

Programme Specification

MSc 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	1
Accreditation details	None
Final award	Master of Science (MSc)
Name of award	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	6148
QAA Subject Benchmark or other external reference	Chemistry 2007
Programme Lead	Guy Denuault

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 (see www.southampton.ac.uk/chemistry/research/groups.page):

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

This taught MSc offers the opportunity to study Chemistry at an advanced level, covering both the traditional core areas of analytical, inorganic, organic, and physical chemistry, as well as more specialist courses aligned to the research groupings of the Department. The programme provides opportunities for you to develop and demonstrate advanced knowledge, understanding, and practical/research skills.

The programme has been developed with reference to the benchmark statements for chemistry developed by the Quality Assurance Agency (2007):

- 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:

- lectures, tutorials, workshops, seminars, and demonstrations delivered by leading researchers and educators in the fundamental and applied aspects of chemistry;
- 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 designed to deepen your understanding of concepts and to develop your critical thinking;
- individual practical work;
- 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 common aspect of the MSc qualification.

The Research Project

In the third semester you will carry out a research project that will enable you to explore one (or more) of the aspects of chemistry covered in the taught part of the course in greater depth. 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.

Over the course of the first semester, you will have the opportunity to select your research project area and seek an academic project supervisor. The specific project topic will be agreed with your academic research supervisor. During the project preparation stage in the second semester, 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. You will present an overview containing these elements to your project supervisory team before the end of semester 2, which will be assessed.

During the third semester, you will have regular meetings, typically weekly or fortnightly, with your supervisor as you complete your research project. You will write brief reports of research progress, which will be assessed and feedback will be provided. This will allow your progress to be discussed and reviewed against the objectives for each period. At the end of the research period, you will present an overview of your research findings to your supervisory team and this will help you fine tune the organisation and content of your dissertation.

Assessment

The Taught Component

The programme makes use of a variety of learning and teaching methods which, depending on the modules, will include traditional lectures, smaller interactive workshops, interactive skills sessions, taught practical sessions in a teaching laboratory environment and a significant research project to take place under the supervision of an individual member of academic staff. All your chemistry and skills centred learning is taken at FHEQ Level 7 (which maps to CHEM6XXX modules). This range of methods is employed as appropriate to each module to deliver the programme learning outcomes as a whole and the learning outcomes of each module. A learning outcome map is provided as Appendix 1 to the programme specification document.

A range of assessment methods is also used and, depending on the modules, will include traditional examinations, submission of coursework (problem sheets, practical reports), oral presentations, oral examinations, and the submission of a dissertation. 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 is of an appropriate standard. Coursework will also be designed to test that you have met the learning outcomes specified. The proportion of marks derived from coursework and examinations is clearly stated in the module descriptions and will be that which is judged to most suit the content of the module and learning outcomes. Most scientific modules are assessed by examination while more skills based courses tend towards a higher proportion of coursework. As for the teaching methods, the assessment methods have been selected to be appropriate for each module, whilst delivering the learning outcomes of the programme as a whole as described below (the numbers reflect the learning outcomes listed in Appendix 1):

Examinations: these are used to ensure achievement of increased knowledge and understanding of advanced aspects of chemistry beyond those covered at first-degree level (1), the demonstration of problem solving skills (12, 15), and illustration of independent learning (17).

Past examination papers are available through the library website <http://library.soton.ac.uk/exampapers> under 'Past exam papers database' and also on the Staff Student Liaison Blackboard site under the appropriate heading.

Course work: the submission of course work ensures that good laboratory practice (2, 5, 26), data analysis and experimental design (27, 28, 29, 30), planning of safe working practice (5), problem solving (11), initiative (17), use of databases (20), critical reading (3, 9, 21), communication (14, 16, 23), ability to select appropriate techniques (27), and critical evaluation of results (13, 30) are assessed. Additionally, the completion of the course work for CHEM6133 Scientific writing and presentation skills for Chemistry MSc will ensure that exploitation of research (2), understanding and evaluation of published work (3, 4, 8, 9), and communication with professionals (14, 16) are assessed.

Oral examinations are included in CHEM6133 Scientific writing and presentation skills for Chemistry MSc, and CHEM6142 MSc Research project as the ability to communicate orally (23) is a key skill.

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 by two independent academics from within the University of Southampton and by a short oral presentation followed by a short viva voce (verbal examination).

As part of the project, you will be required to maintain a laboratory notebook and to create a suitable archive and organisation of your research results. You will also be required to produce a short report describing your progress. The progress report, your diligence, engagement, productivity and initiative, will all be assessed.

Throughout the project, feedback will be provided in a suitable timeframe to allow for your development.

The Dissertation (see curriculum map provided in appendix 1) provides a means of assessing all of the learning outcomes of the programme at the end of the student's period of study. In particular, assessment of the research project and the Dissertation provides a means of assessing the student's critical ability (7), allowing them to demonstrate that they are able to address a research problem (10), by applying and adapting methodology creatively to the solution of an unfamiliar problem (12), present their research results objectively (13), and to communicate those results to a specialist audience (14). The two independent academics' assessment of the learning outcomes for the dissertation project ensures that the student is able to demonstrate the transferable and generic skills (15, 17-26) and subject specific practical skills (27-30).

