academic member of staff to complete approx. 80 hours of **project work**, spread over both semesters. Laboratory work takes place in teaching labs with expert supervision. You will also complete a literature review, and you can choose to combine your research project and literature review in one specialised area, or to differentiate and explore a different bespoke topic for your literature review.

Further practical work is taught through **laboratory sessions** and **PC labs** involving hands-on experience of a wide range of research grade analytical instruments. **Interactive lectures** and **seminars** form the basis of most taught content, with **workshops** or **TBL sessions** typically held at the end of each topic. Fewer contact hours provide more time for **independent work**, and the ability to specialise in your preferred areas of chemistry through a series of assessment items allowing a bespoke choice of subject. Choice is also available within modules, with the Topics module offering a wide choice of topics within the module structure.

4th Year:

The majority of your MChem year is devoted to your **independent research project,** in which you will work in a collaborative research environment. Three days each week are devoted to project work, and regular meetings with your project supervisor will support you in planning and reviewing progress. Alongside your project you will participate in a series of **research skills seminars**, training you in you in aspects of chemical research and in advanced analytical techniques, and to present data and scientific arguments to publication standard.

In addition to project work, you will study a range of synoptic and advanced chemistry topics. In the first semester, you will consolidate your understanding of the depth and breadth of chemistry. **Seminar** style sessions will draw together themes in chemistry, with an emphasis on applied problem solving. In the second semester a choice of topics incorporating research at the forefront of chemistry are offered. The teaching style for these sessions is also seminar based, incorporating preparative work based on topical research papers.

Apart from these formal activities, students are also provided with regular opportunities to talk through

particular areas of difficulty, and any special learning needs they may have, with their Academic Mentors or module lecturers on a one-to-one basis.

7. Teaching Staff

A dynamic group of staff with a broad range of expertise teach on the chemistry with mathematics programme and bring a wealth of experience acquired through research and scholarship across a diverse set of areas. Some current staff members are internationally recognised leaders in their field and manage research groups comprising postgraduate research students and postdoctoral researchers, some of whom contribute to the teaching on the programme. Reflecting the diversity of expertise, some staff members also contribute to the Forensic Science and Physics programmes at Keele.

Many current teaching staff hold or are working towards an accredited Higher Education Teaching qualification and many are Fellows (FHEA) or Senior Fellows (SFHEA) of the Higher Education Academy, the professional body for teachers in Higher Education. Our staff regularly make scholarly contributions to national education conferences, journals and books, as well as attract funding for teaching innovation projects, on topics spanning authentic assessment, embedding technology in teaching, team-based and active learning, gamification and induction to HE, among others. A number of the teaching staff have established a national reputation for excellence in teaching and learning and have been recognised for their innovation in teaching through national teaching awards, for example:

- Green Gown Award - for embedding sustainability in the chemistry curriculum
- National Teaching Fellowship (NTF)
- RSC Higher Education Teaching Award
- RSC Team Prize for Excellence in Higher Education
- AdvanceHE Collaborative Award for Teaching Excellence

The University will attempt to minimise changes to our core teaching teams, however, delivery of the programme depends on having a sufficient number of staff with the relevant expertise to ensure that the programme is taught to the appropriate academic standard.

Staff turnover, for example where key members of staff leave, fall ill or go on research leave, may result in changes to the programme's content. The University will endeavour to ensure that any impact on students is limited if such changes occur.

8. What is the structure of the programme?

The academic year runs from September to June and is divided into two semesters. The number of weeks of teaching will vary from course to course, but you can generally expect to attend scheduled teaching sessions between the end of September and mid-December, and from mid-January to the end of April. Our degree courses are organised into modules. Each module is usually a self- contained unit of study and each is usually assessed separately with the award of credits on the basis of 1 credit = 10 hours of student effort. An outline of the structure of the programme is provided in the tables below.

Two types of module are delivered as part of your programme. They are:

- Compulsory modules - a module that you are required to study on this course;
- Optional modules - these allow you some limited choice of what to study from a list of modules.

This programme provides breadth through the unique combination of mathematics and chemistry, building interdisciplinary skills as part of this. In order to develop the broad range of theoretical, practical, mathematical and computational skills to allow you to tackle cutting edge topics in the final year of study and beyond, there is no optionality in the first two years of the programme. In the final year there are a range of optional modules, including work and teaching placements that allow you to tailor your interests using the skills you have developed.

Global Challenge Pathways

This programme includes the option for you to take a Global Challenge Pathway. These modules offer you an exciting opportunity to work with students and staff from different disciplines to explore topical global issues such as power and conflict, health inequalities, climate change, generative AI, social justice, global citizenship, and enterprise from different perspectives.

Global Challenge Pathways can be taken as one 15-credit module at Levels 5 and 6. For more information about our Global Challenge Pathways please visit:

https://www.keele.ac.uk/study/undergraduate/globalchallengepathways/

Modern Languages or Certificate in TESOL

Alternatively, you could choose to study modules with the University Language Centre. The Language Centre offers three pathways; The Language Specialist, The Language Taster, and The Trinity Certificate in Teaching English to Speakers of Other Language (TESOL). Language Centre modules are available separately for students at Level 4. At Levels 5 and 6 they are included within the Global Challenge Pathways.

If you choose the Language Specialist pathway, you will automatically be enrolled on a Semester 2 Modern Language module as a continuation of your language of choice as a faculty funded 'additional' module. Undertaking a Modern Languages module in Semester 2 is compulsory if you wish to continue to the Language Specialist Global Challenge Pathway the following academic year.

For more information about Language Centre option modules available to you please visit the following webpages.

For new (Level 4) students please visit: https://www.keele.ac.uk/study/languagecentre/

For current (Level 5 and Level 6) students please visit: https://www.keele.ac.uk/students/academiclife/global-challenge-pathways/

Year	Compulsory	Optional	
		Min	Max
Level 4	120	0	0
Level 5	105	15	15
Level 6	105	15	15
Level 7	120	0	0

Module Lists

Level 4

The level 4 structure builds a strong foundation in Chemistry whilst building the foundational maths knowledge and skills to access Mathematics modules at levels 5 and 6 on the integrated programme. The module structure also gives the flexibility to transfer from the Chemistry with Mathematics programme to any of the Chemistry, Chemistry with Medicinal Chemistry or Chemistry with Materials Chemistry programmes at the end of level 4. The zero credit Employability Skills module will support you in identifying and evidencing subject and transferable skills developed in your programme.

Compulsory modules	Module Code	Credits	Period
Mathematical Methods	MAT-10043	15	Semester 1
Practical and Professional Chemistry Skills	CHE-10061	30	Semester 1-2
Chemical Structure and Reactivity	CHE-10063	30	Semester 1-2
Chemistry Connections	CHE-10087	30	Semester 1-2
Chemistry Career Planning and Employability Skills	CHE-10089	0	Semester 1-2
Differential Equations and Multivariable Calculus	MAT-10075	15	Semester 2

Level 5

Compulsory chemistry modules span the breadth of organic, inorganic, physical and analytical chemistry, as well as developing practical and professional skills. You will study two modules specifically relating to mathematics, which build on those taken at Level 4, allowing the mathematical description of real-life processes. You will additionally have the option of considering a global challenges pathway or delve into the area of materials chemistry.

