BSc Chemistry with Computer Science **UCAS Code: F1G4**

Awarding Institution:	The University of Reading
Teaching Institution:	The University of Reading
Relevant QAA subject benchmarking group:	Chemistry
Faculty of Science	Programme Length: 3 years
For students entering Part 1 in 2003	Date of specification: April 2003
Programme Director:	Prof HM Colquhoun
Programme Adviser:	Drs. MJ Almond and EM Page
Board of Studies:	Chemistry
Recognition:	The Royal Society of Chemistry

Summary of programme aims and learning outcomes:
The programme is designed to provide a broad and rigorous study of modern Chemistry linked to an understanding of computer science and its application to chemical problems. It is designed to receive recognition by the Royal Society of Chemistry. (For a fuller statement of the programme aims and learning outcomes see below.)

Transferable skills
The University's Strategy for Teaching and Learning has identified a number of generic transferable skills which all students are expected to have developed by the end of their degree programme. In following this programme, students will have had the opportunity to develop their skills relating to career management, communication (both written and oral), information handling, numeracy, problem-solving, team-working and use of information technology.

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 Computer Science 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) (2003-2004)

Compulsory Modules (100 or 120 credits)		*Credits*	*Level*
CH1I1	*Introduction to Inorganic Chemistry*	20	C
CH1O1	*Introduction to Organic Chemistry*	20	C
CH1P1	*Introduction to Physical Chemistry*	20	C
Either			
CS1A2	*Programming 1*	10	C
CS1B2	*Programming 2*	10	C
Or			
CS1C2	*Introductory Programming 1*	10	C
CS1D2	*Introductory Programming 2*	10	C

The following module is **compulsory** for students who do not have an A-level pass in Mathematics, and **optional** for those who have an A-level pass **at grade D or E**.

CH1M	*Mathematics for Chemistry*	20	C

Optional modules

Students are strongly recommended to take:

CS1H2	*Functional Programming*	20	C

Part 2 (three terms) (2004-2005)

Compulsory Modules (120 credits)		*Credits*	*Level*
CH2I1	*Inorganic Chemistry 2*	20	I
CH2O1	*Organic Chemistry 2*	20	I
CH2P1	*Physical Chemistry 2*	20	I
CH2A1	*Analytical Chemistry & Professional Skills 2*	20	I
CS2G2	*Algorithmic Techniques*	20	I
CS2P2	*Information Systems Design*	20	I

Part 3 (three terms) (2005-2006)

Compulsory modules (100 credits)		*Credits*	***Level***
CH3C1	*Computational Chemistry 1*	20	H
CH3A1	*Analytical Chemistry & Professional Skills 3*	20	H
CH3PR	*Project*	40	H

Optional modules (20 credits)

Students will take **two** of the following modules

CH3I1	*Inorganic Chemistry 3*	20	H
CH3O1	*Organic Chemistry 3*	20	H
CH3P1	*Physical Chemistry 3*	20	H

Progression requirements

To proceed to Part 2 students must obtain
at least an overall pass (≥ 40 %) in Part 1 **and**
40% in the compulsory Chemistry modules (CH1I1, CH1O1, CH1P1) averaged together, **and**
at least 40% in **either** CS1A2& CS1B2 **or** CS1C2 & CS1D2 averaged together **and**
30% in every module.

- *Marks of less than 30% in a maximum of 20 non-core credits (1 module) will be condoned provided that the candidate has pursued the course for the module with reasonable diligence, has completed all required coursework and has not been absent from the examination without reasonable cause. For students taking CH1M, this module is considered as 'core'.*

To proceed to Part 3 students must obtain:
at least 40% in the Chemistry modules (CH2I1, CH2O1, CH2P1, CH2A1) averaged together, **and**
40% in the Computer Science modules (CS2G2 and CS2P2 averaged together) **and**
an average of 40% in the practical chemistry components of the core chemistry modules **and**
30% in every Module.

- *Marks of less than 30% in a maximum of 20 non-core credits (1 module) will be condoned provided that the candidate has pursued the course for the module with reasonable diligence, has completed all required coursework and has not been absent from the examination without reasonable cause*

Students who do not average 40% in their Computer Science modules but who do get an overall average of at least 40% in Part 1 or Part 2 may transfer to the BSc Chemistry programme.

A pass of at least 40% in module CH3PR 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 3 project, which will be assessed through laboratory work, the written report and an oral presentation.

Part 2 contributes one third and Part 3 contributes two thirds towards the Final Degree classification; the weighting between Chemistry and Computer Science is 2:1.

The University's honours classification is as follows:

Mark	Interpretation
70% - 100%	First class
60% - 69%	Upper Second class
50% - 59%	Lower Second class
40% - 49%	Third class
35% - 39%	Pass below Honours standard
0% - 35%	Fail

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: 260 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 A T Russell email a.t.russell@rdg.ac.uk

Support for students and their learning
University support for students and their learning falls into two categories. Learning support includes IT Services, which has several hundred computers and the University Library, which across its three sites holds over a million volumes, subscribes to around 4,000 current periodicals, has a range of electronic sources of information and houses the Learning Resource Centre with some 200 workstations. 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, the Careers Advisory Service, the University's Special Needs Advisers, Hall Wardens and the Students' Union.

Within the School 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.

Careers prospects
A BSc degree in Chemistry with Computer Science from the University of Reading provides a strong platform from which to undertake a wide range of careers both within the chemical and computing 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 with Computer Science graduates from Reading have also found employment using their numerical and other skills in more general areas such as accounting and computing. In addition, some students with a BSc Chemistry with Computer Science degree pursue postgraduate work, either at Reading or elsewhere, by studying for a higher degree in specialised areas of Chemistry, for example computational chemistry.

Opportunities for study abroad

The School 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 normally spend their third year at the European University, returning to take Part 3 of the Chemistry with Computer Science programme, unless they have transferred to the MChem Chemistry with a Year in Europe programme (F104). The year abroad is only assessed when it is part of the MChem programme.

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 and, in addition, the applications of comp-utational chemistry
3. the main techniques involved in practical work
4. the spectroscopic methods used to ident-ify 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 & 2 in which students develop their skills prior to applying them in their Part 3 project.

The final part of 2 is covered by module CH3C1 taught by the Chemistry Department after the basic introduction to Computer Science in Parts 1 & 2 taught by that Department.

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 – be 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 Parts 1 & 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.
C Practical Skills:- be 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 & 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 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 & 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 CH2A1 and CH3A1. 6 is assessed in the Part 3 project.

D. Transferable skills – be 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 programme but, is specifically addressed in core modules CH2I1, CH2O1 & CH2P1.

Team work and career planning are part of module CH2A1. Oral presentations are associated with modules CH3A1 and CH3PR.

Library resources are specifically addressed through a small project in module CH3A1, and within the third 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, CH2A1 and CH3A1.

Career planning is assessed through the 5 credit CMS course embedded within module CH2A1.

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 expect 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 module and programme handbooks.