

## Programme Specification

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### BSc Chemistry (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	3
Accreditation details	Royal Society of Chemistry (RSC)
Final award	Bachelor of Science with Honours (BSc (Hons))
Name of award	Chemistry
Interim Exit awards	Bachelor of Science (Ordinary) Certificate of Higher Education (CertHE) Diploma of Higher Education (DipHE)
FHEQ level of final award	Level 6
UCAS code	F100
Programme code	4987
QAA Subject Benchmark or other external reference	Chemistry 2019
Programme Lead	Andrew Hector

### Programme Overview

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#### Brief outline of the programme

The BSc Chemistry degree aims to enhance your enthusiasm for chemistry and to provide an intellectually stimulating learning environment. You will gain extensive in-depth knowledge and understanding of chemistry and related subjects, as well as a comprehensive training in practical chemistry and an appreciation of the importance of the discipline in different contexts. The programme will provide a sound basis for a successful career as a professional chemist whilst developing a range of transferable skills that are also attractive for non-chemical careers.

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

With a combination of theory and practical modules, students have the opportunity to engage in a range of teaching and learning styles (e.g. lectures, tutorials, practical work, workshops, presentations, groups work, research, written reports etc.). Most lectures and some other teaching sessions are recorded and made available online so that students can review materials more than once and consolidate their understanding.

## Assessment

Theory courses are assessed by end of semester exams and a range of continuous assessments including assessed tutorials and workshops, class tests and written coursework. Practical and project work is assessed via in-lab assessment of practical skills and a range of written and verbal reporting methods. The wide range of assessment methods ensure that students have opportunities to demonstrate their understanding of the learning outcomes in a variety of ways.

## Special Features of the programme

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N/A

**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 programme aims to provide an intellectually stimulating and satisfying experience of learning and studying chemistry in a supportive environment. It will enable you to establish an appreciation of the importance and sustainability of the chemical sciences in an industrial, academic, economic, environmental and social context. You will also develop a range of appropriate generic skills of value in chemical and non-chemical employment.

## 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. Chemical terminology and its appropriate use.

- A2. Fundamental physicochemical principles, including thermodynamics, chemical kinetics, and quantum mechanics, and how to apply that knowledge to the solution of theoretical and practical problems.
- A3. The properties and synthesis of organic and inorganic compounds and materials, including isolation and characterisation techniques.
- A4. Safe working practices, in terms of managing chemical toxicity, chemical stability and chemical reactivity, the preparation of knowledge-based risk assessments and management of risk.

### **Teaching and Learning Methods**

Knowledge and understanding are developed through participation in lectures, workshop/problem classes, small group tutorials, laboratory and computer based practical classes, and through a supervised research project.

### **Assessment Methods**

Testing of the knowledge base and understanding is through a combination of unseen written examinations which comprise questions that test recall of seen material, understanding and interpretation of unseen material, application of knowledge, and problem solving, assessed course work in the form of laboratory reports and other exercises, oral examinations and presentations, and an individual dissertation project report.

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

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

- B1. Design, carry out, concisely discuss and accurately report experimental work in all branches of chemistry.
- B2. Communicate scientific material and arguments.
- B3. Use information technology and data processing skills, assimilate, evaluate and present research results objectively.

### **Teaching and Learning Methods**

Intellectual skills are developed through the teaching and learning activities outlined above. IT, analysis, communication, and problem solving skills are developed extensively through the workshops, tutorials, practical classes and the research project. The use of databases is addressed in the practicals.

### **Assessment Methods**

Subject specific intellectual and research skills are assessed via unseen written examinations, coursework, practical reports and oral examinations.

## Transferable and Generic Skills

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

- C1. Communicate with chemistry specialists and non-specialists, both in written and oral formats, including data presentation.
- C2. Demonstrate problem-solving skills relating to the analysis and interpretation of both qualitative and quantitative information.
- C3. Demonstrate numerical and mathematical skills, including handling data, algebra, functions, trigonometry, calculus, vectors and complex numbers, alongside error analysis, order-of-magnitude estimations, systematic use of scientific units and different types of data presentation.
- C4. Interact with other people to engage in team working.
- C5. Manage your time effectively and demonstrate organisational skills, as evidenced by the ability to plan and implement efficient and effective ways of working.

