

## Programme Specification

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### MSc Chemistry by Research (2020-21)

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided.

Awarding Institution	University of Southampton
Teaching Institution	University of Southampton
Mode of Study	Full-time
Duration in years	1
Accreditation details	None
Final award	Master of Science (MSc)
Name of award	Chemistry by Research
Interim Exit awards	Postgraduate Certificate in Higher Education Postgraduate Diploma in Higher Education
FHEQ level of final award	Level 7
UCAS code	
Programme code	5004
QAA Subject Benchmark or other external reference	Chemistry 2007
Programme Lead	Guy Denuault

### Programme Overview

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#### Brief outline of the programme

This Masters of Science in Chemistry by Research is a one year course beginning in October each year and is intended for participants with high quality first degrees in chemistry or a closely related subject.

This programme provides training in chemical research and involves both lecture based modules and a one year-long research project that constitutes 66 per cent of the assessment. In addition to modules which enhance knowledge in chemistry, participants are offered training with regard to safety in the laboratory and to improve their professional skills, such as data analysis and presentation and oral presentations for example.

Your contact hours will vary depending on your module/option choices. Full information about contact hours is provided in individual module profiles.

#### Learning and teaching

## The Taught Component

Learning and teaching methods will include:

- Staff-led lectures, tutorials, workshops, seminars and demonstrations;
- Directed reading in terms of summary texts and primary scientific literature;
- Student-led seminars and presentations (verbal and poster) and contributions to regular research group meetings;
- Exposure to technical reports, including literature searches and surveys;
- Independent (supported) project work in the research environment on a research problem that could realistically lead to results publishable in the peer reviewed literature;
- Regular meetings about research work with the supervisory team, with the lead academic as the key provider of guidance;
- Engagement with written assignments and other activities associated with the coursework component of the subject and skills component of study;
- Revision for written examinations that are a ubiquitous aspect of the MSc qualification.

## The Research Project

Your research project will enable you to explore an aspect of cutting-edge chemistry which will be an area that you will have specified as of interest to you during your application procedure. At the start of Semester 1, the specifics project topic will be agreed with your academic research supervisor. During the project preparation stage, you will plan the research project, in consultation with your academic supervisor, and estimate the time to be spent on each element of the plan. In addition you will carry out a preliminary literature review of your area of research before arriving at a clear judgement of your overall objectives and how they will build on the current level of knowledge in your area of research. An MSc level research project should realistically offer the opportunity of producing results that would be of a standard to publish in the peer reviewed literature. You will present an overview containing these elements to your project supervisor or your nominated Southampton advisor at an early stage in your time in Southampton. Subsequently there will be regular weekly meetings with either your supervisor or advisor throughout the remainder of the project. You will write progress reports which will be assessed in writing by the supervisor and another academic. This will allow your progress to be discussed and reviewed against the objectives. Furthermore, throughout the year you will present your results to group meetings and student-led scientific meetings. At the end of the research period, you will present a summary of the research findings to your supervisor and this, as well as the previous progress reports, will be used to plan your dissertation.

## Assessment

### Taught component

Your taught component will be assessed by a mixture of examination and coursework. All your chemistry and skills centred learning is taken at FHEQ Level 7 (which maps to CHEM6XXX modules). The exams will be designed to ensure that you have (a) achieved the learning outcomes of each module and (b) the level of sophistication of your understanding. Coursework will also be designed to test that you have met the learning outcomes specified. The proportion of coursework and exam will be that which is judged to most suit your engagement with the content of the course as well judging your level of understanding. Most scientific modules are assessed by examination while more skills based courses tend towards a higher proportion of coursework.

Past examination papers are available through the library website <http://library.soton.ac.uk/exampapers> under 'exam papers online' and also on the Staff/Student Liaison Blackboard site under the appropriate heading. These assessment methods predominantly judge your achievements against the outcomes noted in 'Student Knowledge and Understanding' (examination based) and 'Transferable/general skills' (coursework based).

### Research component

The research component will be assessed on the basis of the practical outcomes of your project work and on your ability to communicate these, and your background understanding, through the authorship of a scientific dissertation. This will be assessed by two independent internal examiners. They can require that a viva voce (verbal examination) is also conducted if they are not satisfied that a fair assessment can be completed on the basis of the dissertation alone.