Compulsory modules	Module Code	Credits	Period
Linear Differential Equations	MAT-20041	15	Semester 1
Chemical Characterisation and Transformations	CHE-20093	30	Semester 1-2
Practical and Professional Chemistry	CHE-20099	30	Semester 1-2
Environmental Analysis	CHE-20089	15	Semester 2
Complex Variable and Vector Calculus	MAT-20047	15	Semester 2

Optional modules	Module Code	Credits	Period
Structure and Function in Materials Chemistry	CHE-20091	15	Semester 1

Level 6

You will study compulsory chemistry modules that give a flavour of the full breadth of chemistry, while allowing specialisation in the areas most relevant to chemistry and mathematics. You will have access to explore further areas of chemistry, continue on your global challenge pathway or gain experiential learning through education/work placement modules. Your independent research project and literature review will also allow you to specialise in research field(s) relevant to your area of interest

Compulsory modules	Module Code	Credits	Period
Kinetics, Catalysis and Mechanism	CHE-30078	15	Semester 1
Non-linear Differential Equations	MAT-30002	15	Semester 1
Partial Differential Equations	MAT-30003	15	Semester 1
Independent Research Project	CHE-30066	15	Semester 1-2
Scientific Literature Review	CHE-30068	15	Semester 1-2
Chemical Analysis: Instrumentation and Evaluation	CHE-30070	15	Semester 2
Topics in Chemical Science	CHE-30074	15	Semester 2

Optional modules	Module Code	Credits	Period
Inorganic, Physical and Quantum Chemistry	CHE-30072	15	Semester 1
Semiconductors and Catalysts: Materials for Sustainability	CHE-30076	15	Semester 1
Flexible Work Placement (Level 6)	NAT-30008	15	Semester 1-2
Professional Experience in Education	NAT-30012	15	Semester 1-2

Level 6 Module Rules

Semiconductors and Catalysts: Materials for Sustainability (CHE-30076) is only an option for students who have taken Structure and Function in Materials Chemistry (CHE-20091) at Level 5.

Please note: You cannot take both Flexible Work Placement (Level 6) and Professional Experience in Education

Level 7

The MChem year places a greater emphasis on your ability to work independently and equips you for a research career. You will be trained in research methods and carry out a 60-credit research project in an area of your choice, reviewing the relevant research literature to place your work in context. A 30-credit taught module consolidates your chemistry knowledge through synoptic topics and offers a choice of modern topics at the forefront of the discipline including material taught from research publications.

Compulsory modules	Module Code	Credits	Period
MChem Research Training	CHE-40050	30	Semester 1-2
Synoptic Topics and Modern Trends in Chemistry	CHE-40070	30	Semester 1-2
MChem Chemistry with Mathematics Independent Research Project	CHE-40074	60	Semester 1-2

Learning Outcomes

The table below sets out what students learn in the programme and the modules in which that learning takes place. Details of how learning outcomes are assessed through these modules can be found in module specifications.

Level 4

The table below sets out what students learn in the programme and the modules in which that learning takes place. Details of how learning outcomes are assessed through these modules can be found in module specifications.

Level 4

In Year 1 (Level 4) and Year 2 (Level 5) these learning outcomes are achieved in the compulsory modules which all students are required to take. Some of these outcomes may also be achieved or reinforced in elective modules together with other outcomes not stated here. In Year 3 (Level 6) the stated outcomes are achieved by taking any of the modules offered in each semester.

Subject Knowledge and Understanding	
Learning Outcome	**Module in which this is delivered**
Chemistry Knowledge: Recall basic knowledge and theories based on taught contents and use these to explain familiar concepts using appropriate terminology.	Chemical Structure and Reactivity - CHE-10063
Mathematics Knowledge and Skills: Recall and apply basic knowledge and theories based on taught content and concepts	Mathematical Methods - MAT-10043 Differential Equations and Multivariable Calculus - MAT-10075
Problem Solving: Apply knowledge and understanding of fundamental chemical principles and concepts to solve qualitative and quantitative problems.	Chemical Structure and Reactivity - CHE-10063 Chemistry Connections - CHE-10087 Mathematical Methods - MAT-10043 Differential Equations and Multivariable Calculus - MAT-10075
Global Awareness: Identify and describe the application of chemistry and mathematics in solving current and future challenges in the world.	Practical and Professional Chemistry Skills - CHE-10061 Chemistry Connections - CHE-10087 Mathematical Methods - MAT-10043 Differential Equations and Multivariable Calculus - MAT-10075
Interdisciplinarity: Identify and describe the contribution of Chemistry to multidisciplinary issues.	Chemistry Connections - CHE-10087

Subject Specific Skills	
Learning Outcome	**Module in which this is delivered**
Safety and Ethics: Demonstrate skills in the safe handling of chemical substances and appropriate behaviour in laboratory environments, and show awareness of risk assessment, COSHH documentation and safe laboratory practices.	Practical and Professional Chemistry Skills - CHE-10061 Chemistry Connections - CHE-10087
Practical Competence: Safely and competently operate standard laboratory instrumentation and equipment	Practical and Professional Chemistry Skills - CHE-10061 Chemistry Connections - CHE-10087
Conceptual Mathematical Modelling: Translate simple problems into symbolic form, applying basic mathematical techniques to analyse models	Mathematical Methods - MAT-10043 Differential Equations and Multivariable Calculus - MAT-10075
Scientific Investigation: Observe, monitor, record and document chemical techniques, properties, events or changes with systematic record keeping, and demonstrate a practical and reflective understanding of the principles of scientific experimentation and inquiry	Practical and Professional Chemistry Skills - CHE-10061 Chemistry Connections - CHE-10087
Data Analysis and Literacy: Locate or synthesise, evaluate and interpret qualitative and quantitative chemical data with an awareness of uncertainty and significance	Practical and Professional Chemistry Skills - CHE-10061 Chemistry Connections - CHE-10087 Mathematical Methods - MAT-10043 Differential Equations and Multivariable Calculus - MAT-10075

Key or Transferable Skills (graduate attributes)	
Learning Outcome	**Module in which this is delivered**
Research Skills: Engage with the chemical literature, including the use of online scientific databases, identifying appropriate sources of chemical information and correctly citing information.	Chemical Structure and Reactivity - CHE-10063 Chemistry Connections - CHE-10087
Numeracy and Digital Skills: Select and use computational methods and mathematical concepts for data analysis, reporting and problem solving, including rearranging equations, systematic use of units and the interpretation of graphical and tabulated data.	Practical and Professional Chemistry Skills - CHE-10061 Chemical Structure and Reactivity - CHE-10063 Chemistry Connections - CHE-10087 Mathematical Methods - MAT-10043 Differential Equations and Multivariable Calculus - MAT-10075
Scientific Communication: Communicate information and ideas verbally and in writing, selecting appropriate content for a lay audience.	Practical and Professional Chemistry Skills - CHE-10061 Chemistry Connections - CHE-10087 Mathematical Methods - MAT-10043
Reflective Practice and Professionalism: Demonstrate the ability to engage with learning opportunities individually and collaboratively, reflecting and acting on feedback to enhance your quality of work and working successfully in a group environment, contributing to team outputs.	Practical and Professional Chemistry Skills - CHE-10061 Chemical Structure and Reactivity - CHE-10063 Chemistry Connections - CHE-10087