## Teaching and Learning Methods

Oral and written communication skills are developed through all the teaching and learning activities. Data presentation is specifically addressed in the practical classes. Numeracy and mathematical skills are developed through a series of support lectures and workshops in parts 1 and 2 of the degree. Information technology skills are developed throughout the programme, with specific emphasis during the practical sessions, via lectures and workshops. Interpersonal skills are enhanced via team working in the practical sessions. Time management and organisational skills are developed through the setting and strict enforcement of deadlines. Skills that enable further professional development, employability, and networking are nurtured and developed throughout the programme and are supported by various extra timetabled sessions.

## Assessment Methods

Communication, presentation, problem-solving, numeracy, information retrieval, and IT skills are assessed via unseen written examination and coursework. Interpersonal skills are assessed through team working in the practical classes. Time management and organisation is assessed by applying penalties for failure to meet deadlines. Skills required to undertake further training, employability, and networking are essential for success on the programme and for future professional development, but are not formally assessed.

## Subject Specific Practical Skills

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

- D1. Determine hazards associated with carrying out chemical experiments and carry out risk assessments.
- D2. Handle chemicals safely and carry out experiments and chemical reactions in a safe manner, based on effective risk assessments.
- D3. Conduct documented laboratory procedures involved in synthesis and analysis, in relation to both inorganic and organic systems and operation of standard chemical instrumentation.
- D4. Plan experimental procedures, given well defined objectives.
- D5. Interpret and explain the limits of accuracy of their own experimental data in terms of significance and underlying theory.

### Teaching and Learning Methods

Subject specific practical skills are developed through specific lectures as well as the completion of exercises that accompany practical sessions.

### Assessment Methods

Practical skills are assessed through pre-lab exercises, laboratory reports and coursework exercises.

## 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.

### Part I

#### Part I Core

Code	Module Title	ECTS	Type
CHEM1035	Fundamentals of Inorganic Chemistry I	7.5	Core

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CHEM1036	Fundamentals of Inorganic Chemistry II	7.5	Core
CHEM1031	Fundamentals of Organic Chemistry I	7.5	Core
CHEM1032	Fundamentals of Organic Chemistry II	7.5	Core
CHEM1033	Fundamentals of Physical Chemistry I	7.5	Core
CHEM1034	Fundamentals of Physical Chemistry II	7.5	Core

### Part I Optional modules

Code	Module Title	ECTS	Type
SOES1008	Earth and Ocean System	7.5	Optional
PHYS1005	Introduction to Astronomy and Space Science	7.5	Optional
CHEM1047	Mathematical Methods in Chemistry I	7.5	Optional
CHEM2024	Mathematical Methods in Chemistry II	7.5	Optional
SOES1009	The Living Earth	7.5	Optional

### Part II

#### Part II Core

Code	Module Title	ECTS	Type
CHEM2005	Aspects of Organic Synthesis	7.5	Core
CHEM2013	Atomic and Molecular Interactions	7.5	Core
CHEM2012	Change and Equilibrium	7.5	Core
CHEM2026	Coordination chemistry	7.5	Core

CHEM2001	Organic Reaction Mechanisms	7.5	Core
CHEM2032	Solid state and organometallic chemistry	7.5	Core

## Part II Optional modules

Take 30 credits, either one 15 credit module in each semester or a single 30-credit BIOL module.

LANGXX15 need to be added to this group.

Code	Module Title	ECTS	Type
CHEM1057	Analytical chemistry	7.5	Optional
UOSM2001	Business Skills for Employability	7.5	Optional
NATS2001	Creating an atmosphere: from pea-soupers to climate change	7.5	Optional
NATS2002	Editing life: genetic engineering and synthetic biology	7.5	Optional
UOSM2026	Ethics in Science, Engineering and Technology: Jekyll and Hyde	7.5	Optional
BIOL1024	Fundamentals of Biochemistry	15	Optional
BIOL1025	Fundamentals of Cell Biology and Physiology	15	Optional
SOES2003	Geohazards and Earth Resources	7.5	Optional
PHYS2015	Introduction to Energy in The Environment	7.5	Optional
SOES1005	Introduction to Ocean Biogeochemistry	7.5	Optional
CHEM2025	Introduction to Programming	7.5	Optional
EDUC1061	Introduction to Teachers and Teaching	7.5	Optional
CHEM1047	Mathematical Methods in Chemistry I	7.5	Optional
CHEM2024	Mathematical Methods in Chemistry II	7.5	Optional
CHEM2010	Organic Chemistry in the Environment	7.5	Optional

BIOL2049	Pharmacology	15	Optional
SOES1009	The Living Earth	7.5	Optional

### Part III

#### Part III Practical

Must register for CHEM3048 and CHEM3050 in the first instance.

