

## MSc Physiology and Molecular Biology Programme Specification

Academic Year:	2023/24
Degree Awarding Body:	University of Bradford
Final and interim award(s):	[Framework for Higher Education Qualifications (FHEQ) level 7]  Master of Science  Postgraduate Diploma  Postgraduate Certificate
Programme duration:	1 year full time
Date last confirmed and/or minor modification approved by Faculty Board	February 2023

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

Physiology and Molecular Biology is the study of the biomolecules, cells, organs and organ systems that constitute a living organism or system. This involves an understanding of the molecular and cellular mechanisms involved in cell-to-cell communication that permit the coordinated function of multiple organ systems necessary to maintain the homeostatic control required for a healthy state. Consequently, an understanding of the normal physiological mechanisms, during a healthy state, is essential before gaining insights into the pathophysiological abnormalities that underlie diseased states. Medical treatment of human and animal diseases therefore requires knowledge of a multiplicity of mechanisms, from the molecular level to the level of the whole organism.

The MSc Physiology and Molecular Biology programme at Bradford has been designed to equip students with the scientific knowledge and the practical skills necessary to enter the employment market in a number of specialist fields, both in the public and the private sectors, and in environments aimed at improving human health across the world in the 21st century.

Graduates specialised in Physiology and Molecular Biology are currently in high demand in employment industries allied to hospitals, universities, healthcare, and diagnostics laboratories, as well as those affiliated to government and other institutions.

The MSc Physiology and Molecular Biology programme at Bradford is focused on the pathophysiology of human disease, particularly at the molecular and cellular levels. Topics that form part of the curriculum include diseased states such as Alzheimer's disease, obesity, diabetes, hypertension, heart failure and renal failure, as well as neuroendocrine disorders associated with reproduction, growth and development. Systems that are studied include neuroendocrine regulation of hormone synthesis and release, including positive and negative feedback mechanisms that maintain homeostasis, particularly in relation to biological timekeeping, energy metabolism, fluid homeostasis, reproduction, growth and development and cognitive function. In the second semester, the focus is on the theoretical knowledge relating to the function of the cardiovascular, respiratory and renal systems, as well as mechanisms involved in normal and arthritic articular joints. Knowledge of the pathophysiological mechanisms during normal and diseased states is coupled to providing a systematic understanding of the rationale employed in developing and providing pharmacological intervention for clinical therapy.

An important feature of the Physiology and Molecular Biology programme is the opportunity to gain practical experience in a wide range of experimental techniques in a progressive and cumulative manner throughout the academic year. The practical training is delivered alongside the theoretical content to provide the contextual relevance to the specific laboratory sessions and workshops. Both the taught and the practical elements of the course are delivered in an environment of current hypotheses rather than certainty, and thus highlight the nature of the natural variation encountered in new empirical data generated in a broad range of healthcare scenarios in different international settings.

A key component of the programme is the laboratory research project that occupies most of the second half of the academic year. The start of the research project is prefaced with a generic training period that incorporates a range of key transferrable skills such as literature searching, health and safety training and project planning. The research project itself offers an extended period of specialist training in research methods and experimental design. This is coupled with training in the use of appropriate statistical methods to enable a detailed analysis of the research data and is followed by guidance on the interpretation and contextualisation of the experimental findings.

## **Programme Aims**

The programme is intended to:

- Develop a systematic understanding of knowledge and critical awareness of selected topics that are of current and future importance to national and international healthcare issues.
- Enhance a conceptual understanding that enables students to critically evaluate current research and advanced scholarship in areas relevant to Physiology and Molecular Biology.

- Develop an understanding of the applications of research techniques to different areas of Physiology and Molecular Biology research that aims to improve health and wellbeing.
- Enable self-direction and originality in tackling and solving problems, and in planning and implementing tasks at a professional or equivalent level.
- Enable critical evaluation of methodologies and, where appropriate, to propose new hypotheses.
- Develop communication of ideas and experimental results, together with appropriate conclusions, to specialist and non-specialist audiences to advance understanding and effective management of existing and future challenges worldwide.
- Advance knowledge and understanding, along with new and transferable skills, requiring the exercise of initiative, personal responsibility and decision-making in complex and unpredictable situations relevant to employment and general healthcare management in hospitals and other organisations.

## Programme Learning Outcomes

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

1. Demonstrate a systematic understanding of current concepts and knowledge and be able to discuss their interpretation and application in key areas of bioscience and healthcare related to Physiology and Molecular Biology.
2. Demonstrate a comprehensive and systematic understanding of the interdisciplinary nature of the approaches required in advancing medical knowledge and understanding of the processes and biological mechanisms.
3. Demonstrate a comprehensive understanding of core experimental competencies relevant to Physiology and Molecular Biology.

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

4. Use detailed literature searching methods and strategies to critically evaluate and critique existing experimental methods currently in use for the investigation of relevant areas of Physiology and Molecular Biology.
5. Demonstrate an understanding of the importance of ethical and practical issues relating to laboratory investigations of living systems in a responsible, safe and ethical manner to ensure that professional judgement is exercised in complex and unpredictable situations.
6. Demonstrate application of professional standards of Health and Safety Policies, Good Laboratory Practice and Control of Substances Hazardous to Health to ensure competency at using equipment, experimental methods and procedures appropriate to Physiology and Molecular Biology.

