

Programme Title: Pharmaceutical Chemistry (BSc) with extramural year variants



## Programme Specification (UG)

|   |   |
|---|---|
| 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 Pharmaceutical Chemistry, Bachelor of Science (BSc) in Pharmaceutical Chemistry with a year in industry/ research, Bachelor of Science (BSc) in Pharmaceutical Chemistry with a Year Abroad. |
| Name of interim award(s):                   |   |
| Duration of study / period of registration: | 3 years (or 4 years with an extramural year)  |
| QMUL programme code / UCAS code(s):         | F154, 2L22, F15Y  |
| QAA Benchmark Group:                        | Chemistry   |
| FHEQ Level of Award :                       | Level 6   |
| Programme accredited by:                    | Royal Society of Chemistry  |
| Date Programme Specification approved:      |   |
| Responsible School / Institute:             | School of Physical & Chemical Sciences  |

Schools / Institutes which will also be involved in teaching part of the programme:

School of Physical & Chemical Sciences

Collaborative institution(s) / organisation(s) involved in delivering the programme:

### Programme outline

This programme aims to provide a thorough training in the field of chemistry with an introduction to key principles of biochemistry, physiology and pharmacology. Emphasis is given to molecular concepts of complex biological systems and the relevance of all the above to the development of medicinal drugs. Students following this program will therefore learn about important chemical principles and their relationship to biological systems, and are well-trained for careers in the pharmaceutical industry. mistry, appropriate for those students seeking professional employment in the field.

This three-year BSc programme runs in parallel with the four-year F152 Chemistry MSci programme and years 1 and 2 of the two programmes are identical. Students are normally able to switch between the two programmes up to the start of the third year (although any transfer from the BSc to MSci programme will be subject to the student meeting the higher progression hurdles of the MSci programme).

## Aims of the programme

This programme aims to provide a thorough training in the field of pharmaceutical chemistry, yielding graduates who are well versed in all the main areas of the subject. More specifically, students will be suitably-trained for professional employment or further study through having:

- wide-ranging knowledge of organic, inorganic and physical chemistry, including selected areas up to an advanced level;
- an understanding of basic principles of human physiology, biochemistry and drug action;
- knowledge of the drug-development process;
- 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:

### **Please note that the following information is only applicable to students who commenced their Level 4 studies in 2017/18, or 2018/19**

In each year of undergraduate study, students are required to study modules to the value of at least 10 credits, which align to one or more of the following themes:

- networking
- multi- and inter-disciplinarity
- international perspectives
- enterprising perspectives.

These modules will be identified through the Module Directory, and / or by your School or Institute as your studies progress.

Academic Content:

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|     |   |
|-----|---|
| A 1 | Basic essential facts, fundamental concepts, principles and theories of chemistry.  |
| A 2 | Facts, concepts, principles and theories at an advanced level across a wide range of chemical topics, typically including many of the following areas:<br>Organic Chemistry: including organic structures and functional groups, stereochemistry, reactions and mechanisms, molecular synthesis, biological aspects of organic chemistry.<br>Inorganic Chemistry: including structure and bonding, chemistry of selected elements, solid-state chemistry, metal complexes and organometallics, applications of inorganic chemistry.<br>Physical Chemistry: including chemical thermodynamics and kinetics, quantum theory and molecular bonding, spectroscopic techniques, interfaces and solution chemistry.<br>Analytical Chemistry: including chemical analysis, molecular spectroscopy, separation techniques, advanced analytical instrumentation. |
| A 3 | Topics in pharmacology: including drug targets; mode of action and metabolism; pharmacokinetics; cancer chemotherapy; structure-activity relationships and methods of drug discovery.   |
| A 4 | Understanding of scientific methodology.  |
| A 5 | Knowledge of common methods and techniques in practical chemistry.  |

Disciplinary Skills - able to:

|      |  |
|------|--|
| B 1  | identify problems, and apply chemical principles to the solution of problems.                      |
| B 2  | retrieve, filter and collate chemical data from a variety of information sources.                  |
| B 3  | evaluate existing knowledge and produce analyses based upon evidence.                              |
| B 4  | plan and conduct laboratory-based practical work, efficiently and with due regard for safety.      |
| B 5  | use a range of laboratory and analytical equipment.  |
| B 6  | analyse, evaluate and interpret the results of controlled experiments.                             |
| B 7  | prepare scientific/technical reports of an appropriate professional standard.                      |
| B 8  | use a range of scientific software and computational tools.  |
| B 9  | plan, undertake and report on a bibliographically-based piece of research.                         |
| B 10 | communicate scientific results clearly and in a manner appropriate for the audience and setting.   |
| B 11 | progress a research project in chemistry, including the ability to assimilate published knowledge. |

