Programme Specification

MSci Chemistry and Biochemistry (2019-20)

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	4
Accreditation details	None
Final award	Integrated Masters degree in Science
Name of award	Chemistry and Biochemistry
Interim Exit awards	Bachelor of Science with Honours (BSc (Hons))
	Bachelor of Science (Ordinary)
	Certificate of Higher Education (CertHE)
	Diploma of Higher Education (DipHE)
FHEQ level of final award	Level 7
UCAS code	FC17
Programme code	5246
QAA Subject Benchmark or other external reference	Biosciences 2007, Chemistry 2007, Master's Degree Characteristics 2016
Programme Lead	Andrew Hector (uccaalh)

Programme Overview

Brief outline of the programme

This undergraduate programme allows you to pursue a combination of two science subjects, with both subjects being studied in each year of the degree. Maintaining learning in two key sciences in all levels of your degree provides you with an interdisciplinary training that will reflect the multifaceted nature of many aspects of modern science, both in terms of research and industrial application.

As many modern sciences are developing at the boundaries of traditional disciplines, this Chemistry with Biochemistry programme should provide you with the qualifications and skills to contribute to this development. It is hoped that this degree will be attractive to outstanding students from all backgrounds irrespective of their race, gender or disability.

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

To assist your learning, you will be provided with an extensive programme of lectures, tutorials, problem workshops, and laboratory classes. You will also be provided with support material and also informal assistance to guide your private study.

You will be assisted to acquire transferrable and generic skills through the formal teaching programme supplemented by several short courses provided by staff from the participating academic units and outside agencies.

Practical skills are developed through the learning and teaching programme. Experimental and fieldwork skills are developed through laboratory experiments, fieldwork and project work.

Throughout the programme you are encouraged to use additional recommended reading material for private study to consolidate the formal learning process, and to broaden and deepen your understanding.

Assessment

There are written examinations at the end of each semester to test your knowledge and understanding of material presented in lectures, tutorials and workshops.
Practical and transferable work/skills are continuously assessed primarily through written reports, laboratory reports, coursework exercises, project reports and presentations.

Project work is assessed by dissertation and oral examination together with a report on your relevant research skills from your project supervisor.

Coursework exercises are set at regular intervals and marked promptly.

In some cases the grade obtained is used to calculate your overall mark for a particular module of study. In other cases the grade for a coursework exercise simply gives you an indication of your progress.

Special Features of the programme

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

The aims of the programme are to:

- Provide you with an education of the highest calibre across a range of science. This is done in order to produce graduates of the quality sought by industry, the professions, and public service, and to provide academic teachers and researchers for the future.
- Offer you a degree structure that is relevant to the needs of industry.

· Provide you with a broad introduction to a range of sciences and scientific skills, through having studied at least two experimental science subjects as well as the relevant mathematics.
· Enable you to develop specialised knowledge in one or more subjects, by studying these subjects in depth.
· Provide you with an intellectually stimulating environment in which you will have the opportunity to develop skills and knowledge, and to achieve your academic potential.
· Provide a lively, informed learning environment that gains maximum benefit from the internationally leading research being carried out by the academic staff in the participating Academic Units, and which develops independent learning and an ethos of lifelong professional development.

Programme Learning Outcomes

Knowledge and Understanding

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

A1. Your selected science subjects, possibly including industrial and commercial applications.

A2. Relevant knowledge of related areas of science, which will support advanced knowledge and understanding in the selected science subjects.

A3. Health and safety issues, risk assessment and regulatory frameworks, and scientific good practice relevant to scientific research in the selected subjects

A4. Develop an in-depth knowledge and critical awareness of a substantial area of science, and be suitably prepared for contemporary professional practice in science or for studying further at doctoral level.

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

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

B1. deal with complex chemical problems both systematically and creatively;

B2. show originality in tackling and solving chemical problems of current interest;

B3. understand how the boundaries of chemical knowledge are advanced through research;

B4. proceed confidently to undertake chemical research for MPhil and PhD degrees;

B5. appreciate the importance of chemistry in industrial, economic, environmental and social contexts.

B6. safely handle chemical materials, taking into account their physical and chemical properties, including any specific hazards associated with their use;

B7. carry out standard laboratory procedures involved in synthetic and analytical work, in relation to both inorganic and organic systems;

B8. monitor, by observation and measurement, chemical properties and processes, and record the results systematically and reliably;

B9. plan, design and execute practical investigations, from the problem-recognition stage through to the evaluation and appraisal of results and findings;

B10. operate a wide range of chemical instrumentation;

B11. interpret observed data in terms of their significance and the theory underlying them;

B12. conduct risk assessments concerning the use of chemical substances and laboratory procedures.

