

**MChem Chemistry with Medicinal Chemistry
For students entering Part 1 in 2011/2**

UCAS code: F150

| | |
|---|--------------------------------|
| 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: | 03/Apr/2012 |
| Programme Director: | Dr Andrew Russell |
| 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 and to give students the experience of doing chemically-related work experience in the pharmaceutical industry. 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 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 with Medicinal 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>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 |
|------|-------------|----|---|

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 |
|-------|-----------------------------|----|---|

Optional modules

Students will select modules amounting to 10 credits (if they take CH1M), or 20 credits (if they take CH1M2) or 30 credits (if they take neither) from outside the Department of Chemistry. Recommended modules for this programme include:

| | | | |
|--------|-----------------------|----|---|
| 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> |
|-------------|---|----------------|--------------|
| CH2AN3 | Analytical Chemistry | 10 | 5 |
| CH2CC1 | Concepts and Skills for Chemists | 10 | 5 |
| CH2IN1 | Further Inorganic Chemistry | 20 | 5 |
| CH2OR1 | Further Organic Chemistry | 20 | 5 |
| CH2PH1 | Further Physical Chemistry | 20 | 5 |
| CH2PRAC | Extended Laboratory Skills for Chemists | 30 | 5 |
| CH2MC2 | Medicinal Chemistry 2 for Chemists | 10 | 5 |

There are no optional choices at Part 2

Part 3 (three terms)

Compulsory modules

| <i>Mod Code</i> | <i>Module Title</i> | <i>Credits</i> | <i>Level</i> |
|-----------------|----------------------------|----------------|--------------|
| CH3IND | MChem Industrial Placement | 120 | 6 |

Part 3 of the programme takes place in a placement in the Chemical Industry. A distance-learning programme will also be provided for the core modules.

Part 4 (three terms)

Compulsory modules

| <i>Code</i> | <i>Module title</i> | <i>Credits</i> | <i>Level</i> |
|-------------|---|----------------|--------------|
| CH4MM1 | Medicinal Chemistry 1 | 10 | 7 |
| CH4MM2 | Medicinal Chemistry 2 | 10 | 7 |
| CH4O1 | Advanced Organic Chemistry - Synthesis of Complex Targets (2) | 10 | 7 |
| CH4PR | MChem Chemistry Project | 60 | 7 |
| CH4SK | Chemistry in Industry and Professional Skills | 10 | 7 |

Optional modules (20 credits) to be chosen from:

| | | | |
|--------|---|----|---|
| CH4CR | Current Topics in Chemical Research | 10 | 7 |
| CH4I2 | Catalysis | 10 | 7 |
| CH4P2 | Biophysical & Bioinorganic Chemistry | 10 | 7 |
| CH4AN1 | Advanced Analytical Techniques for the Molecular Sciences | 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 level 5 or above), **and**

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

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

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/Exams/classificationpost2007.pdf

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 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 (email 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 Student Employment, Experience and Careers Centre (SEEC), 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 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. 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 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

An MChem degree in Chemistry with Medicinal Chemistry from the University of Reading provides a strong platform from which to undertake a wide range of careers both within the chemical and pharmaceutical communities 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. Chemistry graduates from Reading have also 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 may be limited opportunities for students to take their industrial placement in Europe, but this will depend on their having the necessary linguistic skills as well as finding a suitable placement.

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, but with a particular emphasis on medicinal and organic 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 and 2 in which students develop their skills prior to applying them in their Parts 3 and 4 projects.
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 Parts 3 and 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

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

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
8. The ability to work in an industrial environment

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

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, and 2 provide training for the Part 3 and 4 project reports.

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 Parts 3 and 4 project reports.

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 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- 3of 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 CH2PRAC, CH3MC, CH2AN3, CH3AN1 and CH3AN2.

6 is assessed in the Part 4 project.

Teaching/learning methods and strategies

The use of IT is embedded throughout the programme but, is specifically addressed in the core module CH1PRA. Oral and written presentation skills, problem-solving, team working, time management and extracting and summarising information are specifically address in CH1CC1 and CH2CC1 and throughout the remainder of the programme. Team work and career planning are both part of module CH2CC1 and the former in CH3MC. Oral presentations are associated with module CH4PR, CH2CC1 and CH2CC1. Library resources are specifically addressed through a small project in module CH4PR, and 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 compulsory module analytical and professional skills, CH1CC1 and CH2CC1. 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.