Level 5

Subject Knowledge and Understanding	
Learning Outcome	**Module in which this is delivered**
Chemistry Knowledge: Recall knowledge and theories in Chemistry on course content and use them to predict and explain familiar concepts using appropriate terminology.	Environmental Analysis - CHE-20089 Structure and Function in Materials Chemistry - CHE-20091 Chemical Characterisation and Transformations - CHE-20093
Mathematics Knowledge and Skills: Recall and apply basic knowledge and theories based on taught content and concepts	Linear Differential Equations - MAT-20041
Problem Solving: Apply knowledge and understanding of chemistry theories, principles and concepts to solve in-depth qualitative and quantitative problems which may intersect multiple branches of science	Environmental Analysis - CHE-20089 Chemical Characterisation and Transformations - CHE-20093 Linear Differential Equations - MAT-20041 Complex Variable and Vector Calculus - MAT-20047
Global Awareness: Appreciate the contribution of chemistry and mathematics to the innovations that characterise the modern world, and the potential of chemists to develop solutions to current and future challenges	Environmental Analysis - CHE-20089 Practical and Professional Chemistry - CHE-20099 Linear Differential Equations - MAT-20041 Complex Variable and Vector Calculus - MAT-20047
Interdisciplinarity: Recognise the relationships and interfaces between chemistry, mathematics and other subjects, applying chemical concepts effectively in a multidisciplinary environment	Environmental Analysis - CHE-20089 Structure and Function in Materials Chemistry - CHE-20091 Linear Differential Equations - MAT-20041 Complex Variable and Vector Calculus - MAT-20047

Subject Specific Skills	
Learning Outcome	**Module in which this is delivered**
Safety and Ethics: Demonstrate skills in the specific handling techniques for hazardous substances and safe working practices in specialised laboratory environments, and understanding and implementation of risk assessments and COSHH documentation.	Environmental Analysis - CHE-20089 Practical and Professional Chemistry - CHE-20099
Practical Competence: Gain individual familiarity with specialist laboratory instrumentation, equipment and techniques, and judge their appropriate use cases	Environmental Analysis - CHE-20089 Practical and Professional Chemistry - CHE-20099
Conceptual Mathematical Modelling: Formulate complex problems into mathematical models, evaluating and refining models.	Linear Differential Equations - MAT-20041 Complex Variable and Vector Calculus - MAT-20047
Scientific Investigation: Construct and maintain systematic, reliable and detailed records of experimental observations informed by theoretical underpinnings and best professional practice, and recognise, evaluate and critique the methods and findings of scientific experimentation and inquiry	Environmental Analysis - CHE-20089 Practical and Professional Chemistry - CHE-20099
Data Analysis and Literacy: Demonstrate judgement in locating or producing, professionally processing and interpreting qualitative and quantitative chemical data	Environmental Analysis - CHE-20089 Practical and Professional Chemistry - CHE-20099 Linear Differential Equations - MAT-20041 Complex Variable and Vector Calculus - MAT-20047

Key or Transferable Skills (graduate attributes)	
Learning Outcome	**Module in which this is delivered**
Research Skills: Engage with the chemical literature including the use of online scientific databases, making appropriate use of primary and secondary peer reviewed sources in constructing scientific reports and correctly citing information.	Structure and Function in Materials Chemistry - CHE-20091 Practical and Professional Chemistry - CHE-20099
Numeracy and Digital Skills: Deploy mathematical concepts and computational techniques, including the use of specialist scientific software, to manipulate and present chemical information and data including statistical and error analysis of chemical data.	Environmental Analysis - CHE-20089 Chemical Characterisation and Transformations - CHE-20093 Practical and Professional Chemistry - CHE-20099 Linear Differential Equations - MAT-20041 Complex Variable and Vector Calculus - MAT-20047
Scientific Communication: Communicate information and ideas verbally and in writing, selecting appropriate content for a scientific or business audience and producing presentation materials of a professional quality.	Structure and Function in Materials Chemistry - CHE-20091 Practical and Professional Chemistry - CHE-20099
Reflective Practice and Professionalism: Demonstrate the ability to engage with learning opportunities individually and collaboratively, reflecting on the development of employability skills and working successfully in group environments, contributing to team outputs.	Environmental Analysis - CHE-20089 Practical and Professional Chemistry - CHE-20099

Level 6

Subject Knowledge and Understanding	
Learning Outcome	**Module in which this is delivered**
Chemistry Knowledge: Describe and discuss the full breadth of key chemical concepts confidently, accurately and in detail, using appropriate terminology, including selected aspects at the forefront of chemistry.	Chemical Analysis: Instrumentation and Evaluation - CHE-30070 Inorganic, Physical and Quantum Chemistry - CHE-30072 Topics in Chemical Science - CHE-30074 Kinetics, Catalysis and Mechanism - CHE-30078
Mathematics Knowledge and Skills: Describe and discuss the full breadth of key mathematical concepts confidently, accurately and in detail, using appropriate terminology	Non-linear Differential Equations - MAT-30002 Partial Differential Equations - MAT-30003
Problem Solving: Apply knowledge, understanding and critical judgement of modern chemistry theories and practices to solve new, qualitative and quantitative problems that may be multi-layered and/or cross disciplinary in nature.	Chemical Analysis: Instrumentation and Evaluation - CHE-30070 Inorganic, Physical and Quantum Chemistry - CHE-30072 Topics in Chemical Science - CHE-30074 Kinetics, Catalysis and Mechanism - CHE-30078
Global Awareness: Appreciate the contribution of chemistry and mathematics to the innovations that characterise the modern world, and the potential of chemists to develop solutions to current and future challenges.	Topics in Chemical Science - CHE-30074 Semiconductors and Catalysts: Materials for Sustainability - CHE-30076 Kinetics, Catalysis and Mechanism - CHE-30078
Interdisciplinarity: Recognise the relationships and interfaces between chemistry, mathematics and other subjects, applying chemical concepts effectively in a multidisciplinary environment.	Topics in Chemical Science - CHE-30074 Semiconductors and Catalysts: Materials for Sustainability - CHE-30076

Subject Specific Skills	
Learning Outcome	**Module in which this is delivered**
Safety and Ethics: Demonstrate skills in the design and implementation of safe chemical procedures and processes, including production of new risk assessments, COSHH documentation and/or research ethics documentation as appropriate	Independent Research Project - CHE-30066 Chemical Analysis: Instrumentation and Evaluation - CHE-30070
Practical Competence: Use independent judgement to select and operate the appropriate advanced laboratory instrumentation, equipment, techniques and sampling tools to address new questions	Independent Research Project - CHE-30066 Chemical Analysis: Instrumentation and Evaluation - CHE-30070
Conceptual Mathematical Modelling: Construct, analyse and refine mathematical models of complex systems, including solution of real word problems	Non-linear Differential Equations - MAT-30002 Partial Differential Equations - MAT-30003
Scientific Investigation: Plan, formulate and test original chemical hypotheses by designing, observing, recording and interpreting data collections, professionally documenting methodologies and findings, and evaluate the results of open-ended and original scientific investigations	Independent Research Project - CHE-30066
Data Analysis and Literacy: Process, transform and critically evaluate original qualitative and quantitative datasets and use judgement informed by theory to build robust arguments based on data from complementary sources	Independent Research Project - CHE-30066 Chemical Analysis: Instrumentation and Evaluation - CHE-30070 Inorganic, Physical and Quantum Chemistry - CHE-30072 Kinetics, Catalysis and Mechanism - CHE-30078 Non-linear Differential Equations - MAT-30002 Partial Differential Equations - MAT-30003

