

MChem Chemistry with Forensic Analysis
For students entering Part 1 in 2011/2

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:	23/Jun/2014
Programme Director:	Dr Matthew Almond
Programme Advisor:	Dr Elizabeth Page
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

Code	Module title	Credits	Level
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
CH2PRAC	Extended Laboratory Skills for Chemists	30	5
CH2FA1	Forensic Analysis 1	10	5

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

Part 3 (three terms)

Compulsory modules

Code	Module title	Credits	Level
CH3FA2	Forensic Analysis 2	20	6
CH3MC	Practical Chemistry for MChem	20	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 (40 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

Code	Module title	Credits	Level
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:

Physical Chemistry: Students are required to select at least 10 credits from the following modules:

Code	Title	Credits	Level
CH4P1	Measurement Techniques in Physical Chemistry	10	7
CH4P2	Bioinorganic and Biophysical Chemistry	10	7

Students are eligible to take both physical modules in 2014/15 as long as they have not chosen module CH4P1 in 2013/14.

Optional modules: Students should select a maximum of 30 credits from the following modules: *Optional modules will only run at Part 4 if 5 or more students enrol for that module. If a module enrolment is below 5, students will be notified and asked to make an alternate selection.*

Code	Title	Credits	Level
CH4CR	Current Topics in Chemical Research	10	7
CH4AN1	Advanced Analytical Techniques for the Molecular Sciences	10	7
CH4PC	Polymer Chemistry	10	7
CH4O4	Advanced Organic Synthesis - Oligosaccharides and Natural Products	10	7
CH4I3	Functional Inorganic Materials	10	7
CH4O1	Advanced Organic Chemistry - Synthesis of Complex Targets (2)	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 CH1PRA

Progression from Part 2 to Part 3:

To gain a threshold performance at Part 2 a student shall normally be required to achieve an overall average of 40% over 120 credits taken in Part 2, and a mark of at least 30% in individual modules amounting to not less than 100 credits. In order to progress from Part 2 to Part 3, a student shall normally be required to 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

[Marks from 40-49% will be sufficient for progression on the BSc degree programme in Chemistry]

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:

Mark	Interpretation
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/exa-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: 320 from 3 A levels including B in Chemistry (two AS grades are acceptable in place of one A-level), 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 (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

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.

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.

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
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

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, CH2FA, CH3AN1 and CH3AN2.

6 is assessed in the Part 3 and 4 projects.

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 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, CH3FA2 and CH4PRF. Library resources are specifically addressed through a small project in module CH4PRF 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, CH2FA, CH3FA2, CH2AN3, CH4PRF.

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.