

Programme Specification

Instrumental Analytical Chemistry (2017-18)

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	Instrumental Analytical Chemistry
Interim Exit awards	Postgraduate Certificate in Higher Education Postgraduate Diploma in Higher Education
FHEQ level of final award	Level 7
UCAS code	
Programme code	5231
QAA Subject Benchmark or other external reference	Chemistry 2007
Programme Lead	Neil J Wells (njw3)

Programme Overview

Brief outline of the programme

Southampton Chemistry has a leading international reputation for its research across a diverse spectrum of chemistry. Currently the areas of research are described by the following research groupings: Characterisation and Analytics; Chemical Biology, Diagnostics and Therapeutics; Computational Systems; Electrochemistry; Functional Inorganic, Materials and Supramolecular Chemistry; Magnetic Resonance; Organic Chemistry: Synthesis, Catalysis and Flow.

This taught MSc offers an advanced, instrumentation-driven postgraduate education in modern analytical chemistry with some elements in combination with one (or more) of these specialist subject areas. The programme provides opportunities for you to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the identified areas.

The programme has been developed with reference to the benchmark statements for Chemistry developed by the

Quality Assurance Agency:

- to instil an enthusiasm for chemistry, an appreciation of its application in different contexts and to involve you in an intellectually stimulating and satisfying experience of learning and studying;
- to establish an appreciation of the importance and sustainability of the chemical sciences in an industrial, academic, economic, environmental and social context;
- to develop, through an education in chemistry, a range of appropriate generic skills, of value in chemical and non-chemical employment;
- to extend your comprehension of key chemical concepts and so provide you with an in-depth understanding of specialised areas of chemistry;
- to provide you with the ability to plan and carry out experiments independently and assess the significance of outcomes;
- to develop your ability to adapt and apply methodology to the solution of unfamiliar types of problems;
- to instil a critical awareness of advances at the forefront of the chemical science discipline;
- to prepare you effectively for professional employment or doctoral studies in the chemical sciences.

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;
- Self-led, practical research project work;
- Workshops and tutorials based around instruments in the laboratory
- Individual practical work on instruments;
- Group project in the analytical laboratories based on a research problem with regular peer-reviewed presentations and reports;
- 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 one (or more) of the aspects of modern instrumental analytical chemistry covered in the taught part of the course in greater depth. At the start of the summer term, the specific project topic will be agreed with your academic research supervisor. During the project preparation stage, you will plan the 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. MSc level research projects 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 before the end of semester 2. Subsequently there will be regular weekly meetings with either your supervisor or advisor throughout the remainder of the project. You will write monthly reports of research progress, which will be assessed in writing by the supervisor and advisor. This will allow your progress to be discussed and reviewed against the objectives for each month. Furthermore, throughout the summer 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 advisor and this, as well as the previous reports, will be used to plan your dissertation.

Assessment

The 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 www.soton.ac.uk/library/resources/index.html under 'exam papers online' and also on the Staff Student Liaison Blackboard site under the appropriate heading.

The Research Project

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 independently by your supervisor and two other academics from within the University of Southampton and by a viva voce (verbal examination).

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 short reports describing your progress throughout the summer. These will be reviewed and feedback provided in a suitable timeframe to allow for your development in advance of the next report. The outcomes of these reviews do not contribute to the final grade. However, 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

The programme features both group and individual practical experience during the taught component, which is further developed in the project. Written and presentation skills, which are developed through the scientific writing and presentation skills module followed by the dissertation project. The dissertation project is completed full time during the third semester.

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

The specific aims of the MSc in Instrumental Analytical Chemistry are to:

- Provide you with advanced knowledge in the arena of modern primary characterisation techniques in chemistry (and related subject areas);
- Provide you with an opportunity to work with advanced analytical instrumentation in state-of-the-art laboratories dedicated both to education and also to research;
- Develop your knowledge and research skills applicable to a career in modern analytical chemistry, particularly in Facility management and/or research project driven roles.

Programme Learning Outcomes

Knowledge and Understanding

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

- A1. The fundamental analytical techniques: Mass spectrometry, NMR spectroscopy and X-Ray diffraction (single crystal and powder);
- A2. Other general characterisation techniques (IR & UV spectroscopy, TEM, TG/DSC, CD) and separation science methodology;
- A3. GLP, electronic recording, data management, facility management and exploitation of results;
- A4. Data analysis, experimental design and chemometrics;
- A5. Planning of a safe working practice, including evaluation of hazards and environmental effects;
- A6. Working within a small team to achieve a common research goal;
- A7. Self-led practical-based research, particularly on characterisation and analytical instrumentation.
- A8. The ways in which it is possible to exploit the results of research.

