

## Master of Chemistry (Biological and Medicinal Chemistry) Programme Specification

Academic Year:	<b>2023/24</b>
Degree Awarding Body:	<b>University of Bradford</b>
Final and interim award(s):	<b>MChem</b> [Framework for Higher Education Qualifications (FHEQ) level 7] <b>BSc (Honours) Chemistry</b> [Framework for Higher Education Qualifications (FHEQ) level 6] <b>BSc Chemistry</b> [Framework for Higher Education Qualifications (FHEQ) level 6] <b>Diploma of Higher Education</b> [Framework for Higher Education Qualifications (FHEQ) level 5] <b>Certificate of Higher Education</b> [Framework for Higher Education Qualifications (FHEQ) level 4]
Programme accreditation:	<b>The Royal Society of Chemistry</b> – students who meet the requirements can apply for accreditation
Programme duration:	<b>4 Years Full Time</b>
UCAS code:	<b>F157</b>
QAA Subject benchmark statement(s):	<b>Chemistry (2015)</b>
Date last confirmed and/or minor modification approved by Faculty Board	<b>March 2023</b>

**Please note:** This programme specification has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but changes may occur given the interval between publishing and commencement of teaching. Any change which impacts the terms and conditions of an applicant's offer will be communicated to them. Upon commencement of the programme, students will receive further detail about their course and any minor changes will be discussed and/or communicated at this point.

### Introduction

The Chemistry programmes at the University of Bradford are designed around the university's key mission statement 'Making Knowledge Work'. Our degrees will give students a solid background in the chemical sciences, but then allow students to focus on the application of chemistry in specific areas of modern chemistry. These areas have been chosen to reflect the main employment destinations for 21st century chemistry graduates: Materials Chemistry, Analytical Chemistry, Biological and Medicinal Chemistry and Computational Chemistry.

Our degrees have been structured to give students choice and flexibility. During the first two years, students will develop a sound understanding of theoretical and practical aspects of chemistry, with core content delivered across the traditional areas of organic, inorganic, physical and biological chemistry with options in other biosciences. The third year will introduce students to specialist content in medicinal and biological chemistry, including

topics such as bioorganic and bioinorganic chemistry. Taught components at this level include both chemistry and bioscience modules. Students will also have the opportunity to study a specific subject across chemistry and the biosciences to a greater depth during an extended dissertation.

It is possible to exit after stage 3 with a BSc (Honours) in Chemistry.

In the Masters year, students will develop a deeper understanding of the application of chemistry in the life sciences. Masters-level training focuses on deploying a depth of knowledge within medicinal and biological chemistry that is linked to real-world problems. For a significant part of this final year, students will work on a research project within leading research teams at the interface of chemistry and biosciences.

As a Bradford Chemistry graduate, students will be uniquely placed to deploy the skills that have developed during the programme to 'Make Knowledge Work'.

## **Programme Aims**

The programme is intended to:

- develop an enthusiasm for chemistry and an appreciation of its application in different contexts.
- provide opportunities for students to develop a systematic knowledge and understanding of the core principles of chemistry.
- enable students to develop a core range of chemistry-related practical skills.
- develop students' ability to think critically and creatively.
- provide students with opportunities to study subjects outside of core chemistry.
- develop collaborative and group working skills.
- develop awareness of sustainability in the context of the chemical sciences.
- equip students with the subject and key skills necessary to facilitate transition to employment in both chemical and non-chemical employment or further study.
- extend students' comprehension of key chemical concepts and provide an in-depth understanding of applied areas of chemistry.
- provide a supportive educational environment, which meets the needs of students from a variety of backgrounds.
- enable students to become autonomous learners and equip them with the lifelong learning skills required to be adaptable over the course of their career.
- enable students to develop the ability to carry out experiments independently and assess the significance of outcome.
- develop the ability to adapt and apply methodology to the solution of unfamiliar problems.
- instil a critical awareness of advances at the forefront of the chemical sciences.

## Programme Learning Outcomes

To be eligible for the award of **Certificate of Higher Education** at FHEQ level 4, students will be able to:

1. Describe the physical world using the language of chemistry.
2. Describe chemical reactions in terms of the change in structure of organic and inorganic compounds and materials, and in the change of measurable physical attributes of these.
3. Accurately and reliably communicate the results of practical experiments in sufficient detail to allow the experiment to be reproduced from their description alone.
4. Locate the information required to handle potentially hazardous material with due reference to COSHH protocols and regulations, and risk assessment procedures.
5. Work collaboratively to analyse a given problem, and to prepare an oral presentation.
6. Quantify the environmental impact of experiments using Green Chemistry metrics.

Additionally, to be eligible for the award of **Diploma of Higher Education** at FHEQ level 5, students will be able to:

7. Interpret the structure and reactivity of organic and inorganic molecules and compounds by considering appropriate bonding models.
8. Discuss the way in which organic and inorganic compounds react at a molecular level with emphasis on mechanistic tools of interpretation.
9. Explain physical processes, both in terms of classical thermodynamics and in terms of the quantisation of energy.
10. Interpret the results of practical experiments, commenting specifically on the significance of the associated data produced.
11. Use appropriate technology and media to effectively communicate scientific ideas to their peers.
12. Evaluate their skill sets against subject-specific requirements and identify areas for professional and personal development.
13. Establish a collaborative approach to tackling chemical problems.