Key or Transferable Skills (graduate attributes)	
Learning Outcome	**Module in which this is delivered**
Research Skills: Engage with peer reviewed chemical literature, evaluating, interpreting and synthesizing chemical information to construct and critically evaluate scientific research.	Independent Research Project - CHE-30066 Scientific Literature Review - CHE-30068 Topics in Chemical Science - CHE-30074 Semiconductors and Catalysts: Materials for Sustainability - CHE-30076
Numeracy and Digital Skills: Deploy mathematical, statistical and computational methods for data analysis to solve chemical problems and evaluate chemical data, using a broad range of general and specialist software to investigate, interpret and manipulate chemical information.	Chemical Analysis: Instrumentation and Evaluation - CHE-30070 Inorganic, Physical and Quantum Chemistry - CHE-30072 Semiconductors and Catalysts: Materials for Sustainability - CHE-30076 Kinetics, Catalysis and Mechanism - CHE-30078 Non-linear Differential Equations - MAT-30002 Partial Differential Equations - MAT-30003
Scientific Communication: Communicate effectively in both oral and written formats, selecting appropriate content, media and methods for the audience, purpose and subject, and using a broad range of general and specialist software to create materials for presentation.	Independent Research Project - CHE-30066 Scientific Literature Review - CHE-30068 Topics in Chemical Science - CHE-30074 Kinetics, Catalysis and Mechanism - CHE-30078
Reflective Practice and Professionalism: Demonstrate the ability to plan, review and manage progress individually and collaboratively, working successfully with others, reviewing and managing progress, prioritising tasks and meeting deadlines.	Independent Research Project - CHE-30066 Scientific Literature Review - CHE-30068 Chemical Analysis: Instrumentation and Evaluation - CHE-30070

Level 7

Subject Knowledge and Understanding	
Learning Outcome	**Module in which this is delivered**
Chemistry Knowledge: Develop a systematic and broad understanding of chemical concepts and apply this to explain complex synoptic scenarios integrating and synthesising knowledge to demonstrate a holistic and in-depth understanding of chemistry.	Synoptic Topics and Modern Trends in Chemistry - CHE-40070
Problem Solving: Integrate, synthesise and apply knowledge, understanding and original critical judgement of state-of-the-art chemical concepts to the solution of complex problems including questions based on recent research literature.	MChem Research Training - CHE-40050 Synoptic Topics and Modern Trends in Chemistry - CHE-40070
Global Awareness: Identify and evaluate the contribution of your specialist field at the intersection of Chemistry and Mathematics to the innovations that characterise the modern world, and the potential of chemists to develop solutions to current and future challenges.	Synoptic Topics and Modern Trends in Chemistry - CHE-40070 MChem Chemistry with Mathematics Independent Research Project - CHE-40074
Interdisciplinarity: Recognise and discuss the relationships and interfaces between your specialist field of science and its intersections with other fields including those of an interdisciplinary nature.	Synoptic Topics and Modern Trends in Chemistry - CHE-40070 MChem Chemistry with Mathematics Independent Research Project - CHE-40074

Subject Specific Skills	
Learning Outcome	**Module in which this is delivered**
Safety and Ethics Demonstrate autonomy in the design and implementation of safe chemical procedures and processes, including production of new risk assessments, COSHH and ethics documentation as appropriate	MChem Research Training - CHE-40050 MChem Chemistry with Mathematics Independent Research Project - CHE-40074
Practical Competence: Exercise insight and originality in applying advanced laboratory instrumentation, equipment and data collection methods to address new questions	MChem Research Training - CHE-40050 MChem Chemistry with Mathematics Independent Research Project - CHE-40074
Conceptual Mathematical Modelling: Independently design, implement and refine original mathematical models for the solution of research problems, critically evaluating model outputs.	MChem Research Training - CHE-40050 MChem Chemistry with Mathematics Independent Research Project - CHE-40074
Scientific Investigation: Formulate, test and refine original scientific hypotheses by designing, observing, recording and interpreting data collections and documenting methodologies and findings from an extended and original scientific investigation at publication quality	MChem Research Training - CHE-40050 MChem Chemistry with Mathematics Independent Research Project - CHE-40074
Data Analysis and Literacy: Process, transform and critically evaluate original qualitative and quantitative datasets and use judgement fully grounded in modern theory and mathematical tools to build and defend multifaceted scientific arguments	MChem Research Training - CHE-40050 MChem Chemistry with Mathematics Independent Research Project - CHE-40074

Key or Transferable Skills (graduate attributes)	
Learning Outcome	**Module in which this is delivered**
Research Skills: Interrogate and integrate diverse sources of scientific literature to design and develop methods for investigation and analysis, including in areas at the forefront of knowledge.	MChem Chemistry with Mathematics Independent Research Project - CHE-40074
Numeracy and Digital Skills: Choose and deploy appropriate mathematical concepts, computational tools and methods for data analysis, demonstrating competence at the professional level required for publication in the peer reviewed chemical literature.	MChem Research Training - CHE-40050
Scientific Communication: Communicate and defend the background, context, methods, results and potential impact of a significant research project to general and expert scientific audiences.	MChem Research Training - CHE-40050 MChem Chemistry with Mathematics Independent Research Project - CHE-40074
Reflective Practice and Professionalism: Work successfully in a collaborative research environment, taking the responsibility to plan, review and manage progress and demonstrating self-efficacy, adaptability and resilience though effective prioritisation, enterprise and the ability to meet deadlines.	MChem Chemistry with Mathematics Independent Research Project - CHE-40074

Course Transfers

Transfers to Chemistry, Chemistry with Medicinal Chemistry and Chemistry with Materials Chemistry routes:

You may elect to transfer from MChem Chemistry with Mathematics to MChem Chemistry or MChem Chemistry with Medicinal Chemistry at any point up to the first week of Semester 1 of Year 2.

You may elect to transfer from MChem Chemistry with Mathematics to MChem Chemistry with Materials Chemistry:

1. At any point up to the first week of Semester 1 of Year 2.
2. At any point up to the first week of Semester 2 of Year 2 if you have taken CHE20091 Structure and Function in Materials Chemistry

Transfers to the BSc(Hons) (3 year) Programme:

The Chemistry programmes are structured to allow flexibility to transfer between BSc and MChem routes throughout the programme. If you do not reach the Level 5 to 6, or Level 6 to 7 progression thresholds set out in Regulation D2 for Integrated Masters programmes, you will be automatically transferred to the corresponding BSc(Hons) route. You may also choose to transfer to the BSc(Hons) Chemistry with Mathematics route at any point before the end of year 3.

A summary of the credit requirements per year is as follows.

9. Final and intermediate awards

Credits required for each level of academic award are as follows:

Master in Chemistry with Mathematics (MChem)	480 credits	You will require at least 120 credits at levels 4, 5, 6 and 7 You must accumulate at least 360 credits in your main subject (out of 480 credits overall) to graduate with a named single honours degree in this subject.
Honours Degree	360 credits	You will require at least 120 credits at levels 4, 5 and 6 You must accumulate a minimum of 270 credits in your main subject (out of 360 credits overall), with at least 90 credits in each of the three years of study, to graduate with a named single honours degree in this subject.
Diploma in Higher Education	240 credits	You will require at least 120 credits at level 4 or higher and at least 120 credits at level 5 or higher
Certificate in Higher Education	120 credits	You will require at least 120 credits at level 4 or higher

International Year option: in addition to the above students must pass a module covering the international year in order to graduate with a named degree including the 'international year' wording. Students who do not complete, or fail the international year, will be transferred to the three-year version of the programme.

Work Placement Year option: in addition to the above students must pass a non-credit bearing module covering the work placement year in order to graduate with a named degree including the 'with Work Placement Year' wording. Students who do not complete, or fail the work placement year, will be transferred to the three-year version of the programme.

10. How is the Programme Assessed?

The wide variety of assessment methods used on this programme at Keele reflects the broad range of knowledge and skills that are developed as you progress through the degree programme. Teaching staff pay particular attention to specifying clear assessment criteria and providing timely, regular and constructive feedback that helps to clarify things you did not understand and helps you to improve your performance.