Teaching and Learning Methods

Modules within the instrumental analytical chemistry masters programme make use of a range of learning teaching and assessment methods based around a core of lectures, practical experimentation (small group and individual), private research and study. As well as summative coursework assignments, many modules will also make use of formative coursework in the form of short reports and presentations. Formative development will be in the form of reflective, peer group and tutor-led exercises – both theoretical and practical. Group and team working are also a key component of the programme, some coursework being carried out in groups and the learning results presented to the class. A key theme throughout the programme is that of management of facilities, projects and people, which provides an alternative dimension to learning.

Assessment Methods

The taught modules primarily consist of core material and are delivered in the form of lectures, partly with integral small group exercises and practical experimentation, which has a strong individual and hands-on ethic. There is unhindered access to a dedicated educational instrument-based laboratory.

Subject Specific Intellectual and Research Skills

On successful completion of this programme a student will be able to:

- B1. find, read, understand and explain scientific publications related to the chosen area of research;
- B2. demonstrate skills in critical evaluation of primary and secondary scientific literature and the ability to develop their knowledge and understanding on the basis of this evaluation;
- B3. address and resolve a research problem in the chosen specialist area;
- B4. be able to develop research strategies for solving problems in the chosen research area;
- B5. adapt and apply methodology to the solution of unfamiliar problems;.
- B6. assimilate, evaluate and present research results objectively;
- B7. undertake a research project the outcome of which is of a quality that is potentially publishable.

Transferable and Generic Skills

On successful completion of this programme a student will be able to:

- C1. developed problem-solving skills including the demonstration of self-direction and originality;
- C2. the ability to communicate and interact with professionals from other disciplines;
- C3. the ability to exercise initiative and personal responsibility;
- C4. the ability to make decisions in complex and unpredictable situations;
- C5. independent learning ability required for continuing professional development.
- C6. the effective use of printed and on-line catalogues, websites and databases to locate relevant technical information;
- C7. the compilation of knowledge and understanding through critical reading of research material;
- C8. the application of such knowledge and understanding to specialist problems in chemical research;
- C9. communication of specialist technical information in written and verbal forms to a variety of audiences;
- C10. the ability to balance the need for independent research with the importance of making effective contributions to the work of the scientific team;
- C11. the ability to develop and apply technical skills in the independent resolution of sophisticated theoretical problems;
- C12. awareness of good laboratory practice and safety issues in a modern research laboratory.

Subject Specific Practical Skills

On successful completion of this programme a student will be able to:

- D1. collect and critically evaluate data of a high standard of quality on a variety of modern analytical instrumentation;
- D2. maintain modern analytical instrumentation at optimum performance within an analytical facility;
- D3. demonstrate the ability to select appropriate techniques and procedures;
- D4. demonstrate competence in the planning, design and execution of experiments;
- D5. demonstrate the skills required to work independently and be self-critical in the evaluation of risks, experimental procedures and outcomes;
- D6. use an understanding of the limits of accuracy of experimental data to inform the planning of future work.

Programme Structure

The programme structure table is below:

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

Part I

Part I Compulsory

Code	Module Title	ECTS	Type
CHEM6126	Advanced Spectroscopy and its applications 2017-18	3.75	Compulsory
CHEM6127	Chromatography: Theory and Application 2017-18	7.5	Compulsory
CHEM6128	Data-Driven Science 2017-18	3.75	Compulsory

CHEM6143	Delivering Analytics: From Experiment to Exploitation 2017-18	7.5	Compulsory
UOSM6001	Ethics in Science, Engineering, and Technology (Jekyll and Hyde) for Masters and PhD students 2017-18	7.5	Compulsory
CHEM6129	Group Analytical Project 2017-18	7.5	Compulsory
CHEM6125	Mass Spectrometry: Theory and Application 2017-18	7.5	Compulsory
CHEM6124	NMR Spectroscopy: Theory and Application 2017-18	7.5	Compulsory
CHEM6123	X-ray Diffraction: Theory and Application 2017-18	7.5	Compulsory

Part I Core

Code	Module Title	ECTS	Type
CHEM6142	Chemistry MSc Advanced Research Project 2017-18	30	Core

Progression Requirements

The programme will follow the University's regulations for [Progression, Determination and Classification of Results: Undergraduate and Integrated Masters Programmes](#) or the University's regulations for [Progression, Determination and Classification of Results: Standalone Masters Programmes](#) as set out in the General Academic Regulations in the University Calendar: <http://www.calendar.soton.ac.uk/sectionIV/sectIV-index.html>

Support for student learning

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.

Support within Southampton Chemistry

We provide a friendly and supportive environment for you to pursue your studies. This is managed in a system that provides academic support for all students utilising the expertise of all the staff as appropriate. The various people and systems-based support available are noted below.

In Southampton Chemistry you will:

- Receive an induction that will introduce you to all our teaching and learning resources you will interface with during your degree as well as ensuring you understand the regulations which govern your study;
- 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

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, Faculty Programmes Committee, Chemistry Education and Quality Committee, OR providing comments to your student representative to feed back 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.