You will also be required to maintain a laboratory notebook and to create a suitable archive and organisation of your research results. These primary sources of information will be reviewed throughout the duration of your

research project and will be part of the final assessment.

You will be required to produce three short reports describing your progress throughout the year. These will be reviewed and feedback provided in a suitable time frame to allow for your development in advance of the next report. The outcomes of these reviews contribute to the final grade. Past experience clearly demonstrates that a high standard of performance in these regular reports greatly assists in the preparation of a high quality final dissertation.

## Special Features of the programme

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Specific training is provided in chemical safety.

Written and presentation skills, which are developed through the scientific writing and presentation skills module followed by the dissertation project.

**Please note:** As a research-led University, we undertake a continuous review of our programmes to ensure quality enhancement and to manage our resources. As a result, this programme may be revised during a student's period of registration; however, any revision will be balanced against the requirement that the student should receive the educational service expected. Please read our [Disclaimer](#) to see why, when and how changes may be made to a student's programme.

Programmes and major changes to programmes are approved through the University's [programme validation process](#) which is described in the University's [Quality handbook](#).

## Educational Aims of the Programme

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The aims of the programme are to: The aims of the programme are to:

- Provide advanced knowledge in a particular area within the field of modern chemical research;
- Provide an opportunity to work in a research environment in state-of-the-art laboratories;
- Develop knowledge and research skills applicable to a career in research and development in the chemical industry and/or further training in the academic environment.

You can specialise in a research area of your choice, within one of our main research groups:

- Characterisation and Analytics
- Chemical Biology, Diagnostics and Therapeutics
- Computational Systems
- Education
- Electrochemistry
- Functional Organic, Materials and Supramolecular Chemistry
- Magnetic Resonance
- Organic Chemistry: Synthesis, Catalysis and Flow

## Programme Learning Outcomes

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Having successfully completed this programme you will be able to demonstrate knowledge and understanding of:

### Knowledge and Understanding

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On successful completion of this programme you will have knowledge and understanding of:

- A1. How to resolve a significant research problem or series of linked problems in the chosen specialist area.
- A2. The primary scientific literature relevant to your research project and to problems on the periphery of your research project.
- A3. Current research issues and the potential impact of the outcomes of work in your chosen research area.
- A4. Key chemical concepts and methodologies at an advanced level in your specialist area.
- A5. Problem solving methodologies at an advanced level in your project area.
- A6. Societal responsibilities, environmental impact, sustainability and intellectual properties.

### **Subject Specific Intellectual and Research Skills**

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On successful completion of this programme you will be able to:

- B1. Develop research strategies and solve problems in the chosen research area.
- B2. Carry out a critical and detailed evaluation of the primary scientific literature and use this to analyse research problems and propose new solutions to research problems.
- B3. Process, analyse and assess experimental and theoretical data.
- B4. Produce concise and detailed progress reports.
- B5. Prepare and deliver short oral presentations to a peer group aiming to explain the progress of the research.
- B6. Prepare and deliver detailed, lecture like, oral presentations to a peer group aiming to summarise the project outcomes.

### **Transferable and Generic Skills**

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On successful completion of this programme you will be able to:

- C1. Make effective use of printed and on-line catalogues, websites and databases to locate relevant technical information.

- C2. Gather knowledge and understanding through critical reading of research material.
- C3. Apply such knowledge and understanding to specialist problems in chemical research.
- C4. Communicate specialist technical information in written and verbal forms to a variety of audiences.
- C5. Develop and apply technical skills in the independent resolution of sophisticated theoretical problems.
- C6. Implement good laboratory practice and safety procedures and develop an awareness of progress in safety standards and procedures.

### **Subject Specific Practical Skills**

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On successful completion of this programme you will be able to:

- D1. Demonstrate the ability to select appropriate experimental or theoretical techniques and procedures.
- D2. Demonstrate competence in the planning, design and execution of experiments.
- D3. Develop the ability to propose, test and appraise new experiments to advance the project.
- D4. Demonstrate the skills required to work independently and be self-critical in the evaluation of risks, experimental procedures and outcomes.

### **Programme Structure**

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The programme structure table is below:

Information about pre and co-requisites is included in individual module profiles.

Where optional modules have been specified, the following is an indicative list of available optional modules, which are subject to change each academic year. Please note in some instances modules have limited spaces available.