Additionally, to be eligible for the award of Ordinary **Degree of Bachelor** at FHEQ level 6, students will be able to:

14. Accurately apply the range of theories contained within the sub-disciplines of organic, inorganic and physical chemistry to interdisciplinary areas of the chemical sciences.

Additionally, to be eligible for the award of **Honours Degree of Bachelor** at FHEQ level 6, students will be able to:

15. Solve scientific problems by effectively consulting the primary scientific literature and utilising specialist software.

16. Work independently to critically appraise an area of current research in the chemical sciences.
17. Use mechanistic concepts to rationalise and discuss the outcome of complex reactions.
18. Articulate complex scientific arguments in an interview setting.

Additionally, to be eligible for the award of **Degree of Master** at FHEQ level 7, students will be able to:

19. Structure a research project to answer a question at the forefront of the chemical sciences.
20. Design and implement experiments with due reference to relevant health and safety procedures in a professional setting.
21. Critically evaluate recent developments in medicinal chemistry in the light of the underlying science.
22. Examine the commercial, environmental and ethical considerations inherent in the launch of a new drug.
23. Plan and organise themselves independently, so as to make effective use of their time during the implementation of a significant research project.
24. Present the conclusions of their research in a professional and scientifically rigorous manner to their peers, and specialist and non-specialist audiences.

## Curriculum

### Stage 1

FHEQ Level	Module Title	Type	Credits	Study Period	Module Code
4	Organic Chemistry 1	Core	20	1 + 2	CFS4023-B
4	Physical Chemistry 1	Core	20	1 + 2	CFS4024-B
4	Inorganic Chemistry 1	Core	20	1 + 2	CFS4022-B
4	Practical Chemistry 1	Core	40	1 + 2	CFS4026-D
4	Biomolecules and Cells	Core	20	1 + 2	CFS4021-B

At the end of stage 1, students will be eligible to exit with the award of Certificate of Higher Education if they have successfully completed at least 120 credits and achieved the award learning outcomes.

## Stage 2

FHEQ Level	Module Title	Type	Credits	Study Period	Module Code
5	Organic Chemistry 2	Core	20	1 + 2	CFS5017-B
5	Physical Chemistry 2	Core	20	1 + 2	CFS5018-B
5	Inorganic Chemistry 2	Core	20	1 + 2	CFS5016-B
5	Practical Chemistry 2	Core	40	1 + 2	CFS5019-D
4	Human Physiology	Option	20	1 + 2	BIS4009-B
5	Cosmetic Science	Option	20	1 + 2	CFS5026-B

At the end of stage 2, students will be eligible to exit with the award of Diploma of Higher Education if they have successfully completed at least 240 credits and achieved the award learning outcomes.

## Stage 3

FHEQ Level	Module Title	Type	Credits	Study Period	Module Code
6	Molecular Analysis	Core	20	1	CFS6016-B
6	Bio-organic and Bio-inorganic Chemistry	Core	20	1	CFS6014-B
6	Advanced Laboratory & Research Skills	Core	40	1 + 2	CFS6030-D
6	Introduction to Polymer Science	Core	20	2	CFS6031-B
6	Organic Chemistry 3	Core	20	2	CFS6017-B

Students will be eligible to exit with the award of Ordinary Degree of Bachelor if they have successfully completed 120 credits in both Level 4 and 5 and 60 credits at level 6 and achieved the award learning outcomes.

Students will be eligible for the award of Honours Degree of Bachelor if they have successfully completed at least 360 credits and achieved the award learning outcomes.

## Stage 4

FHEQ Level	Module Title	Type	Credits	Semester	Module Code
7	Principles of Drug Discovery	Core	20	1	INC7014-B
7	Synthetic Chemistry for Medicinal Chemists	Core	20	1	CFS7020-B
7	Stage Four Research Project	Core	60	1 + 2	CFS7005-E
7	Computational Medicinal Chemistry	Option	20	2	CFS7010-B
7	Imaging	Option	20	2	CFS7028-B

Students will be eligible for the award of MChem if they have successfully completed at least 480 credits and achieved the award learning outcomes.

## **Placement and/or Study Abroad**

This programme does not provide the option for students to undertake a work placement or period of study abroad as part of their Masters Year. Students wishing to take this option will be transferred to the 4-year MChem Chemistry with Industrial Experience programme.

For further information about study abroad opportunities please refer to

<https://www.bradford.ac.uk/study/abroad/>

For further information about placement opportunities please refer to

<https://www.bradford.ac.uk/chemistry-and-biosciences/chemistry/careers/>

## **Learning and Teaching Strategy**

The programme articulates with the Learning and Teaching strategies of the University. Students will be exposed to a variety of teaching methods designed to develop the learning outcomes and to cater for different preferences for learning. A wide variety of teaching methods appropriate to the learning outcomes of the individual modules is employed throughout the programme. These methods progressively focus on student-centred approaches to learning. Thus, students will be expected to take increasing responsibility for their learning as they progress through the programme. In this way, students will develop the attributes needed for life-long learning and continuing professional development.