If their Part 2 the average is  $\geq 60\%$  students may choose to transfer to CHEM3012 Chemistry Research Project by emailing chem-studentoffice@soton.ac.uk. In order to be included in the project allocation system students will need to request this transfer by the end of June. Students aiming to achieve the 60% average through the referral exams should still apply for a project by the end of June.

Code	Module Title	ECTS	Type
CHEM3048	Advanced Practical Chemistry	7.5	Compulsory
CHEM3050	Chemistry Literature Project	7.5	Compulsory
CHEM3012	Chemistry Research Project	15	Compulsory

#### Part III Semester 1 Compulsory

Code	Module Title	ECTS	Type
CHEM3037	Advanced Inorganic Chemistry	7.5	Compulsory
CHEM3038	Advanced Organic Chemistry (Bioorganic)	7.5	Compulsory
CHEM3039	Advanced Physical Chemistry	7.5	Compulsory

#### Part III Semester 2 Options

Students select three modules.

Code	Module Title	ECTS	Type
CHEM3036	Atmospheric Chemistry: An Experimental and Computational Approach	7.5	Optional

CHEM3045	Atoms, Molecules and Spins: Quantum Mechanics in Chemistry and Spectroscopy	7.5	Optional
CHEM6144	Chemistry through the Computational Microscope	7.5	Optional
CHEM3027	Communicating and Teaching: The Undergraduate Ambassadors Scheme	7.5	Optional
CHEM3040	Macrocyclic and Bio-inorganic Chemistry	7.5	Optional
CHEM3002	Medicinal Chemistry	7.5	Optional
CHEM3044	Sustainable Chemistry	7.5	Optional
CHEM3041	Synthetic Methods in Organic Chemistry	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

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 access:

- Induction at the start of each year - programme for orientation, information on modules, courses, library and computer facilities.
- State of the art teaching and research laboratories.
- A programme handbook and online resources giving information about the programme, university regulations and other sources of support.
- Access to administrative and academic material on module Blackboard pages.
- Academic and pastoral support from members of staff, including your personal academic tutor and a senior tutor.
- Access to administrative staff in the Faculty Student Offices during the normal working day.

Enabling Services provides a wide variety of support for students who have disabilities, mental health conditions and/or specific learning difficulties such as dyslexia. Our expert team can provide advice and support relating to your studies, both while you are preparing for University and throughout your time here. Support includes a daily Student Support drop-in available to all University of Southampton students, with an opportunity to meet one-to-one with a trained advisor to find out about the range of support options available. Student Life are a team dedicated to supporting student wellbeing available 24 hours a day, seven days a week, they are based within Halls of Residence but support all University of Southampton students. Other support includes the Faith and Reflection Centre (for all faiths) and health services including the GP surgery.

## 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. A chemistry degree provides a range of embedded experiences that develop a broad range of skills very effectively. However, our provision also includes skills and employability components to enable students to identify opportunities and make the most of them.

A significant proportion of our graduates decide to go into research by taking a postgraduate qualification, many of them staying in Southampton.

But careers in education, industry and commerce are available even in the toughest economic times. Chemistry gives you the confidence to take on so many varied challenges in life. 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

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Name: Professor Nicholas Westwood - University of St. Andrews

Name: Professor Patrick Unwin - University of Warwick

Name: Professor Michael Whittlesey - University of Bath

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.
Books and Stationery equipment	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, and it is recommended that all students buy a basic set of commonly used texts. These can be purchased from any source. 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. 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.
IT	Students may choose to bring a laptop or tablet to the university, otherwise they will need to print materials to take to lectures. All students have an OFFICE365 account and the OneDrive app that is accessible from any laptop, tablet or smartphone and can be used to store/transfer files.
Laboratory Equipment and Materials	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. Other laboratory equipment and chemicals are provided.

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).