

Molecular Biotechnology MSc

The programme aims to provide students with training and learning opportunities in the skills and specialised knowledge needed to equip them for a career in biotechnology, molecular biotechnology or molecular biology, in particular in industry.

Practical skills will include sessions on fermentation, molecular biology, immunology, cell biology and protein chemistry, and you will go on to complete a major, supervised laboratory or computer-based research project.

[Study here and find out why the University of Birmingham was awarded The Times and The Sunday Times University of the Year 2013-14](http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx)
(<http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx>)

Course fact file

Type of Course: Taught

Study Options: Full time

Duration: 1 year

Start date: September

Contact

Postgraduate Admissions

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School of Biosciences ([/schools/biosciences/index.aspx](http://schools/biosciences/index.aspx))

Details

The programme aims to provide students with training and learning opportunities in the skills and specialised knowledge needed to equip them for a career in biotechnology, molecular biotechnology or molecular biology, in particular in industry.



“ It is difficult not to be influenced by such a great learning atmosphere and this is certainly one of the reasons I wanted to study abroad. ”

Dongni Li, China
MSc Molecular Biotechnology

[/schools/biosciences/our-students/dongni-li.aspx](http://schools/biosciences/our-students/dongni-li.aspx)

Programme content

Modules (all core) are as follows:

- Introduction to Molecular Biotechnology (10 credits)
- Research Techniques in Molecular Biotechnology (20 credits)
- Practical Applications of Molecular Biotechnology (20 credits)
- Functional Genomics and Reverse Genetics (20 credits)

- Gene Expression Analysis (20 credits)
- Funding Science (10 credits)
- From Bench to Market: The Development of Pharmaceutical Products (10 credits)
- Therapeutic Biologicals (10 credits)
- Research project (60 credits)

Module descriptions can be found here (<http://www.birmingham.ac.uk/postgraduate/courses/taught/biosciences/molecular-biotechnology.aspx?OpenSection=Modules>)

Learning and teaching is via lectures, workshops, independent study, laboratory practicals, research and a lab-based project.

Skills gained

Transferable skills gained via this programme will include written and oral presentation skills, statistics, and the ability to plan and write a grant application or a business plan. Subject-specific skills will include key techniques used in molecular biotechnology, specialist knowledge in theoretical and practical aspects of the subject, including: process engineering, molecular biology, functional genomics, 'omics' technologies, protein expression systems and antibody engineering. Practical skills will include fermentation, molecular biology, immunology, cell biology and protein chemistry.

Careers

While many graduates will go on to employment in biotechnology companies, you will also be employable in other life sciences industries or able to go on to further study and research.

Related links

School of Biosciences website: www.birmingham.ac.uk/biosciences (<http://www.birmingham.ac.uk/schools/biosciences/index.aspx>)

Why study this course

“ Dr Pete Lund, Programme Leader, MSc Molecular Biotechnology

“Biotechnology is likely to be one of the major growth areas in applied science in the 21st century, as societies and economies adapt to the many challenges

ahead.

Graduates trained both in the practical skills and the relevant life sciences are likely to be highly sought after by many industries in the life sciences sector, and the aim of this MSc is to produce such graduates."

Key features of this programme:

- Focuses on the molecular and cellular aspects of biotechnology
- Includes material on fermentation, process and downstream engineering, and business aspects
- A mixture of taught material and lab-based research projects
- Teaching and research at one of the UK's top Schools of Biosciences

Who is this programme aimed at?

- Those looking for a future in a biotechnology or an other life sciences related industry
- Those interested in pursuing a research career in life sciences in industry or academia
- Those returning from industry to obtain higher qualifications

Modules

Module descriptions for MSc in Molecular Biotechnology

Introduction to Biotechnology

Credits: 10

Module organiser: Dr Peter Lund

Semester: 1

Description: This module will teach the practical skills which you require in your lab projects and in a practical modules, revise some areas which some students traditionally find challenging (handling concepts of concentration and dilution), and look in lectures and discussion sessions at the history, development, and current shape of the worldwide biotechnology industry and the employment opportunities within it.

