

**BSc Chemistry with Forensic Analysis**  
**For students entering Part 1 in 2014/5**

**UCAS code: F1F4**

Awarding Institution:	University of Reading
Teaching Institution:	University of Reading
Relevant QAA subject Benchmarking group(s):	Chemistry
Faculty:	Life Sciences Faculty
Programme length:	3 years
Date of specification:	16/Jun/2016
Programme Director:	Prof Matthew Almond
Programme Advisor:	Prof Elizabeth Page
Board of Studies:	Chemistry
Accreditation:	The Royal Society of Chemistry

**Summary of programme aims**

The programme is designed to provide a broad and rigorous study of modern Chemistry with a focus upon modern techniques of analytical chemistry especially those applied to Forensic analysis. It is designed to receive accreditation by the Royal Society of Chemistry.

**Transferable skills**

During the course of their studies at Reading, all students will be expected to enhance their academic and personal transferable skills. In following this programme, students will have had the opportunity to develop such skills, in particular relating to career management, communication (both written and oral), information handling, numeracy, problem-solving, team-working, and use of information technology and will have been encouraged to further develop and enhance the full set of skills through a variety of opportunities available outside their curriculum.

As part of this programme students are expected to have gained experience and show competence in the following skills: IT (word-processing, use of spreadsheets and databases), scientific writing, oral presentation, team-working, problem-solving, use of library resources, time-management, and career planning and management.

**Programme content**

The BSc Chemistry with Forensic Analysis degree programme is divided into three Parts, each of 120 credits. The degree profile outlined below lists the compulsory modules and gives some indication of the optional modules from which the student must make a selection. Students choose such optional modules in consultation with the Programme Adviser or the Programme Director. The number of credits for each module is given after its title.

**Part 1 (three terms)**

*Compulsory modules*

<i>Code</i>	<i>Title</i>	<i>Credits</i>	<i>Level</i>
CH1CC2	Chemical Concepts and Skills	20	4
CH1IN1	Fundamentals of Atomic Structure and the Periodic Table	20	4
CH1OR1	Shape, Structure and Reactivity in Organic Chemistry	20	4
CH1PH1	Physical Processes and Molecular Organisation	20	4
CH1PRA	Laboratory Skills for Chemists	20	4

The following module is **compulsory** for students who do not have an A-level pass in Mathematics

<i>Code</i>	<i>Title</i>	<i>Credits</i>	<i>Level</i>
CH1M	Chemistry M	20	4

The following module is **compulsory** for students who have an A-level pass at grade **C-E** in Mathematics and **optional** for those with a grade **A-B**

<i>Code</i>	<i>Title</i>	<i>Credits</i>	<i>Level</i>
CH1M2	Mathematics for Chemistry 2	10	4

*Optional modules*

Students who are required to take CH1M will not be able to select any other optional modules. Students who select module CH1M2 will have the option to select another module equalling 10 credits from outside the department. Student who opt to take neither CH1M/CH1M2 will select other modules equalling 20 credits from the following:

<i>Code</i>	<i>Title</i>	<i>Credits</i>	<i>Level</i>
LW1CCP	Criminology, Crime Prevention and Community Safety	10	4
BI1BC2	Genes and Chromosomes	10	4
BI1BA1	The Living Cell	10	4

## **Part 2 (three terms)**

### *Compulsory modules*

<i>Mod Code</i>	<i>Module Title</i>	<i>Credits</i>	<i>Level</i>
CH2OR1	Further Organic Chemistry	20	5
CH2PH1	Further Physical Chemistry	20	5
CH2PRAC	Extended Laboratory Skills for Chemists	30	5
CH2FA	Forensic Analysis 1	10	5
CH2IN1	Further Inorganic Chemistry	20	5
CH2AN3	Analytical Chemistry	10	5
CH2CC2	Chemical Concepts and Skills 2	10	5

There are no optional modules in Part 2 of this degree programme.

## **Part 3 (three terms)**

### *Compulsory modules*

<i>Code</i>	<i>Title</i>	<i>Credits</i>	<i>Level</i>
CH3AN1	X-Ray Techniques and Databases in Analytical Chemistry	10	6
CH3AN2	Advanced Analytical Techniques for Inorganic Structure Determination	10	6
AR2F17	Forensic Archaeology and Crime Scene Analysis	10	5
CH3PRF	BSc Chemistry Project - Forensic Analysis	40	6

### *Optional modules (50 credits)*

Students will be required to select 50 credits from the following, to include at least 10 credits from each branch of inorganic, physical and organic chemistry.

