Programme Title: Chemistry with a Year in Industry/Research (BSc)

Programme Specification

Awarding Body/Institution: Queen Mary, University of London
Teaching Institution: Queen Mary, University of London
Name of Final Award and Programme Title: Bachelor of Science (BSc) in Chemistry with a Year in Industry/Research
Name of Interim Award(s):
Duration of Study / Period of Registration: 4 years
QM Programme Code / UCAS Code(s): 9A32
QAA Benchmark Group: Chemistry
FHEQ Level of Award: Level 6
Programme Accredited by:
Date Programme Specification Approved:
Responsible School / Institute: School of Biological & Chemical Sciences

Schools which will also be involved in teaching part of the programme
School of Biological & Chemical Sciences

Institution(s) other than Queen Mary that will provide some teaching for the programme

Programme Outline

This programme aims to provide a thorough training in the field of chemistry, appropriate for those students seeking professional employment in the field.

This four-year BSc programme differs from the normal three-year F100 programme in that it incorporates a year-long placement in an industrial organisation or other research environment. The placement is generally taken between the second year and final year of the standard BSc programme.

Aims of the Programme

This programme aims to provide a thorough training in the field of chemistry, yielding graduates who are well versed in all the main areas of the subject and who have also benefitted from the experience of working on an extended project in a professional organisation.

More specifically, students will be suitably-trained for professional employment or further study through having:
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- wide-ranging knowledge of organic, inorganic and physical chemistry, including aspects of each up to an advanced level;
- skills in solving problems of a chemical nature, and in the interpretation and assessment of chemical data;
- well-developed practical skills in the conduct of chemical reactions/experiments and in a range of analytical/preparative techniques;

More generally, the programme aims to:
- provide a rational and coherent programme of study which is relevant to the needs of employers, facilitates the professional development of the student and lays the foundations for a successful career to the benefit of the economy and society;
- provide a sound knowledge base in the fields studied and develop key transferable skills in the areas of communication, numeracy, information technology, team-working, problem-solving, time and task management;
- foster the development of an enquiring, open-minded and creative attitude, tempered with scientific discipline and social awareness, which encourages lifelong learning.

What Will You Be Expected to Achieve?

Students who successfully complete the programme are expected to possess the following knowledge/skills/attributes:

<table>
<thead>
<tr>
<th>Academic Content</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Basic essential facts, fundamental concepts, principles and theories of chemistry.</td>
</tr>
<tr>
<td>A2</td>
<td>Facts, concepts, principles and theories at an advanced level across a wide range of chemical topics, typically including many of the following areas: Organic Chemistry: including organic structures and functional groups, stereochemistry, reactions and mechanisms, molecular synthesis, biological aspects of organic chemistry. Inorganic Chemistry: including structure and bonding, chemistry of selected elements, solid-state chemistry, metal complexes and organometallics, applications of inorganic chemistry. Physical Chemistry: including chemical thermodynamics and kinetics, quantum theory and molecular bonding, spectroscopic techniques, interfaces and solution chemistry. Analytical Chemistry: including chemical analysis, molecular spectroscopy, separation techniques, advanced analytical instrumentation.</td>
</tr>
<tr>
<td>A3</td>
<td>Understanding of scientific methodology.</td>
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<tr>
<td>A4</td>
<td>Knowledge of common methods and techniques in practical chemistry.</td>
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<tr>
<th>Disciplinary Skills - able to:</th>
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<tbody>
<tr>
<td>B1</td>
<td>identify problems, and apply chemical principles to the solution of problems.</td>
</tr>
<tr>
<td>B2</td>
<td>retrieve, filter and collate chemical data from a variety of information sources.</td>
</tr>
<tr>
<td>B3</td>
<td>evaluate existing knowledge and produce analyses based upon evidence.</td>
</tr>
<tr>
<td>B4</td>
<td>plan and conduct laboratory-based practical work, efficiently and with due regard for safety.</td>
</tr>
<tr>
<td>B5</td>
<td>use a range of laboratory and analytical equipment.</td>
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<tr>
<td>B6</td>
<td>analyse, evaluate and interpret the results of controlled experiments.</td>
</tr>
<tr>
<td>B7</td>
<td>prepare scientific/technical reports of an appropriate professional standard.</td>
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<tr>
<td>B8</td>
<td>use a range of scientific software and computational tools.</td>
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<tr>
<td>B9</td>
<td>plan, undertake and report on a bibliographically-based piece of research.</td>
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<tr>
<td>B10</td>
<td>communicate scientific results clearly and in a manner appropriate for the audience and setting.</td>
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<tr>
<td>B11</td>
<td>progress a research project in chemistry, including the ability to assimilate published knowledge.</td>
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Attributes:

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</thead>
<tbody>
<tr>
<td>C1</td>
<td>communicate effectively by written and/or verbal means.</td>
</tr>
<tr>
<td>C2</td>
<td>manage time, prioritise workloads and work to deadlines.</td>
</tr>
<tr>
<td>C3</td>
<td>capacity for independent learning and for further personal development.</td>
</tr>
<tr>
<td>C4</td>
<td>ability to work independently, with minimal supervision.</td>
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<tr>
<td>C5</td>
<td>participate constructively as a member of a group/team.</td>
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<tr>
<td>C6</td>
<td>apply scientific knowledge and problem-solving skills in a wide range of theoretical and practical situations.</td>
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<tr>
<td>C7</td>
<td>ability to assess the relevance, importance and reliability of the ideas of others.</td>
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<tr>
<td>C8</td>
<td>use IT/computer-based technology to effectively locate information and to analyse, manipulate and data.</td>
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<tr>
<td>C9</td>
<td>awareness of the role and impact of science in society.</td>
</tr>
<tr>
<td>C10</td>
<td>reason critically, so as to make appropriate deductions, based on the assessment of available evidence and data.</td>
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How Will You Learn?

Acquisition of knowledge is achieved mainly through lectures and directed independent learning. Understanding is reinforced through a combination of workshops and problem classes, tutorials and laboratory classes (depending upon the module concerned), which include provision of regular feedback on submitted assignments.

Additional learning support is made available through Queen Mary's online learning environment (QMplus), via the provision of various primers and guidance notes, online recordings and other supplementary learning materials. A range of chemistry software (including molecular modelling software) and other scientific software is available through the QMUL Student PC Service.

Skills in the application of chemical theories and concepts, including analysis and problem-solving skills, are developed by a progression of graded problem classes and tutorial exercises.

Chemistry practical skills are also developed in a progressive manner throughout the programme. In the first year attention is
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The practical modules are designed to provide students with the opportunity to develop skills in practical laboratory chemistry, to integrate knowledge from other modules, and to improve skills relating to data analysis and interpretation. The placement offers the opportunity to gain knowledge and experience of the practices of a professional workplace, and to participate as a member of a team working on a specific project. The project work in the final year, back at Queen Mary, offers students the opportunity to demonstrate achievement in research skills, including collating relevant information and critical appraisal of data.

How Will You Be Assessed?

Assessment of the academic content of the programme is generally through a combination of unseen written examinations and assessed coursework. The exact nature of the coursework varies from module to module, but may include work in the form of problem sheets, essays or other types of written assignments. The coursework mark may also include a contribution from computer-based assessments and in-course tests.

In the first year, chemistry practical skills are predominantly assessed through completion of short laboratory reports, based on a supplied report template. In later years, both practical skills and report-writing skills are assessed through written laboratory reports, and includes attention to the quality of samples, reliability of data and skills of interpretation, and quantitative accuracy.

Specific modules (such as the project-based modules) include assessed oral examinations, oral presentations and extended reports/dissertations.

The placement year is assessed on a pass/fail basis, and is not otherwise considered in the classification of the degree.

How is the Programme Structured?

Students are required to register for modules to a value of 120 credits in each academic year; this should normally consist of 60 credits in each semester.

YEAR 1
Core modules (15 credits in total):
CHE101 Foundations of Practical Chemistry (15 credits, level 4, sem A+B)

Compulsory modules (105 credits in total):
CHE100 Essential Skills for Chemists (15 credits, level 4, sem A+B)
CHE102A Fundamentals of Organic Chemistry Semester A (15 credits, level 4, sem A)
CHE102B Fundamentals of Organic Chemistry Semester B (15 credits, level 4, sem B)
CHE103A Fundamentals of Physical & Inorganic Chemistry Semester A (15 credits, level 4, sem A)
CHE103B Fundamentals of Physical & Inorganic Chemistry Semester B (15 credits, level 4, sem B)
CHE104 Fundamentals of Spectroscopy (15 credits, level 4, sem A)
CHE105 States of Matter (15 credits, level 4, sem B)

