

**MChem Chemistry with Forensic Analysis  
For students entering Part 1 in 2012/3**

**UCAS code: F1FK**

Awarding Institution:	University of Reading
Teaching Institution:	University of Reading
Relevant QAA subject Benchmarking group(s):	Chemistry
Faculty:	Life Sciences Faculty
Programme length:	4 years
Date of specification:	30/Jul/2014
Programme Director:	Dr Matthew Almond
Programme Advisor:	Dr Matthew Almond
Board of Studies:	Chemistry
Accreditation:	

**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 develop research skills especially in the area of analytical chemistry. It is designed to receive recognition 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 MChem Chemistry with Forensic Analysis degree programme is divided into four 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>Module title</i>	<i>Credits</i>	<i>Level</i>
CH1CC1	Chemical Concepts in Context	10	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:

CH1M	Chemistry M	20	4
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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**:

CH1M2	Mathematics for Chemistry 2	10	4
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*Optional modules*

Students will select modules amounting to 10 credits (if they take CH1M), 20 credits (if they take CH1M2) or 30 credits (if they take neither) from the following:

LW1CCP	Criminology, Crime Prevention and Community Safety	10	4
BI1BA1	The Living Cell	10	4
BI1BC2	Genes and Chromosomes	10	4

## Part 2 (three terms)

### Compulsory modules

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
CH2IN1	Further Inorganic Chemistry	20	5
CH2OR1	Further Organic Chemistry	20	5
CH2PH1	Further Physical Chemistry	20	5
CH2CC1	Concepts and Skills for Chemists	10	5
CH2AN3	Analytical Chemistry	10	5
CH2FA1	Forensic Analysis 1	10	5
CH2PRAC	Extended Laboratory Skills for Chemists	30	5

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

## Part 3 (three terms)

### Compulsory modules

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
CH3FA3	Forensic Analysis 2	10	6
CH3PRAC	Practical Chemistry for MChem	30	6
CH3AN1	X-Ray Techniques and Databases in Analytical Chemistry	10	6
CH3AN2	Advanced Analytical Techniques for Inorganic Structure Determination	10	6
GV2C5	Crime Scene Analysis	10	5

### Optional modules (50 credits)

Students will be required to select 40 credits from the following:

Students are strongly advised to take at least 10 credits from each branch of chemistry i.e. CH3I1 or CH3I2, CH3O1 or CH3O2 and CH3P1 or CH3P2 and one other module. This is to allow selection from as many optional modules at Part 4 as possible

CH3I1	d- and f- Block Chemistry	10	6
CH3I2	Clusters, Extended Arrays and Solid State Chemistry	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
CH3CRP	Introduction to Chemistry Research and Practice	10	6

## Part 4 (three terms)

### Compulsory modules

<i>Code</i>	<i>Module title</i>	<i>Credits</i>	<i>Level</i>
CH4SK	Chemistry in Industry and Professional Skills	10	7
CH4PR	MChem Chemistry Project	60	7
CH4FA	Cold Cases in the Forensics Literature	10	7

#### *Optional modules (40 credits)*

To be chosen from the following modules not chosen at Part 3. It should be noted that some of these modules have specific prerequisites from Part 3 so the precise choice will depend upon which modules were taken at Part 3:

CH4CR	Current Topics in Chemical Research	10	7
CH4MM1	Medicinal Chemistry 1	10	7
CH4MM2	Medicinal Chemistry 2	10	7
CH4O1	Advanced Organic Chemistry - Synthetic Methodology	10	7
CH4P1	Measurement Techniques in Physical Chemistry	10	7
CH4AN1	Advanced Analytical Techniques in the Molecular Sciences	10	7
CH4I2	Catalysis	10	7

#### **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 50% over 120 credits taken in Part 1 **and**

- not less than 50% in the practical module CHIPRA

[Marks of between 40%-49% will be sufficient to proceed to the BSc programme]

Students who have failed or have not qualified to progress to Part 2 are permitted one re-sit examination in each module in which they have failed to attain the mark required to meet the progression criteria. The mark used for the purpose of progression will be the higher of the two marks obtained between the original and re-sit examinations.

Those students who fail to achieve the progression criteria to Part 2 will leave with a CertHE.

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

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

- a weighted average of 40% over 120 credits taken at Part 2;
- marks of at least 40% in individual modules amounting to not less than 80 credits; and
- 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 achieve an overall average of 50% over 120 credits taken in Part 2 (of which not less than 100 credits should normally be at 5 level or above), **and**

- not less than 50% in the practical module CH2PRAC.