Special Features of the programme

The programme features a progressive approach for written and presentation skills, which are developed through the scientific writing and presentation skills module followed by the project dissertation. The latter 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 aims of the programme are to: The specific aims of the MSc Chemistry, developed with reference to the QA descriptor for higher education qualification at level 7 / Master's degree (2011), are to:

- provide students with the opportunity to develop advanced knowledge and to critically apply this knowledge to an area of research, which is at the forefront of the discipline;
- provide students with an opportunity to work in state-of-the-art laboratories, so that they are able to demonstrate a comprehensive understanding of how modern chemical techniques and methodologies are applicable to their own research or advanced scholarship;
- enable students to demonstrate originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge within the discipline;
- foster a deep conceptual understanding of chemistry so that students can critically evaluate current research and advanced scholarship, evaluate new methodologies, develop critiques, and propose new hypotheses;
- enable students to pursue a career in chemistry, particularly in research project driven roles, either in an academic or industrial setting.

Programme Learning Outcomes

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

Knowledge and Understanding

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

- A1. How to resolve a research problem in the chosen specialist area.
- A2. Current research issues and potential impact of the outcomes of work in your chosen research area.
- A3. Key chemical concepts at an advanced level in several specialist areas.
- A4. Advanced problem-solving methodologies in a number of specialist areas.
- A5. Societal responsibilities, environmental impact, sustainability and intellectual properties.

Subject Specific Intellectual and Research Skills

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

- B1. Carry out a critical evaluation of the primary scientific literature and use this to define research problems.
- B2. Process, analyse and assess experimental and theoretical data.
- B3. Produce progress reports.
- B4. Prepare and deliver short oral presentations to a peer group and explain the progress of the research.

Transferable and Generic Skills

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. Develop an awareness of good laboratory practice and safety issues in a modern research laboratory.

Subject Specific Practical Skills

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

- D1. Demonstrate the ability to select appropriate techniques and procedures.
- D2. Demonstrate competence in the planning, design and execution of experiments.
- D3. Demonstrate the skills required to work independently and be self-critical in the evaluation of risks, experimental procedures and outcomes.

Programme Structure

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

Typical course content

The MSc in Chemistry is of 12 months duration and the MSc Chemistry qualification requires that you complete study which accumulates a total of 90 ECTS (European Credit and Transfer System). This is broken down into a taught component (30 ECTS) and a research project leading to a dissertation (60 ECTS).

The taught part of the programme is confined within two teaching semesters (Oct. to Jan. followed by Feb. to June). Each semester includes twelve weeks of study followed by two or three weeks of examinations in which any end of module assessments will take place. The research component takes place in semester 3, which runs from June to Sept. (see scheme below).

The programme is delivered in a series of modules. Each taught module ranges from 3.75 to 30 ECTS points. As a rough guide a 7.5 ECTS point module requires 150 hours of work. This would include all work i.e. formal lectures, assignments, revision, examination, tutorials etc... plus independent study.

Your theory and skills courses will be confined to the two semester teaching periods mentioned above. There are two compulsory modules totalling 15 ECTS, with 45 ECTS of other modules to choose from the options listed.

The practical phase of your research project will be completed from June until mid-August. It is anticipated that the final weeks of August will involve a concentrated period of dissertation preparation with a limited amount of laboratory work being completed.

Part I Compulsory

Code	Module Title	ECTS	Type
UOSM6001	Ethics in Science, Engineering and Technology: Jekyll and Hyde	7.5	Compulsory
CHEM6133	Scientific writing and presentation skills for Chemistry MSc	7.5	Compulsory

Part I Core

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

Part I Optional - Semester 1

Select a further 90 CATS (37.5 ECTS) worth of modules, across Semester 1 and 2, from appropriate FHEQ Level 7 modules. You may back-track up to 30 CATS (15 ECTS) with Level 6 (CHEM3xxx) modules.

The following modules are examples that are offered. 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. 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/taught_courses/msc-chemistry.page#modules

and

<http://www.southampton.ac.uk/chemistry/undergraduate/modules.page>

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

If you completed a Chemistry Undergraduate degree programme at the University of Southampton then you must not select CHEM6094, CHEM6095 or CHEM6096.

Code	Module Title	ECTS	Type
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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
CHEM3036	Atmospheric Chemistry: An Experimental and Computational Approach	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
CHEM3040	Macrocyclic and Bio-inorganic Chemistry	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
CHEM3041	Synthetic Methods in Organic Chemistry	7.5	Optional
CHEM6153	X-Ray Diffraction as a Characterisation Method	7.5	Optional

Part I Optional - Semester 2

If you completed a Chemistry Undergraduate degree programme at the University of Southampton then you must not select modules that you have taken previously (including the Level 6 equivalent).

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
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

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 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 tutor who will advise on choice of taught modules and can provide pastoral support
- Have an academic project supervisor (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 iSolutions 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, 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

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

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.
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.
Laboratory Equipment and Materials	All laboratory equipment and materials are provided
Printing and Photocopying Costs	Where possible, coursework such as essays; projects; dissertations is likely to be submitted online. However, there are some items where it is not possible to submit on line 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.