YEAR 2
Core modules (15 credits in total):
CHE201 Practical Chemistry (15 credits, level 5, sem A+B)

Compulsory modules (105 credits in total):
CHE202A Structure & Reactivity in Organic Chemistry Semester A (15 credits, level 5, sem A)
CHE202B Structure & Reactivity in Organic Chemistry Semester B (15 credits, level 5, sem B)
CHE203A Solid State & Inorganic Chemistry Semester A (15 credits, level 5, sem A)
CHE203B Solid State & Inorganic Chemistry Semester B (15 credits, level 5, sem B)
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CHE204A  Physical & Quantum Chemistry  Semester A                                   (15 credits, level 5, sem A)
CHE204B  Physical & Quantum Chemistry  Semester B                                  (15 credits, level 5, sem B)
CHE205  Problem Solving in Chemistry                                                              (15 credits, level 5, sem A+B)

YEAR 3
Core modules (120 credits in total):
CHE200  Professional Placement in Chemistry                              (120 credits, level 5, full-year)

YEAR 4
Compulsory modules (75 credits in total):
CHE301  Advanced Practical Chemistry 1                                     (15 credits, level 6, sem A)
CHE302U Organic Synthesis                                                                (15 credits, level 6, sem A)
CHE303U Topics in Inorganic Chemistry                                         (15 credits, level 6, sem A)
CHE304U Topics in Physical Chemistry                                            (15 credits, level 6, sem A)
CHE305U Computational Chemistry                                                 (15 credits, level 6, sem B)

Plus 30 credits from the following:
CHE600  Chemistry Research Project                                             (30 credits, level 6, sem A+B)**
CHE601  Chemistry Investigative Project                                       (30 credits, level 6, sem A+B)

Plus 15 credits from the following:
CHE307  Bioorganic Chemistry                                                          (15 credits, level 6, sem B)
CHE308U Advanced Analytical Chem. & Spectroscopy               (15 credits, level 6, sem B)

** subject to students meeting the minimum academic conditions for registration for this module

Academic Year of Study

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Module Code</th>
<th>Credits</th>
<th>Level</th>
<th>Module Selection Status</th>
<th>Academic Year of Study</th>
<th>Semester</th>
</tr>
</thead>
</table>

What Are the Entry Requirements?
Candidates must be able to satisfy the general admissions requirements of the University and meet the requirements for this specific programme of study. This is usually achieved in one of the following ways (although the entry-points tariff is subject to annual review):

For direct entry to the degree programme, candidates must usually possess a minimum total of 320 points on the UCAS points tariff system, including a minimum of a grade B in 'A2' Chemistry or an equivalent qualification. Mathematics at AS-level or higher is strongly recommended.

or via

Admission to the QMUL Science and Engineering Foundation Programme (SEFP), and successful completion of the foundation year (defined by achievement of the minimum requirements for progression defined in the SEFP programme regulations, and the criteria specified in the SEFP Student Handbook for progression to this particular degree programme).

How Do We Listen and Act on Your Feedback?
The Staff-Student Liaison Committee (SSLC) provides a formal means of communication and discussion between the School and
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The committee consists of student representatives from each year in the school together with appropriate representation from staff within the school. It is designed to respond to the needs of students, as well as act as a forum for discussing programme and module developments. The SSLC meets regularly throughout the year.

The School’s Teaching & Learning Committee (TLC) advises the Director of Taught Programmes on all matters relating to the delivery of taught programmes at school level including monitoring the application of relevant QM policies and reviewing all proposals for module and programme approval and amendment before submission to Taught Programmes Board. Student views are incorporated in the committee’s work in a number of ways, including through student membership, and consideration of various student surveys.

All schools operate an Annual Programme Review of their taught undergraduate and postgraduate provision. APR is a continuous process of reflection and action planning which is owned by those responsible for programme delivery; the main document of reference for this process is the Taught Programmes Action Plan (TPAP) which is the summary of the school’s work throughout the year to monitor academic standards and to improve the student experience. Students’ views are considered in this process through analysis of the NSS and module evaluation questionnaires.