<i>Code</i>	<i>Title</i>	<i>Credits</i>	<i>Level</i>
CH3I1	Multinuclear Metal Systems and Organometallics	10	6
CH3I2	Shapes and Structures of Small Molecules and Extended Arrays	10	6
CH3O1	Advanced Organic Chemistry - Synthesis of Complex Targets	10	6
CH3O2	Advanced Organic Chemistry - Contemporary Synthetic Methodology	10	6
CH3P1	Advanced Topics in Physical Chemistry 1	10	6
CH3P2	Advanced Topics in Physical Chemistry 2	10	6

## **Progression requirements**

### **Progression from Part 1 to Part 2:**

To gain a threshold performance at Part 1 a student shall normally be required to achieve an overall average of 40% over 120 credits taken in Part 1, and a mark of at least 30% in individual modules amounting to not less than 100 credits. In order to progress from Part 1 to Part 2, a student shall normally be required to achieve a threshold performance at Part 1 and achieve an overall average of 40% over 120 credits taken in Part 1 and a minimum of 40% in CH1PRA for accreditation requirements.

### **Progression from Part 2 to Part 3**

To gain a threshold performance at Part 2, a student shall normally be required to achieve:

- (i) a weighted average of 40% over 120 credits taken at Part 2;  
(ii) marks of at least 40% in individual modules amounting to not less than 80 credits; and  
(iii) marks of at least 30% in individual modules amounting to not less than 120 credits.  
In order to progress from Part 2 to Part 3, a student must achieve a threshold performance at Part 2 and 40% in module CH2PRAC.

### Assessment and classification

The University's honours classification scheme is:

<i>Mark</i>	<i>Interpretation</i>
70% - 100%	First class
60% - 69%	Upper Second class
50% - 59%	Lower Second class
40% - 49%	Third class
35% - 39%	Below Honours Standard
0% - 34%	Fail

For the University-wide framework for classification, which includes details of the classification method, please see: <http://www.reading.ac.uk/internal/exams/Policies/exa-class.aspx>

The weighting of the Parts/Years in the calculation of the degree classification is

### Three-year programmes

Part 2 one-third

Part 3 two-thirds

Teaching is organised in modules that involve a combination of lectures, tutorials, workshops and practical sessions. Modules are assessed by a mixture of coursework and formal examinations.

### Admission requirements

Entrants to this programme are normally required to have obtained:

A Level at grades BBB/ABC one of which must be at least a B in Chemistry

Grade B or better in Mathematics.

**Admissions Tutor:** Dr D. Nutt (email: [d.nutt@reading.ac.uk](mailto:d.nutt@reading.ac.uk))

### Support for students and their learning

University support for students and their learning falls into two categories. Learning support is provided by a wide array of services across the University, including: the University Library, the Careers, Placement and Experience Centre (CPEC), In-session English Support Programme, the Study Advice and Mathematics Support Centre teams, IT Services and the Student Access to Independent Learning (S@il) computer-based teaching and learning facilities. There are language laboratory facilities both for those students studying on a language degree and for those taking modules offered by the Institution-wide Language Programme. Student guidance and welfare support is provided by Personal Tutors, School Senior Tutors, the Students' Union, the Medical Practice and advisers in the Student Services Centre. The Student Services Centre is housed in the Carrington Building and offers advice on accommodation, careers, disability, finance, and wellbeing, academic issues (eg problems with module selection) and exam related queries. Students can get key information and guidance from the team of Helpdesk Advisers, or make an appointment with a specialist adviser; Student Services also offer drop-in sessions and runs workshops and seminars on a range of topics. For more information see [www.reading.ac.uk/student](http://www.reading.ac.uk/student)

Within the Chemistry Department additional support is given through practical classes and tutorials in every Part of the degree programme. There are Course Advisers for every Part of the programme and the Director of Undergraduate Studies is also available for consultation and advice on academic and personal matters.

### Career learning

### **Career prospects**

A BSc degree in Chemistry with Forensic Analysis from the University of Reading provides the student with an exemplar of how chemistry can be used to address the needs of society. Graduates of this course can use their skills in many aspects of work as well as in the chemical community. To understand how chemistry applies to forensic science students must develop skills in lateral thinking, problem solving and the ability to think in other people's shoes. Such skills provide an excellent foundation to starting a career as well as for life-long learning. The strong emphasis on analytical chemistry within the course opens up a large number of career opportunities in Chemical Analysis (a major area of employment in the UK) including the Forensic Science Service. Analytical Chemists are highly valued for their numerical and problem solving skills as well as their technical knowledge. They can use their chemical knowledge as research workers, technical assistants, sales and marketing personnel within the chemical industry or as teachers in primary or secondary education. Alternatively, Chemistry with Forensic Analysis graduates from Reading would be able to find employment using their numerical and other skills in more general areas such as accounting and computing. In addition, students with this BSc degree would be eligible to pursue postgraduate work, either at Reading or elsewhere, by studying for a higher degree in specialised areas of Analytical or other branches of Chemistry.

### **Opportunities for study abroad**

There are no formal arrangements within this programme for a student to study abroad. The Department of Chemistry participates in ERASMUS exchange programmes with a number of European Universities. Language tuition is available through the Institution Wide Language Programme (IWLP) in Part 1 if the student does not have adequate language skills. Such exchanges are only permitted if the student has the requisite degree of fluency in the language to benefit from such a European programme and gains a Grade C or above in the Part 2 assessments in Chemistry and overall. Students normally spend their third year at the European University, returning to take Part 3 of the programme. The year abroad is only assessed when it is part of the MChem programme.