Attributes:

|     |   |
|-----|---|
| C 1 | communicate effectively by written and/or verbal means. |
|-----|---|

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| C 2  | manage time, prioritise workloads and work to deadlines.   |
| C 3  | capacity for independent learning and for further personal development.  |
| C 4  | ability to work independently, with minimal supervision.   |
| C 5  | participate constructively as a member of a group/team.  |
| C 6  | apply scientific knowledge and problem-solving skills in a wide range of theoretical and practical situations.   |
| C 7  | ability to assess the relevance, importance and reliability of the ideas of others.                              |
| C 8  | use IT/computer-based technology to effectively locate information and to analyse, manipulate and data.          |
| C 9  | awareness of the role and impact of science in society.  |
| C 10 | reason critically, so as to make appropriate deductions, based on the assessment of available evidence and data. |

### 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 concentrated on the basic laboratory skills and safe working practice, while at higher levels more advanced techniques and non-prescribed exercises are introduced. These practical modules thereby offer 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 project work 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.

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

### How is the programme structured?

Please specify the structure of the programme diets for all variants of the programme (e.g. full-time, part-time - if applicable). The description should be sufficiently detailed to fully define the structure of the diet.

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.

In the first year, you will study 120 credits, comprising the following:

- 8 x 15 credit compulsory modules (Semesters A & B)

In the second year, you will study 120 credits, comprising the following:

- 6 x 15 credit compulsory modules (totalling 90 credits, across Semesters A & B)
- 3 x 10 credit compulsory modules (totalling 30 credits, across Semesters A & B)

To be eligible for the award of Bachelor of Science (BSc) in Pharmaceutical Chemistry with year in Industry/Research students must take SPC5550 after the 2nd year and then return to QMUL the following year to complete the Year 3 diet in their 4th Year of study.

To be eligible for the award of Bachelor of Science (BSc) in Pharmaceutical Chemistry with Year Abroad, students must take SPC5555 after the 2nd year and then return to QMUL the following year to complete the Year 3 diet in their 4th Year of study.

In third year, you will study 120 credits comprising the following:

Compulsory modules (45 credits in total):

|   |                              |
|---|------------------------------|
| CHE310 Professional Skills in Chemistry   | (15 credits, level 6, sem A) |
| CHE302U Organic Synthesis                 | (15 credits, level 6, sem A) |
| CHE306U Advanced Pharmaceutical Chemistry | (15 credits, level 6, sem A) |

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 45 credits from the following:

|                                       |                              |
|---------------------------------------|------------------------------|
| CHE303U Topics in Inorganic Chemistry | (15 credits, level 6, sem A) |
| CHE304U Topics in Physical Chemistry  | (15 credits, level 6, sem A) |

|  |                              |
|--|------------------------------|
| CHE307 Bioorganic Chemistry                            | (15 credits, level 6, sem B) |
| CHE309 Topics in Biological Chemistry                  | (15 credits, level 6, sem B) |
| CHE305U Computational Chemistry                        | (15 credits, level 6, sem B) |
| CHE308U Advanced Analytical Chemistry and Spectroscopy | (15 credits, level 6, sem B) |

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

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Academic Year of Study FT - Year 1

| Module Title                                 | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|--|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Foundations of Practical Chemistry           | CHE101      | 15      | 4     | Core                    | 1                      | Semesters 1 & 2 |
| Essential Skills for Chemists                | CHE100      | 15      | 4     | Compulsory              | 1                      | Semesters 1 & 2 |
| Fundamentals of Organic Chemistry Semester A | CHE102A     | 15      | 4     | Compulsory              | 1                      | Semester 1      |
| Fundamentals of Organic Chemistry Semester B | CHE102B     | 15      | 4     | Compulsory              | 1                      | Semester 2      |
| Fundamentals of Inorganic Chemistry          | CHE113      | 15      | 4     | Compulsory              | 1                      | Semester 1      |
| Fundamentals of Physical Chemistry           | CHE114      | 15      | 4     | Compulsory              | 1                      | Semester 2      |
| Fundamentals of Spectroscopy                 | CHE104      | 15      | 4     | Compulsory              | 1                      | Semester 1      |
| States of Matter and Analytical Chemistry    | CHE108      | 15      | 4     | Compulsory              | 1                      | Semester 2      |