Academic Support

The induction programme for new undergraduate students includes:
- briefings from senior staff on matters relating to general university study
- briefings on the conduct of chemistry practicals and laboratory matters
- an introduction to Library Services

Each student is then assigned a personal academic guidance tutor (or "advisor") who remains their main point of contact regarding academic matters and pastoral concerns throughout their degree programme. Students can see their advisors in their office hours or arrange an appointment via email. If advisors are not readily available, or cannot help with a specific problem, the School has several Senior Academic Advisors (typically one for each division) to facilitate student concerns.

The School also operates a Peer-Assisted Study Support (PASS) programme to provide peer guidance for first-year students.

Each module has a module coordinator, whose role is to ensure that the module runs smoothly, and that an appropriate level of information is provided to students of the module.

Whilst on placement you will be working under the day-to-day supervision of a specific line manager, and a staff member of the employing organisation will act as a mentor. Your progress is monitored from Queen Mary by a Placement Coordinator & Support Officer.

Project-work is carried out under the guidance of a specific academic member of staff (the "supervisor"), whose role includes the provision of academic and technical guidance, as well as monitoring your progress throughout the project.

Programme-specific Rules and Facts

Progression from year 1 to year 2 of this programme is subject to the following criteria:
105 credits passed with an average mark of no less than 65.0%
(students who fail to meet the criteria will be transferred to the F100 programme and be considered for progression under the rules that apply for that programme)

All placements must be approved by the School (in regard to professional suitability, and provision of a satisfactory training environment). Candidates failing to obtain a placement for the third year will be transferred onto the F100 programme at the end of year 2.

Progression from year 3 to year 4 of this programme is subject to the following criteria:
a pass in the CHE200 Professional Placement in Chemistry module

In the event that a candidate fails the CHE200 Professional Placement in Chemistry module at the first attempt then the SEB will make recommendations as outlined below:
- that the candidate is permitted to resit the module by re-submission of the student report and/or re-presentation.
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If the candidate is deemed to have irretrievably failed the CHE200 module.

Failure of the CHE200 module leads to an enforced change of programme to the F100 programme, and the students returns to Queen Mary to resume their studies in the third year of the F100 programme in the following academic year.

Specific Support for Disabled Students

Queen Mary has a central Disability and Dyslexia Service (DDS) that offers support for all students with disabilities, specific learning difficulties and mental health issues. The DDS supports all Queen Mary students: full-time, part-time, undergraduate, postgraduate, UK and international at all campuses and all sites.

Students can access advice, guidance and support in the following areas:
- Finding out if you have a specific learning difficulty like dyslexia
- Applying for funding through the Disabled Students’ Allowance (DSA)
- Arranging DSA assessments of need
- Special arrangements in examinations
- Accessing loaned equipment (e.g. digital recorders)
- Specialist one-to-one “study skills” tuition
- Ensuring access to course materials in alternative formats (e.g. Braille)
- Providing educational support workers (e.g. note-takers, readers, library assistants)
- Mentoring support for students with mental health issues and conditions on the autistic spectrum.

Links With Employers, Placement Opportunities and Transferable Skills

Chemistry is often regarded as the "central science", and interfaces with physics, biology, materials science and medicine. This four year degree offers a high-level of training in both practical and theoretical aspects of chemistry, suitable for those wishing to pursue a career as a professional chemist.

Graduates of chemistry degree courses are generally recognised by employers as having good technical and transferable skills: including skills in literacy, numeracy, application of logic, problem solving, communication, IT and computation, independent and team working, and time management.

Graduates of this programme will have gained specific experience of the working practices and working environments afforded by those employers offering placements; organisations that may consider students for placements would include major international chemical, petrochemical and pharmaceutical companies.

Opportunities for employment within the field of chemistry would include careers in the following areas: chemical industry; pharmaceuticals; food industry; mining, oil and gas industries; consumer products (e.g. cosmetics); analytical and forensic services; teaching and education; environmental protection.

Opportunities for employment outside the field of chemistry would include careers in the following areas: finance; commerce; civil service; law; journalism; publishing; healthcare; technical sales; information technology.

Programme Specification Approval

Person completing Programme Specification: Dr N Lebrasseur
| **Person responsible for management of programme** | Dr I Abrahams |
| **Date Programme Specification produced/amended by School Learning and Teaching Committee** | 28 Jan 2015 |
| **Date Programme Specification approved by Taught Programmes Board** | |