

**MChem Chemistry**  
**For students entering Part 1 in 2008/9**

**UCAS code: F103**

|   |                                |
|---|--------------------------------|
| 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:                      | 04/Apr/2011                    |
| Programme Director:                         | Dr Matthew Almond              |
| Programme Advisor:                          | Dr 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. It is accredited 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 line with the University's Strategy for Learning and Teaching. 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 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>Module</i> | <i>Title</i>  | <i>Credits</i> | <i>Level</i> |
|---------------|---|----------------|--------------|
| CH1IN1        | Fundamentals of Atomic Structure and the Periodic Table | 20             | C            |
| CH1OR1        | Shape, Structure and Reactivity in Organic Chemistry    | 20             | C            |
| CH1PH1        | Physical Processes and Molecular Organisation           | 20             | C            |
| CH1PRA        | Laboratory Skills for Chemists                          | 20             | C            |

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

|      |             |    |   |
|------|-------------|----|---|
| CH1M | Chemistry M | 20 | C |
|------|-------------|----|---|

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 | C |
|-------|-----------------------------|----|---|

*Optional modules*

Students will select modules amounting to 20 credits (if they take CH1M), 30 credits (if they take CH1M2) or 40 credits (if they take neither) from outside the Department of Chemistry.

**Part 2 (three terms)***Compulsory modules*

| <i>Code</i> | <i>Module title</i>                            | <i>Credits</i> | <i>Level</i> |
|-------------|--|----------------|--------------|
| CH2AN1      | Analytical Chemistry and Professional Skills 1 | 20             | I            |
| CH2IN1      | Further Inorganic Chemistry                    | 20             | I            |
| CH2OR1      | Further Organic Chemistry                      | 20             | I            |
| CH2PH1      | Further Physical Chemistry                     | 20             | I            |
| CH2PRA      | Extended Laboratory Skills for Chemists        | 20             | I            |

*Optional modules\* (20 credits) to be chosen from:*

|        |                              |    |   |
|--------|------------------------------|----|---|
| CH2AA1 | Further Analytical Chemistry | 20 | I |
| CH2E1  | Environmental Chemistry      | 20 | I |
| CH2MMC | Medicinal Chemistry          | 20 | I |

*\*Students will normally select two chemistry modules, but one can be replaced by suitably weighted module from other Schools, or a language, timetable permitting.*

**Part 3 (three terms)***Compulsory modules*

| <i>Code</i> | <i>Module title</i>  | <i>Credits</i> | <i>Level</i> |
|-------------|--|----------------|--------------|
| CH3I1       | d and f Block Chemistry  | 10             | H            |
| CH3O1       | Advanced Organic Chemistry: Synthesis of Complex Targets             | 10             | H            |
| CH3P1       | Advanced Topics in Physical Chemistry 1                              | 10             | H            |
| CH3MC       | Advanced Chemistry Practical Techniques                              | 20             | H            |
| CH3I2       | Clusters, Extended Arrays and Solid-State Chemistry                  | 10             | H            |
| CH3O2       | Advanced Organic Chemistry: Contemporary Synthetic Methodology       | 10             | H            |
| CH3P2       | Advanced Topics in Physical Chemistry 2                              | 10             | H            |
| CH3AN1      | X-Ray Techniques and Databases in Analytical Chemistry               | 10             | H            |
| CH3AN2      | Advanced Analytical Techniques for Inorganic Structure Determination | 10             | H            |

*Optional modules (20 credits) to be chosen from:*

|       |  |    |   |
|-------|--|----|---|
| CH4I2 | Catalysis                              | 10 | M |
| CH4P2 | Bioinorganic and Biophysical Chemistry | 10 | M |
| CH4CR | Current Topics in Chemical Research    | 10 | M |

**Part 4 (three terms)***Compulsory modules*

| <i>Mod Code</i> | <i>Module Title</i>   | <i>Credits</i> | <i>Level</i> |
|-----------------|---|----------------|--------------|
| CH4SK           | Chemistry in Industry and Professional Skills                 | 10             | M            |
| CH4O1           | Advanced Organic Chemistry - Synthesis of Complex Targets (2) | 10             | M            |
| CH4PR           | MChem Chemistry Project                                       | 60             | M            |
| CH4P1           | Measurement Techniques in Physical Chemistry                  | 10             | M            |