Our assessment strategy will help you to develop and evidence your ability to:

1. **Conduct and report practical work:**

We place a strong emphasis on developing robust lab skills and confident use of research grade equipment. A **practical exam** at the end of 1st year consolidates the lab skills you have developed and gives confidence in progressing to the advanced practical skills in 2nd year. Reporting of practical work during years 1 and 2 uses **electronic lab portfolios** to scaffold the development of record keeping, data analysis and chemical characterisation, setting you up for the professional **electronic lab notebooks** required for record keeping in your independent research in 3rd year and MChem projects. You are taught to prepare a professional **lab report** in year 1, develop this to a publication format **scientific paper** in year 2 and write up your own **research paper** at 3rd year, culminating in a 15,000 word **dissertation** on your research project in your MChem year.

2. Apply knowledge and understanding to solve problems:

Problem solving skills are developed throughout the programme through formative problems and assessed **problem sheets**. These assessments are typically based on authentic scientific tasks and may incorporate information retrieval tasks and/or data analysis. The use of written **class tests and examinations** in selected modules assess your ability to solve problems in a time limited fashion under invigilated conditions and supports the consolidation of knowledge. To support the emphasis on problem-solving you will be encouraged to create your own content summary pages for some of these assessments. In the MChem year, an **interview** assessment probing depth and breadth of knowledge is used alongside written exams.

3. Demonstrate a range of scientific skills

You will develop a broad range of scientific skills over the course of your degree, which are assessed through authentic **exercises** and scientific **reports**. These include the development of digital skills for creating, manipulating and processing data, using specialist scientific software, and design exercises where you will apply your skills to propose creative solutions to chemical challenges.

4. Communicate effectively with a range of audiences:

In addition to the formal reporting of practical work, your ability to source and communicate information from scientific literature is developed from writing for a lay audience in 1st year, through to more formal scientific and business writing tasks in 2nd year to a scientific **literature review** on a topic of your choosing in 3rd year. A series of **poster** and **infographic** assessments assess your ability to summarise detailed knowledge in a highly visual and accessible format. These build to you presenting a conference style poster session in 3rd year, delivering an elevator pitch and answering questions on your topic, and presenting a poster on the findings of your year-long MChem project at a research symposium at the end of your fourth year.

Oral communication skills are built through a **group presentation** in 2nd year. In 3rd year you will deliver an individual **presentation** on your choice of topic, summarising the research literature in that field. A **technical interview** in 3rd year allows you to demonstrate your understanding of a topic in an oral discussion, replicating an interview style experienced in many scientific careers. These build towards the **oral viva** associated with your 3rd year and MChem projects

5. Work professionally, both individually and collaboratively.

Reflective diaries are used in 1st and 2nd year to document learning experiences and the acquisition of professional and employability skills. A series of **group assignments** in 2nd year focus on developing the skills needed to work successfully in group environments. You will produce professional outputs in the form of business proposal (2nd year) and **research proposal** (MChem).

In 3rd year you will undertake an individual research project, working collaboratively with an academic member of staff to plan, review and manage progress. This is further developed in your final year, when you will be working within a collaborative research environment to conduct a significant piece of research that is potentially publishable (approx. 400 practical hours). These projects, documented through detailed record keeping (**lab books**), and communicated through appropriate scientific writing (**research paper**/ **literature review** / **dissertation**) and oral communication (**presentation, poster and viva**) draw together the professional skills required of a scientist in the 21st century.

Marks are awarded for summative assessments designed to assess your achievement of learning outcomes. You will also be assessed formatively to enable you to monitor your own progress and to assist staff in identifying and addressing any specific learning needs. Feedback, including guidance on how you can improve the quality of your work, is also provided on all summative assessments within three working weeks of submission, unless there are compelling circumstances that make this impossible, and more informally in the course of tutorial and seminar discussions.

11. Contact Time and Expected Workload

This contact time measure is intended to provide you with an indication of the type of activity you are likely to undertake during this programme. The data is compiled based on module choices and learning patterns of students on similar programmes in previous years. Every effort is made to ensure this data is a realistic

representation of what you are likely to experience, but changes to programmes, teaching methods and assessment methods mean this data is representative and not specific.

Undergraduate courses at Keele contain an element of module choice; therefore, individual students will experience a different mix of contact time and assessment types dependent upon their own individual choice of modules. The figures below are an example of activities that a student may expect on your chosen course by year stage of study. Contact time includes scheduled activities such as: lecture, seminar, tutorial, project supervision, demonstration, practical classes and labs, supervised time in labs/workshop, fieldwork and external visits. The figures are based on 1,200 hours of student effort each year for full-time students.

Activity

	Scheduled learning and teaching activities	**Guided independent Study**	**Placements**
Year 1 (Level 4)	31.3%	68.7%	0%
Year 2 (Level 5)	33.5%	66.5%	0%
Year 3 (Level 6)	24.7%	75.3%	0%
Year 4 (Level 7)	11.7%	88.3%	0%

12. Accreditation

The Master in Chemistry with Mathematics (MChem) combinations, including the "with International Year" and "with Work Placement Year" options, will be submitted for accreditation to the Royal Society of Chemistry (RSC) once the MChem variant of the programme has been established, on the basis of the existing accreditation of the BSc variant and Keele's other accredited MChem programmes. .

13. University Regulations

The University Regulations form the framework for learning, teaching and assessment and other aspects of the student experience. Further information about the University Regulations can be found at: http://www.keele.ac.uk/student-agreement/

If this programme has any exemptions, variations or additions to the University Regulations these will be detailed in an Annex at the end of this document titled 'Programme-specific regulations'.

14. What are the typical admission requirements for the Programme?

See the relevant course page on the website for the admission requirements relevant to this programme: https://www.keele.ac.uk/study/

English for Academic Purposes

Please note: All new international students entering the university will provide a sample of Academic English during their registration Using this sample, the Language Centre may allocate you to an English language module which will become compulsory. This will replace any GCP modules. *NB:* students can take an EAP module only with the approval of the English Language Programme Director and are not able to take any other Language modules in the same academic year.

English Language Modules at Level 4:

- Business - ENL-90003 Academic English for Business Students (Part 1); ENL-90004 Academic English for Business Students (2)
- Science - ENL-90013 Academic English for Science Students
- General - ENL-90006 English for Academic Purposes 2; ENL-90001 English for Academic Purposes 3; ENL-90002 English for Academic Purposes 4

English Language Modules at Level 5:

- Business - ENL-90003 Academic English for Business Students (Part 1); ENL-90004 Academic English for

Business Students (2)
- Science - ENL-90013 Academic English for Science Students
- General - ENL-90006 English for Academic Purposes 2; ENL-90001 English for Academic Purposes 3; ENL-90002 English for Academic Purposes 4

English Language Modules at Level 6:

- Business - ENL-90003 Academic English for Business Students (Part 1); ENL-90004 Academic English for Business Students (2); ENL-90005 Advanced Business English Communication
- Science - ENL-90013 Academic English for Science Students
- General - ENL-90006 English for Academic Purposes 2; ENL-90001 English for Academic Purposes 3; ENL-90002 English for Academic Purposes 4

Recognition of Prior Learning (RPL) is considered on a case-by-case basis and those interested should contact the Programme Director. The University's guidelines on this can be found here: https://www.keele.ac.uk/qa/programmesandmodules/recognitionofpriorlearning/

15. How are students supported on the programme?

Support for student learning on the Programme is provided in the following ways:

- **Academic Mentors**: You are allocated an Academic Mentor for the duration of your studies as part of the University's Academic Mentoring system and in accordance with the University Code of Practice on Academic Mentoring. The role of the Academic Mentor is to meet formally with you periodically to discuss your progress and performance and to offer support and advice. You can make arrangements to see your Academic Mentor at any time during your studies.
- **Use of e-learning/the Keele Learning Environment (KLE)**: All modules are supported by electronic learning resources in accessible formats that are available to students *via* the KLE.
- **Health and Safety:** All students admitted to the programme receive detailed training on health and safety in the laboratory and are provided with a Safety Handbook, Safety Glasses and a Laboratory Coat. Other personal protective equipment (PPE) will be provided as required.
- **Students with disabilities, medical conditions or dyslexia:** Students admitted to the Chemistry programmes with disabilities or medical conditions are asked to disclose any conditions relevant to their studies to Student Services. Module Leaders, in conjunction with the school Disability Inclusion Tutor and Student Experience and Support Officer are responsible for ensuring reasonable adjustments are made.
- **School Student Experience and Support Officer (SESO)**: If you need to talk to someone, whether it's about your studies or life outside of them, Student Services have a dedicated SESO for the School. Your SESO works closely with teams such as Disability Support and Inclusion, Student Financial Support, Counselling and Mental Health, Residence Life and Chaplaincy, as well as your School itself, to ensure that all students can easily access the support they need.
- Support for students on the **International Year** or the **Work Placement Year i**s detailed in the relevant annexes at the end of this document.

16. Learning Resources

Practical sessions in Chemistry and Mathematics are based in the Central Science Laboratories (CSL), which house modern, well-equipped teaching and research laboratory facilities, including up-to-date PC suites and state-of-the-art analytical instrumentation. You also have use of electronic resources which are accessible on or off campus.

Each module has a site within the university's virtual learning environment (the Keele Learning Environment or KLE), which hosts teaching materials (lecture notes/slides, laboratory scripts, assessments and briefing documents, past examination papers, online quizzes, videos/screencasts and audio clips) and useful links. A module handbook for each module summarises details of the specific learning outcomes, Graduate Attributes, and assessments relating to each module, alongside detailed assessment briefing documents for all assessments.

Interactive lectures and other non-laboratory taught sessions are taught across the campus in modern teaching rooms equipped with screens for use with visualisers and tablet PCs. Sessions are recorded using the university's lecture capture platform Panopto and are also accessible through the KLE.

Additional learning resources available to you on the programme include:

- An extensive collection of books and journals held in the University Library on campus
- Access to a comprehensive range of ebooks, journals and published papers all available online.
- Bookable study spaces and academic skill development resources and workshops.

17. Other Learning Opportunities

Study Abroad (International Year)

A summary of the International Year, which is a potential option for students after completion of year 2 (Level 5), is provided in Annex A.

Work Placement Year

Students have the opportunity to apply directly for the 5-year 'with Work Placement Year' degree programme or to transfer onto the 5-year degree programme at the end of Year-1 and in Year-2 at the end of Semester 1. Students who are initially registered for the 5-year degree programme may transfer onto the 4-year MChem degree programme at any point in time, prior to undertaking their year-long placement. To be eligible for the placement year, students must have a good University attendance record. They must also have passed all Year 1 and Year 2 Semester 1 modules. Students must have met the progression requirements to proceed to their final year of study prior to commencing a placement.

Students wishing to take the work placement year should meet with the Programme Director to obtain their signature to confirm agreement before they will be allowed to commence their placement.

International students who require a Tier 4 visa must check with the Immigration Compliance Team prior to commencing any form of placement.

A summary of the Work Placement Year, which is a potential option for students after completion of year 2 (Level 5), is provided in Annex B.

18. Additional Costs

Activity	Estimated Cost
PPE equipment (laboratory coats and glasses) are provided by the School at no cost to the student. Students will be required to have a laboratory notebook, this is provided at no cost to the student in the induction session and can be used for multiple modules/years. Replacement items are available from the School Stores, the 2025/26 price for these are listed below: Laboratory Book - £2.00 Laboratory Glasses - £3.75 Laboratory Coat - £15	£0 - £20
Textbooks and printing: Students will be required to supply appropriate writing equipment and may chose to print copies of lecture materials. All core textbooks are available in the main University Library. To increase the availability of these resources, eBooks are also purchased alongside the printed text where available; these can be accessed through the University Library Catalogue. Additional costs may be incurred if the student wishes to purchase any book for themselves.	£10 - £280

If you elect to take one of the optional modules:

- NAT-30008: Flexible Work Placement (level 6)
- NAT-30012: Professional Experience in Education

You will have to bear the costs of travelling to and from your placement provider, and if necessary, accommodation, food and personal costs. Depending on the placement provider additional costs may include parking permits, travel and transport, suitable clothing, DBS checks, and compulsory health checks.

A small stipend may be available from the placement provider for work placements, but this will need to be explored on a placement-by-placement basis as some organisations, such as charities, may not have any extra money available. Students should budget with the assumption that their placement will be unpaid.

International students who require a Tier 4 visa should check with the Immigration Compliance team prior to commencing any type of paid placement to ensure that they are not contravening their visa requirements.

These costs have been forecast by the University as accurately as possible but may be subject to change as a result of factors outside of our control (for example, increase in costs for external services). Forecast costs are reviewed on an annual basis to ensure they remain representative. Where additional costs are in direct control of the University we will ensure increases do not exceed 5%.

As to be expected there will be additional costs for inter-library loans and potential overdue library fines, print and graduation. We do not anticipate any further costs for this programme.

19. Quality management and enhancement

The quality and standards of learning in this programme are subject to a continuous process of monitoring, review and enhancement.

- The School Education Committee is responsible for reviewing and monitoring quality management and enhancement procedures and activities across the School.
- Individual modules and the programme as a whole are reviewed and enhanced every year in the annual programme review which takes place at the end of the academic year.
- The programmes are run in accordance with the University's Quality Assurance procedures and are subject to periodic reviews under the Revalidation process.

Student evaluation of, and feedback on, the quality of learning on every module takes place every year using a variety of different methods:

- The results of student evaluations of all modules are reported to module leaders and reviewed by the Programme Committee as part of annual programme review.
- Findings related to the programme from the annual Postgraduate Taught Experience Survey (PTES), and from regular surveys of the student experience conducted by the University, are subjected to careful analysis and a planned response at programme and School level.
- Feedback received from representatives of students on the programme is considered and acted on at regular meetings of the Student Staff Voice Committee.

The University appoints senior members of academic staff from other universities to act as external examiners on all programmes. They are responsible for:

- Approving examination questions
- Confirming all marks which contribute to a student's degree
- Reviewing and giving advice on the structure and content of the programme and assessment procedures

Information about current external examiner(s) can be found here:
http://www.keele.ac.uk/qa/externalexaminers/currentexternalexaminers/

20. The principles of programme design

The programme described in this document has been drawn up with reference to, and in accordance with the guidance set out in, the following documents:

a. UK Quality Code for Higher Education, Quality Assurance Agency for Higher Education: http://www.qaa.ac.uk/quality-code
b. QAA Subject Benchmark Statement: (Chemistry, 2022): https://www.qaa.ac.uk/the-quality-code/subject-benchmark-statements/chemistry

c. *QAA Subject Benchmark Statement: (Mathematics, Statistics and Operational Research, 2023): https://www.qaa.ac.uk/the-quality-code/subject-benchmark-statements/subject-benchmark-statementmathematics-statistics-and-operational-research*
d. Keele University Regulations and Guidance for Students and Staff: http://www.keele.ac.uk/regulations
e. Royal Society of Chemistry Accreditation Information (2024): https://www.rsc.org/membership-and-community/degree-accreditation/

21. Annex - International Year

MChem Chemistry with Mathematics with International Year

International Year Programme

International Year Programme

Students registered for this Single Honours programme may either be admitted for or apply to transfer during their period of study at Level 5 to the International Year option. Students accepted onto this option will have an extra year of study (the International Year) at an international partner institution after they have completed Year 2 (Level 5) at Keele.