## Typical course content

The MSc by Research programme is of 12 months duration. The research component is a feature of your studies throughout this entire period. The taught part of the programme is confined within two teaching semesters (October to January followed by February to June). Each semester includes twelve weeks of study followed by two weeks of examinations in which any end of module assessments will take place.

The MSc in Chemistry by Research qualification requires that you complete study which accumulates a total of 90 ECTS (ECTS = European Credit Transfer Scheme). This is broken down into a research project leading to a dissertation (60ECTS) and a taught component (30ECTS).

The practical phase of your research project will be completed from October until July of the following year. Although you will have been preparing your dissertation throughout this period, it is anticipated that the majority of July and August will involve a concentrated period of dissertation preparation with a limited amount of laboratory work being completed.

Your theory and skills modules will be confined to the two semester teaching periods mentioned above. You will have a free choice of modules (subject to them being relevant to a MSc qualification in chemistry and being at the appropriate academic level) but will be guided by a strong recommendation to keep an equal balance of modules between Semester 1 and 2 where at all possible. It will be possible to have a more concentrated period of study in either Semester 1 or 2 with the approval of your project supervisor and the Director of the MSc programme.

## Programme details

Southampton Chemistry has a long tradition of running an annual programme of lectures specifically aimed at postgraduate students and in this respect, we are ahead of the field. University regulations reflect national recommendations by placing an increasing stress on skills training, in particular transferable skills to supplement the advanced knowledge courses. MSc students are expected to attend a number of lecture courses in advanced knowledge, skills and, of course, safety during their study.

### Part I Compulsory

Code	Module Title	ECTS	Type
CHEM6133	Scientific writing and presentation skills for Chemistry MSc	7.5	Compulsory

### Part I Core

Code	Module Title	ECTS	Type
CHEM6086	MSc Research Project	60	Core

### Part I Optional

You may select 45 CATS (22.5 ECTS) worth of modules from appropriate CHEM FHEQ Level 7 modules.

Detailed module descriptions including the breakdown of coursework and examination elements for each module are available online at

[https://www.southampton.ac.uk/chemistry/postgraduate/research\\_degrees/courses/msc\\_research.page?#modules](https://www.southampton.ac.uk/chemistry/postgraduate/research_degrees/courses/msc_research.page?#modules)

where an indicative list of options can be found. We cannot guarantee to offer every option each year.

### Part I Optional Semester 1

The modules listed are the recommended options and are subject to availability. Should you wish to select an alternative this will require the approval of the MSc Programme Lead. Such approval may be sought by emailing chem-studentoffice@soton.ac.uk.

Code	Module Title	ECTS	Type
CHEM6094	Advanced Inorganic Chemistry	7.5	Optional
CHEM6095	Advanced Organic Chemistry (Bioorganic)	7.5	Optional
CHEM6096	Advanced Physical Chemistry	7.5	Optional
CHEM6141	Advanced Topics in Inorganic Chemistry	7.5	Optional
CHEM6138	Chemical Enterprise and Professional Skills	3.75	Optional
CHEM6157	Introduction into Practical Aspects of NMR	7.5	Optional
CHEM6022	Introduction to Electrochemistry I	7.5	Optional
CHEM6134	Introduction to Electrochemistry II	7.5	Optional
CHEM6125	Mass Spectrometry: Theory and Application	7.5	Optional
CHEM6124	NMR Spectroscopy: Theory and Application	7.5	Optional
CHEM6135	Practical Techniques in Electrochemistry	7.5	Optional
CHEM6155	Spin Dynamics	7.5	Optional
CHEM6153	X-Ray Diffraction as a Characterisation Method	7.5	Optional

### Part I Optional Semester 2

Code	Module Title	ECTS	Type
CHEM6162	Advanced Chemical Biology	7.5	Optional
CHEM6147	Advanced Spectroscopy and Applications	7.5	Optional
CHEM6156	Advanced Topics in Magnetic Resonance	7.5	Optional