Learning outcomes 1-14, 17, 18, 21 and 22 will be developed in a number of modules, through a mix of lectures, seminars, tutorials, laboratory practicals, workshops and directed study. Lectures, seminars and tutorials will be delivered on-campus or using a blended delivery style with material delivered through structured online learning packages. Directed study will include directed reading of selected textbooks, specified source literature and open learning materials, directed web-based materials, report writing and other assignments. In addition, individual project/dissertation work will further help to develop learning outcomes 15, 16, 19, 20, 23 and 24.

## **Assessment Strategy**

Students will demonstrate their achievement via written closed-book examinations using constructed (essays, short answers) and selected response (MCQ) questions and a variety of coursework assignments, including laboratory reports, oral presentations and dissertations.

The development of learning outcomes 3, 4, 6, 10, 20, 23 and 24 will be through involvement in laboratory, small-group workshops, case-based work and projects (individual and small group). They will be assessed by critical appraisal, case analysis and critique, case presentations, laboratory reports and dissertations.

## **Assessment Regulations**

This Programme conforms to the standard University Assessment Regulations which are available at the link: <http://www.bradford.ac.uk/regulations/>

However, there are five exceptions to these regulations as listed below:

- Students who, at initial attempt, do not achieve a module mark of 35.0% or more for Practical Chemistry 1 (stage 1 students) or Practical Chemistry 2 (stage 2 students) will forfeit the right to supplementary assessment and will be required to repeat the modules with attendance.
- An attendance of 70% or above is a requirement of passing the Practical Chemistry 1, Practical Chemistry 2 and Advanced Laboratory and Research Skills modules in order to reach the required level of competency.
- In order for students to progress from Stage 2 to 3 of the programme of the Integrated Degree of Master, students must have an average mark of 55.0% at the first attempt across all 120 credits studied in Stage 2. Students who do not achieve this will be required to transfer to the BSc (Hons) Chemistry Programme.
- In order to progress between Stage 3 and 4 of the programme of the Integrated Degree of Master, students must have completed 120 credits at stage 3 with a mark of 40.0% or more in each module. Compensation is not permitted.
- The MChem award is calculated based on the marks accrued in stages 2, 3 and 4 of the programme in the following weightings: Stage 2: 10%, Stage 3: 40%, Stage 4: 50%. The fall-back award of BSc (Hons) will be calculated according to the standard university regulations: Stage 2: 20% and stage 3: 80%.

## Admission Requirements

We take into consideration a number of factors when assessing your application. It's not just about your grades; we take the time to understand your personal circumstances and make decisions based on your potential to thrive at university and beyond. Consideration of applications will be based on a combination of formal academic qualifications and other relevant experience.

The minimum entry requirements for the programme are GCSE passes including English, Mathematics and a Science at grade C or 4.

A typical offer to someone seeking entry through the UCAS scheme would be 112 UCAS points (equivalent to BBC) with at least 40 points in Chemistry (old tariff 280 points with at least 100 points in Chemistry). The UCAS tariff applicable may vary and is published here <https://www.bradford.ac.uk/courses/ug/chemistry-medicinal-mchem/>. This link provides admission information relevant to the current recruitment cycle and therefore may be different to when this document was originally published.

On completion of a UCAS form students will be invited to the School for an Open Day when they will have the opportunity to meet staff, view the facilities and discuss “the Bradford experience” with current students.

## Recognition of Prior Learning

Applications are welcome from students with non-standard qualifications or mature students (those over 21 years of age on entry) with significant relevant experience.

If applicants have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate and recognise this learning in order to provide applicants with exemptions from specified modules or parts of the programme.

## Minor Modification Schedule

Version Number	Brief description of Modification	Date of Approval (Faculty Board)
2	Introduction of new 40-credit module CFS6030-D Advanced Laboratory & Research Skills (replaces CFS6018-B & CFS6021-B). Change to delivery period for CFS6014-B and CFS6017-B.	09 February 2018
3	CFS6015-B replaced by CFS6031-B. CFS7011-B replaced by INC7014-B. CFS7010-B re-titled.	March 2019
4	Renamed to Biological and Medicinal Chemistry and introduced CFS4021-B Biomolecules and Cells as 20-credit core module in stage 1. Clarified FHEQ level of elective allowed in stage 2.	October 2019
5	Modified delivery approach to include blended learning	September 2020
6	Specification reformatted and made accessible.	November 2020
7	Imaging module added as an option in Stage 4. Changed Computational Medicinal Chemistry to an option. Addition of attendance requirement statement. Changed delivery semesters for Molecular Analysis and Introduction to Polymer Science in stage 3. Added Options to Stage 2.	June 2021
8	Annual changes for 2021 academic year	June 2021
9	Annual changes to programme spec for 2022 academic year	March 2022
10	Annual changes to programme spec for 2023 academic year	March 2023