Students who wish to undertake a year-long industrial placement may be eligible to transfer to the BSc or MChem Chemistry with a Year in Industry programmes. The placement year normally takes place between Parts 2 and 3 of this degree programme.

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### **Programme Outcomes**

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas:

#### **Knowledge and Understanding**

##### **A. Knowledge and understanding of:**

1. The fundamental concepts and techniques chemistry
2. A selection of more specialist topics in the three main branches of the subject and in analytical chemistry
3. The main techniques involved in practical work
4. The spectroscopic methods used to identify molecules and to determine their structure and the basics of the underlying theory

##### **Teaching/learning methods and strategies**

The knowledge required for the basic topics is provided in formal lectures supported by problem sets for students to tackle on their own and which are discussed formally in tutorial sessions with members of staff. Practical classes are held throughout Parts 1 and 2 in which students develop their skills prior to applying them in their Part 3 project. Feedback on student work is provided by the discussion and return of work in tutorials and by regular workshop sessions during which students tackle unseen problems in the presence of academic staff who provide support. All practical work is marked and returned to the student.

##### *Assessment*

Most knowledge is tested through a combination of

coursework and unseen formal examinations, although 3 is assessed by coursework. Dissertations and oral presentations also contribute to assessment, particularly in Part 3.

### Skills and other attributes

#### B. Intellectual skills - *able to:*

1. Think logically
2. Analyse and solve problems
3. Organise tasks into a structured form
4. Understand the evolving state of knowledge in a rapidly developing area
5. Transfer appropriate knowledge and methods from one topic within the subject to another
6. Plan, conduct and write a report on an independent project.

#### C. Practical skills - *able to:*

1. Follow practical instructions safely and accurately
2. Carry out a variety of experimental procedures
3. Measure and interpret various spectroscopic techniques
4. Interpret quantitatively the results of their experiments
5. Formulate safety protocols
6. Devise suitable experimental methods for tackling a particular problem

#### D. Transferable skills - *able to:*

1. Use IT (word-processing, spreadsheets and chemical databases)
2. Communicate scientific ideas

#### Teaching/learning methods and strategies

Logic is an essential part of the understanding and construction of synthetic methods and mechanistic pathways which form the framework for much organic and inorganic chemistry. While not exclusively the preserve of physical chemistry, problem solving plays a major part in this section of the course. Latest developments in the subject are introduced where appropriate, particularly in Part 3. Practical reports in Part 1 and 2 provide training for the Part 3 project report.

#### Assessment

1 - 4 are assessed directly and indirectly in most parts of this chemistry course, while 5 contributes to the most successful work. 6 is assessed in the Part 3 project report.

#### Teaching/learning methods and strategies

Detailed practical manuals are provided for all practical courses in Parts 1 and 2, together with sources of recommended further reading. Staff and postgraduate demonstrators are present during every practical session to guide and help students and to mark their reports. Workshop sessions are held to assist students in interpreting spectroscopic information obtained on unknown compounds. In Part 3 students work on individual projects under the supervision of one or more members of staff.

#### Assessment

1 to 4 are tested to different extents by the practical work associated with Parts 1 and 2 of the chemistry course. 3 is assessed through problems set in written examinations. 5 is specifically assessed during the practical course in Part 2 where safe working procedures are emphasised at every stage. 3 is specifically but not exclusively assessed within core modules CH2PRAC, CH2AN1, CH2FA, CH3AN1 and CH3AN2. 6 is assessed in the Part 3 project.

#### Teaching/learning methods and strategies

The use of IT is embedded throughout the side of the programme but, is specifically addressed in core module CH1PRA. Oral and written presentation

3. Give oral presentations
4. Work as part of a team
5. Use library resources
6. Manage time
7. Plan their career

skills, problem-solving, team working, time management and extracting and summarising information are specifically addressed in CH1CC2, CH2CC2 and throughout the remainder of the programme. Team work and career planning are part of module CH2CC2. Oral presentations are associated with modules CH1CC2, CH2CC2, CH2FA and CH3PRF. Library resources are specifically addressed within the third year project. Time management is essential for the timely and effective completion of the programme.

*Assessment*

2 - 6 are assessed in module CH1CC2. 1 - 5 contribute assessed coursework within the compulsory modules on analytical and professional skills, CH2CC2, CH2FA, CH2AN1, and CH3PRF. Career planning is assessed through the 5 credit CMS course embedded within modules CH1CC2 and CH2CC2.

**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 he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module can be found in the module description and in the programme handbook. The University reserves the right to modify this specification in unforeseen circumstances, or where the process of academic development and feedback from students, quality assurance process or external sources, such as professional bodies, requires a change to be made. In such circumstances, a revised specification will be issued.**