The ways in which the quality of your programme is checked, both inside and outside the University, are:

- Regular module and programme reports which are monitored by the Faculty.
- Programme validation, normally every five years.
- External examiners, who produce an annual report.
- Accreditation approval processes carried out by the Royal Society of Chemistry.
- A national Research Assessment Exercise (our research activity contributes directly to the quality of your learning experience).
- Higher Education Review by the Quality Assurance Agency.

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

Criteria for admission

The University's Admissions Policy applies equally to all programmes of study. The following are the typical entry criteria to be used for selecting candidates for admission. The University's approved equivalencies for the requirements listed below will also be acceptable.

In addition to the University's General Regulations for Admissions, the normal entry requirement to study this analytical chemistry masters is at least an upper second class honours degree in Chemistry, or a closely related subject. The degree must have had a minimum Chemistry content of 50%. Closely related subjects are: biochemistry, physics, polymer science, environmental sciences, material science, mathematics.

Non-UK applicants will usually have completed 4 years or more in higher education.

Students who have achieved a lower second honours degree will only be admitted onto this masters in analytical chemistry in exceptional circumstances.

A key feature of your first degree studies is that you must demonstrate achievement of learning outcomes (both content and level) that will ensure you can seamlessly integrate into our teaching and research experience. Candidates who do not hold any of the above qualifications, but who have relevant professional experience in the fields of instrumental analytical chemistry may be eligible for admissions, but are advised to contact the MSc Admissions Tutor prior to applying

The analytical chemistry masters selection process will involve close scrutiny of your academic credentials in a process that will include both the academic researcher you identified as being of interest to you and the Post Graduate Admissions Tutor. Typically the process will involve an interview (via Skype for students not available to come to Southampton). The whole process is supported by a Post Graduate Admissions Administrator who remains in touch with students throughout the application process.

A minimum standard of English Language is required. You will need a band C pass in one of the tests listed at:

<http://www.southampton.ac.uk/studentadmin/admissions/admissions-policies/language.page>

Further information on language support can be found at:

http://www.southampton.ac.uk/international/entry_reqs/english_language.shtml

This page contains specific entry requirements for this course. Find out about equivalent entry requirements and qualifications for your country.

Recognition of Prior Learning (RPL)

The University has a [Recognition of Prior Learning Policy](#)

Students are accepted under the University's recognition of prior learning policy; however, each case will be reviewed on an individual basis.

English Language Proficiency

The table below sets out the English proficiency requirements for this programme in terms of the IELTS test. We accept a range of other English proficiency tests including TOEFL and Cambridge Advanced/Proficiency. For full details of the recognised tests and the equivalent requirements in those tests please see www.southampton.ac.uk/admissions-language.

Overall	Reading	Writing	Speaking	Listening
6.5	5.5	5.5	5.5	5.5

Career Opportunities

This programme is specifically aimed at students who wish to pursue careers in the analytical chemistry sector in industrial production, service, or research facilities or in the academic environment.

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 degrees are third only behind Medicine and Dentistry as the degree 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.

During your year here you will have the opportunity to broaden your options by meeting employers, getting involved in volunteering activities, work placements and much more.

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.

With a 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

Name: Professor Graham Mills - University of Portsmouth

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 s/he takes 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
Software Licenses	All software is provided
Clothing	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.
Hardware	It is advisable that students provide their own laptop or personal computer, although shared facilities are available across the University campus.
Computer discs or USB drives	Students are expected to provide their own portable data storage device.
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>
Laboratory Equipment and Materials	All laboratory equipment and materials are provided
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.
Printing and Photocopying Costs	<p>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 on line and students will be asked to provide a printed copy. Current University printing costs can be found at http://www.southampton.ac.uk/isolutions/students/printing-for-students.page</p> <p>Please Note: Paper sizes not recognised by the printing devices will prompt you to select the size and then charge a minimum of 50p per black and white copy and a maximum of £1 per colour copy.</p> <p>You can pay for your printing by using the money loaders or by using print copy payment service by going to https://www.printcoppayments.soton.ac.uk/</p> <p>Please remember that we are unable to refund any credit that has not been used by the end of your course, so please consider this when topping up your printing/copy account</p> <p>You will be given a printing allowance towards the costs of printing lecture handouts and/or practical scripts of £15 per Semester.</p>

	<p>The University Print Centre also offer a printing and copying service as well as a dissertation/binding service. Current printing and copying costs can be found at http://www.southampton.ac.uk/printcentre/copyrooms/service.page</p> <p>They also provide a large format printing service, e.g. Academic posters. Details of current costs can be found at http://www.southampton.ac.uk/printcentre/exhibition/academicposters.page ?.</p>
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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.

CHEM6129	Group Analytical Project	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
UOSM6001	Ethics in Science, Engineering, and Technology																	✓	✓	✓	✓	✓	✓		✓									