Academic Year of Study FT - Year 2

| Module Title   | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|--|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Practical Chemistry                                    | CHE211      | 10      | 5     | Core                    | 2                      | Semesters 1 & 2 |
| Applied Spectroscopy                                   | CHE215      | 10      | 5     | Compulsory              | 2                      | Semester 1      |
| Structure & Reactivity in Organic Chemistry Semester A | CHE202A     | 15      | 5     | Compulsory              | 2                      | Semester 1      |
| Structure & Reactivity in Organic Chemistry Semester B | CHE202B     | 15      | 5     | Compulsory              | 2                      | Semester 2      |
| Solid State & Inorganic Chemistry Semester B           | CHE203B     | 15      | 5     | Compulsory              | 2                      | Semester 2      |

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| Module Title                            | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|---|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Quantum & Physical Chemistry Semester A | CHE204A     | 15      | 5     | Compulsory              | 2                      | Semester 1      |
| Pharmaceutical Chemistry Semester A     | CHE206A     | 15      | 5     | Compulsory              | 2                      | Semester 1      |
| Pharmaceutical Chemistry Semester B     | CHE206B     | 15      | 5     | Compulsory              | 2                      | Semester 2      |
| Introductory Programming for Chemists   | CHE209      | 10      | 5     | Compulsory              | 2                      | Semester 2      |
| Essential Skills for Chemists II        | CHE210      | 0       | 5     | Study only              | 2                      | Semesters 1 & 2 |

Academic Year of Study FT - Year 3

| Module Title                      | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|-----------------------------------|-------------|---------|-------|-------------------------|------------------------|-----------------|
| Professional Skills in Chemistry  | CHE310      | 15      | 6     | Compulsory              | 3                      | Semester 1      |
| Organic Synthesis                 | CHE302U     | 15      | 6     | Compulsory              | 3                      | Semester 1      |
| Topics in Inorganic Chemistry     | CHE303U     | 15      | 6     | Elective                | 3                      | Semester 1      |
| Topics in Physical Chemistry      | CHE304U     | 15      | 6     | Elective                | 3                      | Semester 1      |
| Computational Chemistry           | CHE305U     | 15      | 6     | Elective                | 3                      | Semester 2      |
| Chemistry Research Project        | CHE600      | 30      | 6     | Elective                | 3                      | Semesters 1 & 2 |
| Chemistry Investigative Project   | CHE601      | 30      | 6     | Elective                | 3                      | Semesters 1 & 2 |
| Bioorganic Chemistry              | CHE307      | 15      | 6     | Elective                | 3                      | Semester 2      |
| Advanced Pharmaceutical Chemistry | CHE306U     | 15      | 6     | Compulsory              | 3                      | Semester 1      |
| Topics in Biological Chemistry    | CHE309      | 15      | 6     | Elective                | 3                      | Semester 2      |

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| Module Title                                   | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester   |
|--|-------------|---------|-------|-------------------------|------------------------|------------|
| Advanced Analytical Chemistry and Spectroscopy | CHE308U     | 15      | 6     | Elective                | 3                      | Semester 2 |

Academic Year of Study FT - Year 2

| Module Title  | Module Code | Credits | Level | Module Selection Status | Academic Year of Study | Semester        |
|---|-------------|---------|-------|-------------------------|------------------------|-----------------|
| One of the following modules must be taken to qualify for one of the extramural year degrees: |             |         |       |                         |                        |                 |
| SPCS Industrial/Professional Experience Placement Module                                      | SPC5550     | 120     | 5     | Core                    | 3                      | Semesters 1-3   |
| SPCS Study Abroad Year  | SPC5555     | 120     | 5     | Core                    | 3                      | Semesters 1 & 2 |

### 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 300 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. Biology at AS-level or higher is desirable.

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 will the quality of the programme be managed and enhanced? How do we listen to and act on your feedback?

The Staff-Student Liaison Committee (SSLC) provides a formal means of communication and discussion between the School and its students. 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.

### What academic support is available?

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.

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.

### How inclusive is the programme for all students, including those with disabilities?

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.

### Programme-specific rules and facts

None

### 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 three year degree offers a high-level of training in both practical and theoretical aspects of chemistry, and also covers key aspects of biochemistry, physiology and pharmacology. It is therefore suitable for those wishing to pursue a career as a professional chemist, including positions in the pharmaceutical industry.

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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.

Students of this programme may have the opportunity to undertake an international exchange (for one semester or a complete academic year) under Queen Mary's International Exchange Programme, or shorter term placements within the School's research laboratories or with appropriate UK employers during the summer vacations. Positions on exchanges and placements are subject to a successful application, and are awarded on a competitive basis.

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.

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## Programme Specification Approval

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**Person completing Programme Specification:**

Lesley Howell

**Person responsible for management of programme:**

Tippu Sheriff

**Date Programme Specification produced / amended by School / Institute Learning and Teaching Committee:**

8 Dec 2022

**Date Programme Specification approved by Taught Programmes Board:**