CHEM6137	Atoms, Molecules and Spins: Quantum Mechanics in Chemistry and Spectroscopy	7.5	Optional
CHEM6152	Battery Materials and Characterisation	3.75	Optional
CHEM6150	Battery Technologies and their Applications	7.5	Optional
CHEM6144	Chemistry through the Computational Microscope	7.5	Optional
CHEM6127	Chromatography: Theory and Application	7.5	Optional
UOSM6001	Ethics in Science, Engineering and Technology: Jekyll and Hyde	7.5	Optional
CHEM6092	Medicinal Chemistry	7.5	Optional
CHEM6136	Modelling in Electrochemistry	3.75	Optional
CHEM6154	Nuclear Magnetic Resonance Spectroscopy	7.5	Optional
CHEM6151	Practical Techniques in Battery Research	7.5	Optional
CHEM6149	Principles, Techniques and Energy Applications of Electrochemistry	7.5	Optional
CHEM6161	Stereoselective Reactions	7.5	Optional
CHEM6145	Supramolecular Chemistry of Functional Molecules and Materials	7.5	Optional
CHEM6103	Sustainable Chemistry	7.5	Optional
CHEM6146	X-Ray Crystallographic Techniques, Advanced Main Group Chemistry and Applications	7.5	Optional

## Progression Requirements

The programme follows the University's regulations for [Progression, Determination and Classification of Results : Undergraduate and Integrated Masters Programmes](#) and [Progression, Determination and Classification of Results: Postgraduate Master's Programmes](#) Any exemptions or variations to the University regulations, approved by AQSC are located in [section VI of the University Calendar](#).

## Support for student learning



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There are facilities and services to support your learning some of which are accessible to students across the University and some of which will be geared more particularly to students in your particular Faculty or discipline area.

The University provides:

- library resources, including e-books, on-line journals and databases, which are comprehensive and up-to-date; together with assistance from Library staff to enable you to make the best use of these resources
- high speed access to online electronic learning resources on the Internet from dedicated PC Workstations onsite and from your own devices; laptops, smartphones and tablet PCs via the Eduroam wireless network. There is a wide range of application software available from the Student Public Workstations.
- computer accounts which will connect you to a number of learning technologies for example, the Blackboard virtual learning environment (which facilitates online learning and access to specific learning resources)
- standard ICT tools such as Email, secure filestore and calendars.
- access to key information through the MySouthampton Student Mobile Portal which delivers timetables, Module information, Locations, Tutor details, Library account, bus timetables etc. while you are on the move.
- IT support through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Hartley Library.
- Enabling Services offering support services and resources via a triage model to access crisis management, mental health support and counselling. Support includes daily Drop In at Highfield campus at 13.00 – 15.00 (Monday, Wednesday and Friday out of term-time) or via on-line chat on weekdays from 14.00 – 16.00. Arrangements can also be made for meetings via Skype.
- assessment and support (including specialist IT support) facilities if you have a disability, long term health problem or Specific Learning Difficulty (e.g. dyslexia).
- the Student Services Centre (SSC) to assist you with a range of general enquiries including financial matters, accommodation, exams, graduation, student visas, ID cards
- Career and Employability services, advising on job search, applications, interviews, paid work, volunteering and internship opportunities and getting the most out of your extra-curricular activities alongside your degree programme when writing your CV
- Other support that includes health services (GPs), chaplaincy (for all faiths) and 'out of hours' support for students in Halls and in the local community, (18.00-08.00)
- A Centre for Language Study, providing assistance in the development of English language and study skills for non-native speakers.

The Students' Union provides

- an academic student representation system, consisting of Course Representatives, Academic Presidents, Faculty Officers and the Vice-President Education; SUSU provides training and support for all these representatives, whose role is to represent students' views to the University.
- opportunities for extracurricular activities and volunteering
- an Advice Centre offering free and confidential advice including support if you need to make an academic appeal
- Support for student peer-to-peer groups, such as Nightline.

Associated with your programme you will be able to:

- Receive an induction that will introduce you to all the teaching and learning resources you will interface with during your degree as well as ensuring you understand the regulations which govern your study;
- Have a personal research supervisor who will advise on choice of taught modules and can provide pastoral support (this is the primary source of support for your research);
- Have an academic advisor who can provide an alternative and independent view on your progress. Typically, this will be the module coordinator for your research project;
- Receive individually tailored guidance from academic staff delivering the taught components of your programme. Each module has an academic coordinator who would be the first point of contact in the event of needing academic support;
- Be able to obtain additional support from the senior staff involved in the MSc Programme. These include the Director of the MSc degree and the Director of Programmes;
- Have a personal e-mail account, web access, specialist software relevant to your work and IT support from the University i-Solutions team;
- Attend group meetings in the selected research group and research seminars given by visiting speakers.