*Optional modules\* (30 credits) to be chosen from the following modules **not** chosen at Part 3:*

|         |   |    |   |
|---------|---|----|---|
| CH4CR   | Current Topics in Chemical Research   | 10 | M |
| CH4MM1  | Medicinal Chemistry 1   | 10 | M |
| CH4MM2* | Medicinal Chemistry 2   | 10 | M |
| CH4O2   | Advanced Organic Chemistry - Heterocycles, Natural Products and Advanced Materials. | 10 | M |
| CH4PC   | Polymer Chemistry   | 10 | M |
| CH4I2   | Catalysis   | 10 | M |

*\*Requires CH4MM1*

## **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 compulsory core modules (CH1IN1, CH1OR1, CH1PH1 and CH1PRA) averaged together **and** not less than 40% in CH1PRA **and** not less than 30% in CH1M if taken.

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

### **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 core modules (CH2IN1, CH2OR1, CH2PH1, CH2AN1 and CH2PRA) averaged together, **and** not less than 50% in the practical module CH2PRA.

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

Part 2 contributes 20%, Part 3 contributes 40 %, and Part 4 contributes 40% towards the Final Degree classification. A pass of at least 40% in module CH4PR is required to qualify for an honours degree.

## **Summary of Teaching and Assessment**

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 4 project, which will be assessed through laboratory work, the written report, a poster 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: 300 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 J M Elliott (j.m.elliott@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 Advisory Service, In-sessional 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 the Student Services Directorate. The Student Services Directorate is housed in the Carrington Building and includes the Careers Advisory Service, the Disability Advisory Service, Accommodation Advisory Team, Student Financial Support and Counselling. Student Services has a Helpdesk available for enquiries made in person or online

([www.risisweb.reading.ac.uk](http://www.risisweb.reading.ac.uk)), or by calling the central enquiry number on (0118) 378 5555. 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 on everything from accommodation to finance. The Carrington Building is open between 8:30 and 17:30 Monday to Thursday (17:00 Friday and during vacation periods). Further information can be found on the Student website ([www.reading.ac.uk/student](http://www.reading.ac.uk/student)).

Within the Department of Chemistry 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**

Although most previous graduates from this degree programme have proceeded to further study for a higher degree at Reading or elsewhere, others have successfully found employment after graduation without further study. An MChem degree in Chemistry from the University of Reading provides a strong platform from which to undertake a wide range of careers both within the chemical community and outside. 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 graduates from Reading have found employment using their numerical and other skills in more general areas such as accounting, computing and teaching.

### **Opportunities for study abroad or for placements**

There are no formal arrangements within this programme. Students wishing to spend their third year abroad follow the alternative programme MChem Chemistry with a Year in Europe, F104. The Department of Chemistry participates in Socrates exchange programmes with a number of European Universities. Language tuition is available through the Institution Wide Language Programme (IWLP) in Part 1 and Part 2 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 spend the third year of the MChem Chemistry with a Year in Europe, F104, at the European University, returning to take Part 4 of the programme at Reading.

### **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.

2 is addressed particularly during Part 4 of the course.

Practical classes are held throughout Parts 1, 2 and 3 in which students develop their skills prior to applying them in their Part 4 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 4.

### 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
7. Construct a poster.

#### 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 4. Practical reports in Part 1, 2 and 3 provide training for the 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 and 7 are 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

#### 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 post-graduate 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 some open-ended experiments are undertaken by small teams of students. In Part 4 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 - 3 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 CH2PRA, CH3MC, CH2AN1 and CH3AN1 and CH3AN2. 6 is assessed in the Part 4 project.

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

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

#### Teaching/learning methods and strategies

The use of IT is embedded throughout the programme but, is specifically addressed in the core modules CH1IN1 and CH1PH1.

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

Team work and career planning are both part of module CH2AN1 and the former in CH3MC.

Oral presentations are associated with modules CH4PR.

Library resources are specifically addressed within the fourth year project.

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

#### *Assessment*

1 - 5 contribute assessed coursework within the two compulsory modules on analytical and professional skills, CH2AN1.

Career planning is assessed through the 5 credit CMS course embedded within module CH2AN1.

**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.**