UNIVERSITY of BRADFORD
Faculty of Life Sciences

MSc Analytical Sciences Programme Specification

Academic Year:	**2022/23**
Degree Awarding Body:	**University of Bradford**
Final and interim awards at Level 7 FHEQ (Framework for Higher Education Qualifications in England):	**Master of Science in Analytical Sciences** **Postgraduate Diploma** **Postgraduate Certificate**
Programme duration:	**1 year full time** **2 years part time**
QAA Subject benchmark statement:	**Chemistry (2014)**
Date last confirmed and/or minor modification approved by Faculty Board	**June 2021**

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

This programme is designed to develop graduate students into experienced, independent practitioners of modern analytical science in tune with the needs of research and industry. The MSc Analytical Sciences is a research-focused degree. It is designed to provide the necessary practical, interpretative analytical skills to enable students to apply a wide range of analytical techniques to key areas of application in advanced aspects of modern analytical chemistry. The programme provides students with the opportunity to explore areas of specialist knowledge through optional modules, followed by a genuine research experience through an extended research project.

The instrumental science programmes are centred at Bradford's state-of-the-art University Analytical Centre, a £3m facility housing the major capital equipment of the University and the focus for its academic and commercial contract research in analysis.

The programme is designed to offer learning for both full time (1-year) and part-time (2 years) studies.

Programme Aims

The programme is intended to:

- Develop a systematic knowledge and understanding of the core principles of instrumental analytical chemistry, to enable students to develop skills in a range of essential analytical techniques.

- Allow students to identify appropriate contexts for application of instrumental analytical techniques.
- Instruct students in methods of data analysis to assess the significance of experimental outcomes.
- Allow students to assimilate, evaluate and present results of instrumental analysis objectively.
- Instruct students in the safe operation of instrumentation in a modern analytical laboratory.
- Critically understand quality control systems applicable in analytical sciences.
- Provide students with a supportive and structured environment in which they are encouraged to develop the independent study skills required for lifelong learning.
- Equip students with information and skills to facilitate transition to employment or further study.
- Develop and enhance students' ability in a range of personal and key transferable skills such as group work, presentation skills and report writing.
- Enhance skills associated with the communication of scientific data.
- Develop an understanding of the processes and challenges involved in taking research ideas into the marketplace.
- Provide students with experience of project management methods and experimental design for analytical chemistry.
- Provide students with experience in research at the forefront of the field of their chosen specialism.
- Adapt and apply analytical methods to problems in the chosen field of specialism.
- Provide students with the opportunity to develop key skills in the dissemination of research outcomes through a thesis, journal communication and scientific presentation

Programme Learning Outcomes

To be eligible for the award of **Postgraduate Certificate** at FHEQ level 7, students will be able to:

1. Evaluate, appraise and apply instrumental analytical techniques.
2. Explain and critically evaluate experimental approaches and the operation of frequently applied instrumental analytical techniques.
3. Employ critical thinking and conceptual understanding and recognise, define and prioritise problems, analyse, interpret, objectively evaluate and prioritise information recognising its limitations.
4. Examine their level of attainment in defined attributes and skills using reflective practice.
5. Critically examine and categorise an area of the scientific literature.

6. Implement project planning techniques in designing a research project plan.
7. Communicate analytical data.
8. Manipulate samples for selection, preparation and analysis.
9. Operate analytical instrumentation under supervision.
10. Manipulate and interpret analytical data.
11. Devise experimental strategies for analysis, project-plan experimentation and develop a written project proposal from concept.
12. Employ effective time management and task prioritisation.

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

13. Manage a scientific research project.
14. Manage health and safety for their own sample collection, preparation and analysis, including completion of relevant COSHH, ethical and other risk assessments.
15. Operate selected analytical instrumentation independently.
16. Write and interpret scientific reports.

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

17. Implement an original and self-directed research project.
18. Demonstrate competence in presenting scientific data.
19. Critically evaluate and present the results of research.
20. Produce a dissertation and associated journal communication employing advanced level academic writing skills.

Curriculum

The programme consists of a core of compulsory modules designed to develop generic analytical key skills, specialism practice for each pathway and project management experience. The specialist modules relating to analytical instruments (60 credits) include lectures, workshops, and hands-on laboratory and instrument sessions with relevant samples under the instruction of a team of interdisciplinary specialists in the area. A substantial 100 credit individual research theme runs throughout the MSc.

All modules are at level 7. The curriculum may change, subject to the University's annual monitoring and programme review procedures. Details about modules, including specific learning outcomes, are available from the module descriptors.

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Postgraduate Certificate

Students study CFS7025-B, CFS7029-B and CFS7030-B as core modules. .