Research Techniques in Molecular Biotechnology

Credits: 20

Module Organiser: Dr Tim Dafforn

Semester: 1 and 2

Description: This module is intended to provide in-depth research training. Sessions are designed to give you an appreciation of, and enhance your knowledge of, modern techniques in molecular and cellular biology, for all of which the University of Birmingham has world-class facilities. Members of staff present details of different techniques, with examples including animal cell culture; high throughput DNA sequencing; cell manipulation, transfection & micro-injection; protein expression and purification; microscopy and cell sorting; circular dichroism, fluorescence & absorbance; reporter gene technology; immunodiagnostics; NMR spectroscopy; mass spectrometry; and X-Ray crystallography. Some sessions will include tours of the laboratories and a chance to work on data generated using the above methods. **Workshops** tackle open-ended research problems using some of the above methods.

Practical Applications of Molecular Biotechnology

Credits: 20

Module Organiser: Prof Jeff Cole

Semester: 1

Description: This continuously assessed practical module will focus on techniques used in molecular biotechnology. The first of two major groups of activities will involve preliminary experiments to learn the basic techniques necessary to prepare fermentation experiments designed to produce a difficult recombinant protein. Then students will work in teams of 4 or 5 to complete a fermentation experiment. They will individually write reports of each group of experiments, the second of which must be presented in the form of a paper suitable for submission to a specified journal. The assessments will be based on all four components, the performance in the laboratory, and the quality of the written reports,

Gene Expression Analysis

Credits: 20

Module Organiser: Professor Zewei Luo

Semester: 1

Description: This module introduces the concepts and methods of genomics, transcriptomics and proteomics, and provides an in depth coverage of their current status. A special emphasis is given to genetical genomics and reconstruction of transcriptional networks, and the analysis and interpretation of micro-array data.

From Bench to Market – the development of pharmaceutical drug products

Credits: 20

Module Organiser: Dr Rachel Bridson (Chemical Engineering)

Semester: 1

Description: The module covers the typical "time-line" of drug product development, Key activities, issues and importance of stages in drug product development: drug discovery, developability, pre-clinical studies, formulation, clinical trials, primary and secondary manufacturing, marketing and post marketing activities, Patents and intellectual property, The regulatory and quality environment of the pharmaceutical industry, and quality by design approaches to pharmaceutical manufacturing.

Therapeutic Biologicals

Credits: 10

Module Organiser: Dr Jon Green

Semester: 2

Description: This module describes the different types of therapeutic biologicals (also known as biopharmaceuticals) used for diagnosis, prevention and treatment of serious and chronic diseases. These molecules are generally large, complex modified proteins derived from living material. The module will cover the production and use of therapeutic monoclonal antibodies, cytokines, hormones, enzymes and vaccines. The production of these molecules, their mode of action and pre-clinical development will be described.

Funding Science

Credits: 10

Module Organiser: Dr Eva Hyde

Semester: 2

Description: In this module you engage in an activity designed to develop your entrepreneurial and business skills in a science context and develop team working skills. A mini-course is held on writing grants and business plans, after which you work in small groups on a topic of your choice for an application. A series of presentations and feedback sessions lead to final presentations where each group presents their proposal or business plan to the other students, who have to provide a written critique of the proposal.

Functional Genomics and Reverse Genetics

Description: This module will explain current methods of exploring and confirming the nature of candidate genes underlying quantitative and major gene traits. It will cover functional genomic and molecular genetic techniques including forward and reverse genetic approaches, gene cloning, functional analysis of genes via knock-out and knock-in technologies, and techniques for analysing protein function within an organism. We will also cover more general topics relevant to modern functional genomics "in practice".

Fees and funding

Standard fees ([/postgraduate/pgt-fees/fees.aspx](#)) apply - This programme is in **Fee Band B** for International Students.