Students who successfully complete both the second year (Level 5) and the International Year will be permitted to progress to Level 6. Students who fail to satisfy the examiners in respect of the International Year will normally revert to the standard programme and progress to Level 6 on that basis. The failure will be recorded on the student's final transcript.

Study at Level 4, Level 5 and Level 6 will be as per the main body of this document. The additional detail contained in this annex will pertain solely to students registered for the International Year option.

International Year Programme Aims

In addition to the programme aims specified in the main body of this document, the international year programme of study aims to provide students with:

1. Personal development as a student and a researcher with an appreciation of the international dimension of their subject
2. Experience of a different culture, academically, professionally and socially

Entry Requirements for the International Year

Students may apply to the 4-year programme during Level 5. Admission to the International Year is subject to successful application, interview and references from appropriate staff.

The criteria to be applied are:

- Academic Performance (an average of 55% across all modules in Semester 1 at Level 5 is normally required. Places on the International Year are then conditional on achieving an average mark of 55% across all Level 5 modules. Students with up to 15 credits of re-assessment who meet the 55% requirement may progress to the International Year. Where no Semester 1 marks have been awarded performance in 1st year marks and ongoing 2nd year assessments are taken into account)
- General Aptitude (to be demonstrated by application for study abroad, interview during the 2nd semester of year 2 (Level 5), and by recommendation of the student's Academic Mentor, 1st and 2nd year tutors and programme director)

Students may not register for both an International Year and a Placement Year.

Student Support

Students will be supported whilst on the International Year via the following methods:

- Phone or Skype conversations with Study Abroad tutor, in line with recommended Academic Mentoring meeting points.
- Support from the University's Global Education Team

Learning Outcomes

In addition to the learning outcomes specified in the main text of the Programme Specification, students who complete a Keele undergraduate programme with International Year will be able to:

1. Describe, discuss and reflect upon the cultural and international differences and similarities of different learning environments
2. Discuss the benefits and challenges of global citizenship and internationalisation
3. Explain how their perspective on their academic discipline has been influenced by locating it within an international setting.
4. Reflect on the international relevance of Chemistry and related disciplines, and their importance for addressing regional and global environmental, economic and technological challenges.
5. Consider different modes and methods of learning and teaching in the physical sciences from an international standpoint and relate these to your own development as a scientist.

In addition, students who complete the International Year will be able to:

These learning outcomes will all be assessed by the submission of a satisfactory individual learning agreement, the successful completion of assessments at the partner institution and the submission of the reflective portfolio element of the international year module.

Regulations

Students registered for the International Year are subject to the programme-specific regulations (if any) and the University regulations. In addition, during the International Year, the following regulations will apply:

Students undertaking the International Year must complete 120 credits, which must comprise *at least 40%* in the student's discipline area.

This may impact on your choice of modules to study, for example you will have to choose certain modules to ensure you have the discipline specific credits required.

Students are barred from studying any module with significant overlap to the Level 6 modules they will study on their return. Significant overlap with Level 5 modules previously studied should also be avoided.

Additional costs for the International Year

Tuition fees for students on the International Year will be charged at 15% of the annual tuition fees for that year of study, as set out in Section 1. The International Year can be included in your Student Finance allocation, to find out more about your personal eligibility see: www.gov.uk

Students will have to bear the costs of travelling to and from their destination university, accommodation, food and personal costs. Depending on the destination they are studying at additional costs may include visas, study permits, residence permits, and compulsory health checks. Students should expect the total costs of studying abroad be greater than if they study in the UK, information is made available from the Global Education Team throughout the process, as costs will vary depending on destination.

Students who meet external eligibility criteria may be eligible for grants as part of this programme. Students studying outside of this programme may be eligible income dependent bursaries at Keele.

Students travel on a comprehensive Keele University insurance plan, for which there are currently no additional charges. Some Governments and/or universities require additional compulsory health coverage plans; costs for this will be advised during the application process.

22. Annex - Work Placement Year

MChem Chemistry with Mathematics with Work Placement Year

Work Placement Year summary

Students registered for this programme may either be admitted for or apply to transfer during their studies to the 'with Work Placement Year' option (NB: for Combined Honours students the rules relating to the work placement year in the subject where the placement is organised are to be followed). Students accepted onto this programme will have an extra year of study (the Work Placement Year) with a relevant placement provider after they have completed Year 2 (Level 5) at Keele.

Students who successfully complete both the second year (Level 5) and the Work Placement Year will be permitted to progress to Level 6. Students who fail to satisfactorily complete the Work Placement Year will normally revert to the 3-year programme and progress to Level 6 on that basis. The failure will be recorded on the student's final transcript.

Study at Level 4, Level 5 and Level 6 will be as per the main body of this document. The additional detail contained in this annex will pertain solely to students registered for the Work Placement Year option.

Work Placement Year Programme Aims

In addition to the programme aims specified in the main body of this document, the Work Placement Year aims to provide students with the opportunity to carry out a long-term work-based learning experience within an industry of their choice between Years 2 and 3 (Levels 5 and 6) of their degree programme. The module will be underpinned by reflective assessment, employer and tutor evaluation and support from the Placements and Projects Manager and Academic Placements Link.

Entry Requirements for the Work Placement Year

Admission to the Work Placement Year is subject to successful application, interview and references from appropriate staff. Students have the opportunity to apply directly for the 4-year 'with work placement year' degree programme, or to transfer onto the 4-year programme at the end of Year-1 and in Year-2 at the end of Semester 1. Students who are initially registered for the 4-year degree programme may transfer onto the 3-year degree programme at any point in time, prior to undertaking the year-long work placement. Students who fail to pass the work placement year, and those who fail to meet the minimum requirements of the work placement year module (minimum 30 weeks full time (1,050 hours), or equivalent, work placement), will be automatically transferred onto the 3-year degree programme.

The criteria to be applied are:

- A good University attendance record and be in 'good academic standing'.
- Academic Performance (an average of 50% across all modules in Semester 1 at Level 5 is normally required. Places on the Work Placement Year are then conditional on achieving an average mark of 50% across all Level 5 modules. Students with up to 15 credits of re-assessment who meet the 50% requirement may progress to the Work Placement Year. Where no Semester 1 marks have been awarded performance in 1st year marks and ongoing 2nd year assessments are taken into account)
- Students undertaking work placements will be expected to complete a Health and Safety checklist prior to commencing their work experience and will be required to satisfy the Health and Safety regulations of the company or organisation at which they are based.
- *(International students only)* Due to visa requirements, it is not possible for international students who require a Tier 4 Visa to apply for direct entry onto the 4-year with Work Placement Year degree programme. Students wishing to transfer onto this programme should discuss this with student support, the academic tutor for the work placement year, and the Programme Lead. Students should be aware that there are visa implications for this transfer, and it is the student's responsibility to complete any and all necessary processes to be eligible for this programme. There may be additional costs, including applying for a new Visa from outside of the UK for international students associated with a transfer to the work placement programme.

Students may not register for both an International Year and a Work Placement Year.