FHEQ Level	Module Title	Module Type	Credits	Study Period	Module Code
7	Advanced methods in analytical science	Core	20	1	CFS7029-B
7	Research skills, professional development, and commercial awareness	Core	20	1	CFS7025-B
7	Spectroscopy	Core	20	1	CFS7030-B

Students will be eligible to exit with the award of Postgraduate Certificate if they have successfully completed 60 credits and achieved the award learning outcomes.

Postgraduate Diploma

In addition to the requirements for Postgraduate Certificate, students study CFS7022-B as a core module and select **two** other options.

FHEQ Level	Module Title	Module Type	Credits	Study Period	Module Code
7	Research Project – Preparatory Investigations	Core	20	2	CFS7022-B
7	Separation science and mass spectrometry	Option	20	2	CFS7027-B
7	Imaging	Option	20	2	CFS7028-B
7	Materials characterisation	Option	20	2	CFS7018-B
7	Archaeometry	Option	20	2	ARC7035-B

Students will be eligible to exit with the award of Postgraduate Diploma if they have successfully completed at least 120 credits and achieved the award learning outcomes.

Degree of Master

FHEQ Level	Module Title	Module Type	Credits	Study Period	Module Code
7	Research Project – Advanced Investigations	Core	60	3	CFS7023-E

Students will be eligible for the award of Degree of Master if they have successfully completed at least 180 credits and achieved the award learning outcomes.

Learning and Teaching Strategy

A variety of teaching methods appropriate to the learning outcomes of the individual modules are employed throughout the programmes. Learning is developed through use of lectures, laboratories, workshops and directed study. Hands-on laboratory work (wet chemistry, instrumental use, instrument demonstration, software use) is core to this programme. Directed study involves a variety of activities, including directed reading of specified literature, web-based materials (e.g. videos, problem solving) and report writing. These learning and teaching strategies progressively focus on student-centred approaches to learning and will reflect increasing reliance on independent responsibility for learning. In

this way students will develop the attributes needed for life-long learning and continued professional development.

Assessment Strategy

A range of assessments are used in these programmes: Formative assessments are used throughout the programme (e.g. extensive use of E-learning, on-line, diagnostic testing and pre-module preparation materials). These are used to inform staff of the student background knowledge in advance of course and direct students towards relevant information to help prepare for study.

Summative assessments include formal examinations, coursework (short and long problem-solving questions, laboratory reports, research design), oral and poster presentations, and the MSc dissertation includes the preparation of a scientific paper thus increasing research output and aiding careers in research.

Learning outcomes LO 3, 7, 10 and 12 will be developed through a series of lectures, laboratories, workshops and directed study in 'Advanced methods in Analytical Science' and will be assessed through coursework and formal exams.

Learning outcomes LO 1, 2, 3, 7, 8, 9 and 12 will be developed through a series of specialist instrumental modules (including; Imaging, Spectroscopy, Separation Science and Mass Spectrometry) run as lectures and workshops/laboratory sessions. These module outcomes will be assessed by a laboratory report based on data obtained during a supervised instrumental session and formal exam. Learning outcomes LO 4-7, 11-12 will be developed through the module 'Research Skills, Professional Development, and Commercial Awareness' and assessed by coursework involving preparation of a project plan, training plan, and evidence of reflective practice.

Learning outcomes LO 13-16 and 17-20 will be developed through supervised research and assessed through the Research Project – Preparatory Investigations (20 credits) and Research Project – Advanced Investigations (60 credits). These will be assessed through the preparation of a dissertation, a journal publication and an oral presentation covering the research project.

A more detailed description of the way that learning is related to assessment in the modules that make up this programme can be found in the module descriptors.

Assessment Regulations

This Programme conforms to the standard University Postgraduate Assessment Regulations which are available at https://www.bradford.ac.uk/regulations

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.

Applicants for the MSc in Analytical Sciences will be expected to have completed (or be due to complete) a degree in Chemistry, or a closely related discipline, or have substantive equivalent experience. The degree should be a 1st or 2:1 BSc in a science subject (e.g. Biosciences, Pharmaceutical Science, Chemistry, Forensic Science, Geology, Environmental Science, Archaeological Science). Applicants who have a 2:2 in a science subject with significant analytical chemistry content will also be considered.

Admission onto the programmes will be on an individual basis for overseas students, at an equivalent level to UK entry requirements, on the advice of Student Registry.

For students whose first language is not English a minimum International English Language Testing System (IELTS) score at 6.0, with no sub-test less than 5.0, or the equivalent score in another recognised English language test.

Admissions are made on the basis of a completed application form, references, official transcripts, or a list of courses/modules and grades/marks stamped by the applicant's undergraduate department or student registry. These documents are therefore required of all applicants.

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	Specification reformatted and made accessible.	November 2020
3	CFS7026-B Solid Analysis added to Sem 1	June 2021
4	Annual changes for 2021 academic year	June 2021
5	CFS7026-B removed and CFS7030-B made core in line with RSC accreditation requirement	Feb 2022
6	Annual changes for 2022 academic year	March 2022