7. Prepare, process and interpret data, using advanced qualitative and quantitative techniques, statistical programmes, spreadsheets and programmes for presenting data visually.
8. Communicate effectively to specialists and non-specialists.
9. Plan, design and undertake a significant research project autonomously, which may involve primary or secondary data (for example from a survey database).
10. Report the findings in an interim project report or a scientific publication.

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

11. Suggest new hypotheses to explore new and novel lines of inquiry at a high scholarly level.
12. Demonstrate self-direction, originality and capability in executing new investigations in the form of a substantial research project based on experimental knowledge and skills relevant to Physiology and Molecular Biology and communicate the findings in a final Project Report, Dissertation or scientific publication.

## Curriculum

FHEQ Level	Module Title	Type	Credits	Semester	Module Code
7	Molecular and Cell Biology	Core	20	1	BIS7020-B
7	Neuroendocrine Basis of Regulation and Metabolism	Core	20	1	BIS7021-B
7	Practical Skills in Research	Core	20	1	LIS7018-B
7	Research Project Preparation and Plan	Core	20	2	BIS7022-B
7	Practical Molecular Biology	Core	20	2	BIS7027-B
7	Pathophysiological Basis of Chronic Disease	Core	20	2	BIS7024-B
7	Research Project	Core	60	3	BIS7026-E

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.

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.

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 wide variety of teaching methods, appropriate to the learning outcomes of the individual modules, are employed throughout the programme, and are supported by formative assessment where possible. The teaching methods are designed to encourage students to take increasing responsibility for their own learning as they progress through the course. In this way students are expected to develop the key attributes needed for life-long learning and continued professional development. Students are also supported by a designated Personal Academic Tutor to help them get the most from their studies throughout the academic year and facilitate their personal and professional development, including career aspiration.

The programme content is taught using conventional teaching methods that include lectures, seminars, tutorials, laboratory classes, workshops and a research project. In addition, independent self-directed or problem-based learning may include interactive research case studies, peer and collaborative sessions, reflective practice and portfolio building. These may be supplemented with interactions with science professionals and tasks that are either work-based or linked to other placements.

## Assessment Strategy

Assessments use a combination of unseen written examinations and a wide range of coursework elements such as laboratory reports, essays, online and computer-based assessments, data interpretation and analysis. This is also supplemented with assessment of communication skills in oral and poster communications during peer-reviewed and collaborative sessions. Together, these strategies are designed to evaluate a broad range of skills including the abilities to:

- Access and evaluate scientific information from a variety of sources and comprehend biological phenomena at different organisational levels (from molecules through to organism systems).
- Communicate the underlying principles and methodologies, both orally and in writing, in a way that is organised and topical, and also recognises the limits of the current state of knowledge.
- Demonstrate appropriate practical techniques and skills relevant to Physiology and Molecular Biology; including data collection, analysis and interpretation of those data, and testing of hypotheses in a context that can be used to suggest new lines of future investigation.
- Execute and present an independent piece of hypothesis-driven work within a supported framework in which qualities such as time management, problem solving, and independence are evident.

These skills and abilities are assessed in a subject-specific manner to establish an understanding of the major biological processes at the cellular, molecular and the whole organism levels, with a particular emphasis on the structure, arrangement, expression, and regulation of genes to explain how the principles of genetics that control gene expression underlie the basis of molecular biology, together with an ability to devise and evaluate

suitable and relevant experimental methods for the investigation of relevant areas of Physiology and Molecular Biology.

For example, the overarching programme design requires the successful completion of the key assessments associated with the core modules (e.g. LIS7018-B and BIS7022-B) that are designed to prepare students for an increasing level of autonomy and independence required to demonstrate the application of advanced research skills during the Research Project (BIS7026-E) and to demonstrate the achievement of skills described in PLO7 to PLO12 to develop independent researchers for the future.

Reassessment of any failed components of assessment will be carried out using a format that is similar to that of the original assessment. If, however, this is not possible, an alternative format may be used to examine the same Learning Outcomes e.g. items of assessment that need to be undertaken on an individual basis rather than as group work.

## 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. Applications are welcome from students with non-standard qualifications with significant relevant experience.

The standard entry requirements for the programme are as follows:

Normally, you would be expected to have gained an Honours degree in an appropriate biological sciences discipline with a minimum of a 2:2 or a similar qualification.

For students from outside of the UK/EU you will be required to meet the current visa and entry requirements for study in the UK, and if your first language is not English you must also satisfy the University that you meet the International English Language Testing Service (IELTS) overall band of 6.0 with a minimum of 5.5 in all elements.

We are continually reviewing and developing our practices and policies to make the University more inclusive, but if you are disabled we may need to make some adjustments to make sure that you are not disadvantaged. We would advise you to contact the Programme Leader before you apply to discuss these.

## Recognition of Prior Learning

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)
1	Updates to incorporate January intake	December 2020
2	Specification reformatted and made accessible	February 2021
3	Optional modules replaced with new core module BIS7027-B	June 2021
4	Annual changes for 2021 academic year	June 2021
5	Annual changes for 2022 academic year	March 2022