Those students who achieve the threshold performance but do not meet the MChem progression requirement of an average of 50% over 120 credits will be eligible to transfer to a BSc Programme or leave with a DipHE.

Students who re-sit examinations at Part 2 and meet the MChem progression criteria will have their marks capped for classification purposes in accordance with the University regulations.

Students who fail to progress are permitted one re-sit examination in each module in which they have obtained less than 50% or failed to attain the mark required to meet the progression criteria.

If the student gets a lower mark at resit than the 1st attempt, the mark used for classification purposes will be the 1st attempt mark. However if a student gets a higher mark at re-sit when compared to the 1st attempt mark, the resit mark will be used for classification purposes and will be capped at 40% unless the resit mark achieved is lower than 40%, in which case the lower mark will be used.

##### **Progression from Part 3 to Part 4:**

In order to progress from Part 3 to Part 4, a student must achieve an overall average of 40% over 120 credits taken in Part 3.

Students who fail to meet the progression criteria from Part 3 to Part 4 are allowed one re-sit examination in any module in which they have obtained less than 40%.

If the student gets a lower mark at resit than the 1st attempt, the mark used for classification purposes will be the 1st attempt mark. However if a student gets a higher mark at re-sit when compared to the 1st attempt mark, the resit mark will be used for classification purposes and will be capped at 40% unless the resit mark achieved is lower than 40%, in which case the lower mark will be used.

Those students who fail to achieve the progression requirement to Part 4 but achieve an overall weighted average of between 35 - 39.9% will be eligible for the award of BSc Chemical Sciences in accordance with the University's Framework for Classification and Progression for First Degrees.

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

- Part 2 33%
- Part 3 66%.

A pass of at least 40% in module CH4PR is required to qualify for an Honours degree.

### **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: [www.reading.ac.uk/internal/exams/Policies/ea-class.aspx](http://www.reading.ac.uk/internal/exams/Policies/ea-class.aspx).

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

### **Integrated Masters programmes (MEng, MMath, MChem, etc)**

Part 2 20%

Part 3 40%

Part 4 40%

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. At least 50% of the assessment will normally be by formal examination except for the Part 3 project, which will be assessed through laboratory work, the written report and an oral presentation.

### **Admission requirements**

Entrants to this programme are normally required to have obtained:

Grade C or better in Mathematics and English in GCSE; and to have achieved

UCAS tariff: ABB at A Level including B in Chemistry, or

International Baccalaureate: 30 points including 6 in chemistry, or

Scottish Highers: BBBB including B in Chemistry, or

Irish Leaving Certificate: BBBBC including B in Chemistry.

**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 prospects**

An MChem 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, or sales and marketing personnel within the chemical industry. 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 or for placements**

For those with competence in a language other than English or who wish to study in a country where English is the national language special arrangements can be made. For others there would not be opportunities for a student to study abroad on this programme because the programme specification does not allow time for the student to study the prerequisite language modules. Students who wish to carry out an industrial placement may transfer to the MChem Chemistry with a Year in Industry programme at any time during the first two years of their course.

### **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 of 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 team working projects and major research project at Part 4.

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 some modules are assessed by coursework only. 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

**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, & 2 provide training for the Part 3 mini-project reports and Part 4 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 4 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 team projects in Part 4 they 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 & 2 of the chemistry course.

3 is assessed through problems set in written examinations.

5 is specifically assessed during the organic practical course in Part 2, although safe working procedures are emphasised at every stage.

3 is specifically but not exclusively assessed within core modules CH2AN3, CH2FA1, CH3AN1 and CH3AN2.

6 is assessed in the Part 3 and 4 projects.

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

1. Use IT (word-processing, spreadsheets and chemical databases)
2. Communicate scientific ideas
3. Give oral presentations
4. Work as part of a team
5. Use library resources
6. Manage time
7. Plan their career

#### Teaching/learning methods and strategies

The use of IT is embedded throughout the side of the programme but, is specifically addressed in core module CHIPRA.

Oral and written presentation skills, problem solving, team working, time management and extracting and summarising information are specifically addressed in CH1CC1, CH2CC1 and throughout the remainder of the programme. Team work and career planning are part of module CH2CC1. Oral presentations are associated with modules CH2FA, CH2CC1, CH3FA3 and CH4PR. Library resources are specifically addressed through a small project in module CH4PR and within the final year project.

Time management is essential for the timely and effective completion of the programme

#### *Assessment*

1 - 5 contribute assessed coursework within the modules on professional skills, CH2FA1, CH3FA3, CH2AN3, CH4PR.

2-6 are assessed in module CH1CC1 and CH2CC1  
Career planning is assessed through the 5 credit CMS course embedded within module CH2CC1.

**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.**