B13. formulate and test hypotheses by planning, conducting and reporting a programme of biochemical research;

B14. use a range of biochemical laboratory equipment to generate data;

B15. use computer software to record and analyse biochemical data and determine their importance and validity;

B16. analyse and solve complex biochemical problems;

B17. integrate your biochemistry knowledge base with other selected disciplines such as physiology, biology, pharmacology or chemistry;

B18. integrate and evaluate biochemical data from a variety of sources, including primary source material in journals;

B19. understand how the boundaries of biochemical knowledge are advanced through research;

B20. conduct risk assessments concerning the use of chemicals, animal material and laboratory procedures.

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 and in workshops and briefing lectures that are part of the research project module.

Assessment Methods

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

Transferable and Generic Skills

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

C1. present material and arguments clearly and correctly, in writing and orally;

C2. apply numerical skills to scientific problems;

C3. learn independently in familiar and unfamiliar situations with open-mindedness and in a spirit of critical enquiry;

C4. work constructively as a member of a team;

C5. manage time and work to deadlines;

C6. use information and communications technology;

C7. use the library, internet and other sources effectively;

C8. manage tasks and solve problems, transfer techniques and solutions from one area to another, apply critical analysis and judgement;

C9. plan and implement efficient and effective modes of working;

C10. problem-solving skills including the demonstration of self-direction and originality;

C11. the ability to communicate and interact with professionals from other disciplines;

C12. the ability to exercise initiative and personal responsibility;

C13. the ability to make decisions in complex and unpredictable situations;

C14. Independent learning ability required for continuing professional development

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 and the research project. 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 and the research project, via lectures and workshops. Interpersonal skills are enhanced via team working in the practical sessions and interaction with the research group and supervisor in the research project. 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 examinations, coursework, and the project dissertation. Interpersonal skills are assessed as part of the supervisor's assessment for the project module and 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

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

D1. carry out safely a series of planned experiments;

D2. use laboratory and fieldwork equipment to generate data;

D3. analyse experimental results and assess their validity;

D4. prepare substantial written reports;

D5. give presentations using a variety of media;

D6. use computer packages and write computer programs;

D7. plan, design and execute practical investigations, from the problem-recognition and planning stage through to the evaluation and appraisal of results and findings;

D8. evaluate experimental data in terms of their significance and the theory underlying them;

D9. be able to present an organised and well-argued case based on the results obtained from a research investigation;

D10. be able to conduct risk assessments concerning the use of chemicals, equipment and laboratory procedures.

Teaching and Learning Methods

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

Assessment Methods

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

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

Detailed information for each module can be found in the module descriptors on the Centre for Biological Sciences and Chemistry websites.

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

Part I Compulsory

The following modules are compulsory and must be taken:

Code	Module Title	ECTS	Type
BIOL1007	Macromolecules of Life	7.5	Compulsory
BIOL1008	Metabolism & Metabolic Disorders	7.5	Compulsory

Part I Core

The following modules are core and must be taken:

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

Part II Compulsory

The following modules are compulsory and must be taken:

Code	Module Title	ECTS	Type
BIOL2013	Bioinformatics and DNA Technology	7.5	Compulsory
BIOL2012	Exploring Proteins: Structure and Function	7.5	Compulsory
BIOL2010	Flow of Genetic Information	7.5	Compulsory
BIOL2011	Molecular Cellular Biochemistry	7.5	Compulsory

Part II Core

The following modules are core and must be taken:

Code	Module Title	ECTS	Type
CHEM2005	Aspects of Organic Synthesis	7.5	Core
BIOL1013	Integrative Mammalian Physiology	7.5	Core
CHEM2001	Organic Reaction Mechanisms	7.5	Core
BIOL1011	Systems Physiology	7.5	Core

Part III

Part III Core

The following modules are core and must be taken:

Code	Module Title	ECTS	Type
CHEM3038	Advanced Organic Chemistry (Bioorganic)	7.5	Core
BIOL3013	Molecular Recognition	7.5	Core

Part III Core Optional

Must choose either (CHEM2013 and CHEM2012) OR (CHEM2015 and CHEM2016).

Note that the choice you make here will affect which inorganic or physical chemistry modules are available to you in part 4

Code	Module Title	ECTS	Type
CHEM2013	Atomic and Molecular Interactions	7.5	Optional/Core
CHEM2012	Change and Equilibrium	7.5	Optional/Core
CHEM2015	Intermediate Inorganic Chemistry I	7.5	Optional/Core
CHEM2016	Intermediate Inorganic Chemistry II	7.5	Optional/Core

Part III Core Project Choice

You must take ONE of the following core modules (15 ECTS):

BIOL3034 has limited places available and these are allocated by academic performance. If you fail to be allocated a place on BIOL3034 you will be transferred to CHEM3012.