Student Support

Students will be supported whilst on the Work Placement Year via the following methods:

- Regular contact between the student and a named member of staff who will be assigned to the student as their University supervisor. The University supervisor will be in regular contact with the student throughout the year, and be on hand to provide advice (pastoral or academic) and liaise with the Placement supervisor on the student's behalf if required.
- Two formal contacts with the student during the placement year: the University supervisor will visit the student in their placement organization at around 5 weeks after the placement has commenced, and then visit again (or conduct a telephone/video call tutorial) at around 15 weeks into the placement.
- Weekly supervision sessions will take place with the placement supervisor (or his/her nominee) throughout the duration of the placement.

Learning Outcomes

In addition to the learning outcomes specified in the main text of the Programme Specification, students who complete the 'with Work Placement Year' option will be able to:

1. Identify areas for skills development, in relation to a specific career or sector.
2. Demonstrate skills and attribute development through engagement with a placement.
3. Reflect on the broader personal and professional development throughout the placement experience.
4. Devise an action plan for future careers development.

These learning outcomes will be assessed through the non-credit bearing Work Placement Year module Professional Placement Year (NAT-30010) which involves:

- Skills Audit and Placement Plan - Students will identify and outline knowledge, skills or professional behaviours not already possessed, or needed to progress in a given field, sector or role, with a justification for how the placement can support their personal & professional development.
- Presentation - Students complete a 15-minute presentation that outlines their development until this point in relation to their skills audit and what further development needs to happen before the end of the project. Students also have to engage in a question and answer session with the audience.
- Employability Portfolio consisting of:

1. A reflective diary with regular reflections, approximately every 100 hours, in the form of a blog/vlog (equivalent to 2,500 words
2. Complete a recorded interview video answering a series of interview style questions in which you draw on anecdotes from your project demonstrating a broad range of professional and personal development (15-20 minutes)

Regulations

Students registered for the 'with Work Placement Year' option are subject to programme-specific regulations (if any) and the University regulations. In addition, during the Work Placement Year, the following regulations will apply:

- Students undertaking the Work Placement Year must successfully complete the zero-credit rated Professional Placement Year module (NAT-30010)
- In order to ensure a high quality placement experience, each placement agency will sign up to a placement contract (analogous to a service level agreement).
- Once a student has been accepted by a placement organisation, the student will make a pre-placement visit and a member of staff identified within the placement contract will be assigned as the placement supervisor. The placement supervisor will be responsible for ensuring that the placement experience meets the agreed contract agreed with the University.
- The placement student will also sign up an agreement outlining his/her responsibilities in relation to the requirements of each organisation.

Students will be expected to behave professionally in terms of:

(i) conforming to the work practices of the organisation; and

(ii) remembering that they are representatives of the University and their actions will reflect on the School and have an impact on that organisation's willingness (or otherwise) to remain engaged with the placement.

Additional costs for the Work Placement Year

Tuition fees for students on the Work Placement Year will be charged at 20% of the annual tuition fees for that year of study, as set out in Section 1. The Work Placement Year can be included in your Student Finance allocation; to find out more about your personal eligibility see: www.gov.uk

Students will have to bear the costs of travelling to and from their placement provider, accommodation, food and personal costs. Depending on the placement provider additional costs may include parking permits, travel and transport, suitable clothing, DBS checks, and compulsory health checks.

A small stipend may be available to students from the placement provider during the placement but this will need to be explored on a placement-by-placement basis as some organisations, such as charities, may not have any extra money available. Students should budget with the assumption that their placement will be unpaid.

Eligibility for student finance will depend on the type of placement and whether it is paid or not. If it is paid, this is likely to affect student finance eligibility, however if it is voluntary and therefore unpaid, should not affect student finance eligibility. Students are required to confirm eligibility with their student finance provider.

International students who require a Tier 4 visa should check with the Immigration Compliance team prior to commencing any type of paid placement to ensure that they are not contravening their visa requirements.

23. Annex - Programme-specific regulations

Programme Regulations: MChem Chemistry with Mathematics

Final Award and Award Titles	Master in Chemistry with Mathematics (MChem)
Intermediate Award(s)	BSc (Hons) Chemistry with Mathematics Diploma in Higher Education Certificate in Higher Education
Last modified	n/a
Programme Specification	https://www.keele.ac.uk/qa/programmespecifications

The University's Academic Regulations which can be found on the Keele University website (https://www.keele.ac.uk/regulations/)[1] apply to and regulate the programme, other than in instances where the specific programme regulations listed below over-ride them. These programme regulations list:

- *Exemptions* which are characterised by the omission of the relevant regulation.
- *Variations* which are characterised by the replacement of part of the regulation with alternative wording.
- *Additional Requirements* which set out what additional rules that apply to students in relation to this programme.

The following **exemptions, variations** and **additional requirements** to the University regulations have been checked by Academic Services and have been approved by the Faculty Education Committee.

A) EXEMPTIONS

The clause(s) listed below describe where an exemption from the University's Academic Regulations exists:

For the whole duration of their studies, students on this Programme are exempt from the following regulations:

- **No exemptions apply.**

B) VARIATIONS

The clause(s) listed below describe where a variation from the University's Academic Regulations exists:

Variation 1: Detail of the Award

1. Any student who fails to satisfy the requirements for progression to Level 7 shall revert to BSc Honours Degree candidature and be considered for the award of an Honours Degree (BSc Chemistry with Mathematics) under the provisions of regulation C3.
2. Any student who fails to satisfy the requirements for the award of a Master's degree shall revert to BSc Honours Degree candidature and be considered for an award as detailed in part 1 above.

Variation 2: Condonement

The CHE-10061 (Practical and Professional Chemistry Skills), CHE-20099 (Practical and Professional Chemistry), CHE-20089 (Environmental Analysis), CHE-30066 (Independent Research Project) and CHE-30068 (Scientific Literature Review) modules must be passed at 40% and are not eligible for condonement due to accreditation requirements. All other modules are eligible for condonement as defined in Regulation D5.

Variation 3: Work Placement Year Eligibility

In order to be eligible to pursue a work placement year between level 5 and level 6, students must meet all university requirements and have demonstrated suitable competency in relevant practical and professional skills where appropriate.

Additional Requirements

The programme requirements listed below are in addition to the University's Academic Regulations:

Additional requirement 1: Laboratory and Practical Classes

1. Laboratory and practical sessions are compulsory and are essential in fulfilling the intended learning outcomes of modules of which they are part, and a requirement of Royal Society of Chemistry accreditation. Over a semester, failure to attend >70% of the laboratory/practical classes without approval, may result in failure of the relevant modules with no reassessment being offered. In addition, students must meet any ILOs related to practical sessions in each module, where appropriate. Failure to attend laboratory/practical sessions in a given module, without approval, may result in failure of the relevant modules with no reassessment being offered.
2. Any student failing to follow the health and safety guidelines in the undergraduate laboratory will be asked to leave. This may include inappropriate dress, refusal to follow reasonable requests of staff, late attendance resulting in missed safety briefings, or attending under the influence of alcohol or other substances. The student will not be permitted to make up the missed session.

Additional requirement 2: Coursework Assessment

Failure to engage appropriately with a module's coursework assessment items without good cause (that is, by failing to submit more than 50% of coursework items) may result in reassessment being denied.

[1] References to University Regulations in this document apply to the content of the University's Regulatory Framework as set out on the University website here https://www.keele.ac.uk/regulations/.

Version History

This document

Date Approved: 13 April 2026

Previous documents

Version No	Year	Owner	Date Approved	Summary of and rationale for changes
1	2025/26	ANDREA WITHINGTON	22 January 2026	