Administrative staff in the Faculty Student Office support both staff and students in the administration of postgraduate teaching within Southampton Chemistry. This is normally your first port of call for issues relating

to the administration of your programme (e.g. registration, timetables, module courses, coursework submission, sickness and absence, examinations, etc.).

## Methods for evaluating the quality of teaching and learning

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You will have the opportunity to have your say on the quality of the programme in the following ways:

- Completing student evaluation questionnaires for each module of the programme.
- Acting as a student representative on various committees, e.g. Staff/Student Liaison Committees, School Programmes Committee OR providing comments to your student representative to feedback on your behalf.
- Serving as a student representative on Faculty Scrutiny Groups for programme validation.
- Taking part in programme validation meetings by joining a panel of students to meet with the Faculty Scrutiny Group.

Further details on the University's quality assurance processes are given in the [Quality Handbook](#).

## Career Opportunities

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Employability is about more than just getting a job. We believe in helping our students gain the necessary experience for a future career, along with the skills to identify opportunities and make the most of them. It is reassuring to know that Chemistry is regularly ranked 3rd behind Medicine and Dentistry as the discipline which offers the highest financial return over the term of the graduate's career, but the rewards of a Chemistry degree lie at a deeper personal level and not just in terms of financial return. A significant proportion of our graduates decide to go into research by taking a PhD qualification, most of them staying in Southampton. But careers in industry and commerce are available even in the toughest economic times. There are also research and teaching opportunities and the options to branch out into other fields such as medicine, pharmaceuticals, even finance, and the law and science journalism. This is because chemistry gives you the confidence to take on so many varied challenges in life. With a MSc Chemistry degree from the University of Southampton your career path will be limited only by the level of your commitment and determination.

## External Examiner(s) for the programme

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Name: Professor Justin Hargreaves - University of Glasgow

Students must not contact External Examiner(s) directly, and external examiners have been advised to refer any such communications back to the University. Students should raise any general queries about the assessment and examination process for the programme with their Course Representative, for consideration through Staff: Student Liaison Committee in the first instance, and Student representatives on Staff: Student Liaison Committees will have the opportunity to consider external examiners' reports as part of the University's quality assurance process.

External examiners do not have a direct role in determining results for individual students, and students wishing to discuss their own performance in assessment should contact their Personal Academic Tutor in the first instance.

**Please note:** This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if they take full advantage of the learning opportunities that are provided. More detailed information can be found in the programme handbook.



## Appendix 1:

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. In addition to this, students registered for this programme also have to pay for:

### Additional Costs

Type	Details
Approved Calculators	Candidates may use calculators in the examination room only as specified by the University and as permitted by the rubric of individual examination papers. The University approved models are Casio FX-570 and Casio FX-85GT Plus. These may be purchased from any source and no longer need to carry the University logo.
Computer discs or USB drives	Students are expected to provide their own portable data storage device.
Equipment and Materials	All laboratory equipment and materials are provided
Hardware	It is advisable that students provide their own laptop or personal computer, although shared facilities are available across the University campus.
Lab Coats	One laboratory coat and a pair of safety spectacles are provided at the start of the programme to each student. If these are lost the student must replace them at their own expense.
Printing and Photocopying Costs	Where possible, coursework such as essays; projects; dissertations is likely to be submitted on line. However, there are some items where it is not possible to submit online and students will be asked to provide a printed copy.
Software Licenses	All software is provided
Stationery	You will be expected to provide your own day-to-day stationary items, e.g. pens, pencils, notebooks, etc.). Any specialist stationery items will be specified under the Additional Costs tab of the relevant module profile.
Textbooks	<p>Where a module specifies core texts these should generally be available on the reserve list in the library. However due to demand, students may prefer to buy their own copies. These can be purchased from any source.</p> <p>Some modules suggest reading texts as optional background reading. The library may hold copies of such texts, or alternatively you may wish to purchase your own copies. Although not essential reading, you may benefit from the additional reading materials for the module.</p>

In some cases you'll be able to choose modules (which may have different costs associated with that module) which will change the overall cost of a programme to you. Details of such costs will be listed in the Module Profile. Please also ensure you read the section on additional costs in the University's Fees, Charges and Expenses Regulations in the University Calendar available at [www.calendar.soton.ac.uk](http://www.calendar.soton.ac.uk).