Code	Module Title	ECTS	Type
CHEM3012	Chemistry Research Project	15	Optional/Core
BIOL3034	Laboratory Research Project	15	Optional/Core

Part III Optional

You must select TWO further modules (15 ECTS)

You are advised to select 1 module in each Semester to maintain an even workload. Note that CHEM3041 is a pre-requisite to Part 4 Organic Modules CHEM6004 & CHEM6148

Code	Module Title	ECTS	Type
BIOL3064	Cancer Chromosome Biology	7.5	Optional
BIOL3022	Cell Signalling in Health and Disease	7.5	Optional
CHEM3040	Macrocyclic and Bio-inorganic Chemistry	7.5	Optional
CHEM3002	Medicinal Chemistry	7.5	Optional
BIOL3017	Molecular and Structural Basis of Disease	7.5	Optional
BIOL3014	Molecular Cell Biology	7.5	Optional

BIOL3018	Molecular Pharmacology	7.5	Optional
BIOL3054	Nutrition in Health and Disease: Part1	7.5	Optional
BIOL3015	Regulation of Gene Expression	7.5	Optional
CHEM3041	Synthetic Methods in Organic Chemistry	7.5	Optional

Part IV

Part IV Compulsory

The following module is compulsory and must be taken

Code	Module Title	ECTS	Type
CHEM6090	Chemistry Advanced Research Project	30	Compulsory

Part IV Optional

You must select four modules from the following (30 ECTS).

Code	Module Title	ECTS	Type
CHEM6004	Advanced Organic Reactions	7.5	Optional
CHEM6147	Advanced Spectroscopy and Applications	7.5	Optional
CHEM6137	Atoms, Molecules and Spins: Quantum Mechanics in Chemistry and Spectroscopy	7.5	Optional
BIOL6041	Biomedical Technology	7.5	Optional
BIOL6071	Cancer Chromosome Biology	7.5	Optional
BIOL6023	Cellular Signalling in Health and Disease	7.5	Optional
CHEM6144	Chemistry through the Computational Microscope	7.5	Optional
CHEM6092	Medicinal Chemistry	7.5	Optional

BIOL6030	Molecular Cell Biology	7.5	Optional
BIOL6022	Molecular Pharmacology	7.5	Optional
BIOL6032	Molecular Recognition	7.5	Optional
CHEM6154	Nuclear Magnetic Resonance Spectroscopy	7.5	Optional
CHEM6093	Organic Materials Chemistry	7.5	Optional
CHEM6149	Principles, Techniques and Energy Applications of Electrochemistry	7.5	Optional
BIOL6027	Regulation of Gene Expression	7.5	Optional
CHEM6145	Supramolecular Chemistry of Functional Molecules and Materials	7.5	Optional
CHEM6103	Sustainable Chemistry	7.5	Optional
CHEM6148	Synthesis of Natural Products and Pharmaceuticals	7.5	Optional
BIOL6033	The Molecular and Structural Basis of Disease	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*** as set out 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.

From the Centre for Biological Sciences and Southampton Chemistry you will be able to access:

· Induction at the start of the course - programme for orientation, information on modules, courses, library and computer facilities.
· Programme Handbooks, module handbooks and material on academic unit websites.
· Library and academic skill packages.
· Library and computer facilities.
· Well-equipped laboratories.
· Academic and pastoral support from members of staff, including your personal tutor which will include scheduled meetings at appropriate occasions during the academic year.
· Access to all administrative and academic material on the Academic Unit, Programme and individual module web sites and/or Blackboard.
· Access to all academic staff through an appointment system and e-mail.
· Access to administrative staff in the Faculty Student Offices during the normal working day.
· Feedback on assessment

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, Chemistry Education & Quality Committee, Faculty Programmes 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
- 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.*

Career Opportunities

- Biotechnology and pharmaceutical industry
- Postgraduate research training
- Scientific officer in medical laboratories
- Teaching
- Forensic science
- Legal profession
- Business management

External Examiner(s) for the programme

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 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
Parking costs (including on placements at hospitals)	There may be a requirement to undertake work at Southampton General Hospital (SGH), for example during a final year research project. Students may need to cover costs for transport to travel to SGH or for car parking.
IT	Computer Discs or USB drives: Students are expected to provide their own portable data storage device. Software Licenses: All software is 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 and safety spectacles: 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.
Stationery	You will be expected to provide your own day-to-day stationery 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	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. 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.
Laboratory Equipment and Materials	All laboratory equipment and materials are provided.
Placements (including Study Abroad Programmes)	Students who choose to go on an industrial placement at the can expect to cover costs for health and travel insurance, accommodation and living expenses; travel costs; visa costs. This will vary depending on which country you are travelling to.
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	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.

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.