- Home/EU students £5,940 FT (£2,970 PT)
- International students £17,355 FT only

Learn more about [fees and funding](#)

Scholarships and studentships

Several 'Head of College scholarships' of up to £5,000 are available to international (non-EU) students for this course. All applicants are automatically considered for these; there is no need to make a separate application. Scholarships will be awarded on the basis of academic quality. In order to be considered for one of these scholarships, your application must be made by the 30th June 2013. For further details of these and other scholarships, please contact Postgraduate Admissions on +44 (0)121 414 5922 or email: bio-pgtadmissions@contacts.bham.ac.uk (<mailto:bio-pgtadmissions@contacts.bham.ac.uk>).

International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

Find out about [scholarships for international students. \(/International/students/finance/scholarships/index.aspx\)](#)

For further information contact the School directly or get in touch with the **Student Funding Office via the online enquiries system** (<https://universityofbirmingham.service-now.com/ASStudent/>).

Entry requirements

This programme is designed for UK and international graduates who have an appropriate Life Sciences background, with a suitable degree in the Biological Sciences, Biochemistry or Biomedical Sciences. Graduates should have a good Honours degree from a UK university (the minimum requirement is a second-class Honours degree) or the equivalent from outside the UK. Applicants must have studied some molecular biology (including gene cloning) and some genetics as part of their first degree.

Learn more about [entry requirements \(/postgraduate/requirements-pgt/index.aspx\)](#)

International students

Academic requirements

We accept a range of qualifications, our [country pages \(http://www.birmingham.ac.uk/international/students/country/index.aspx\)](#) show you what qualifications we accept from your country.

English language requirements

You can satisfy our English language requirements in two ways:

- by holding an **English language qualification** (<http://www.birmingham.ac.uk/students/requirements/requirements-pg/international/index.aspx>) to the level required for an **Engineering or Science course**
- by taking and successfully completing one of our **English courses for international students** (<http://www.birmingham.ac.uk/students/requirements/requirements-pg/international/english-courses.aspx>)

English to IELTS 6.0 (with no less than 5.5 in any band).

How to apply

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the [How to apply pages \(http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx\)](#)

Apply now (<https://pga.bham.ac.uk/lpages/LESo40.htm>)

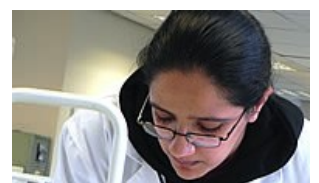
Related links

[Postgraduate opportunities- School of Biosciences \(/schools/biosciences/courses/postgraduate/index.aspx\)](#)

Learning and teaching

The MSc Molecular Biotechnology will provide you with the skills and specialised knowledge required for a career in biotechnology, molecular biotechnology or molecular biology, in particular within an industry setting.

Overall our aim is to equip you with a theoretical and practical background needed to apply your knowledge to biotechnology problems. We focus on key techniques used in molecular biotechnology, including aspects of process engineering, molecular biology, functional genomics, 'omics' technologies, protein expression systems and antibody engineering.



Practical skills will include sessions on fermentation, molecular biology, immunology, cell biology and protein chemistry, and you will go on to complete a major, supervised laboratory or computer-based research project. The course provides the opportunity to develop your writing and presenting skills and you will also study relevant numerical methods, and learn how to plan and write a grant application or a business plan.



Assessment methods

Assessments:

- Project reports and project talks, oral presentations, extended essays, written reports, practical reports
- Class tests on data-handling and data interpretation
- Written grant application or business plan

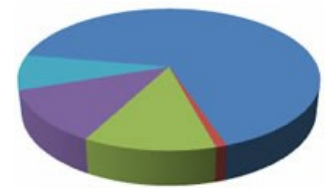
Employability

What can I do with an MSc in Molecular Biotechnology?

Graduates from this programme will be well-placed for future careers in the biotechnology, pharmaceutical, biomedical and other science-based industries, many of which are undergoing a period of rapid international growth.

The programme was designed in consultation with a senior scientist in a global pharmaceutical company, and includes relevant applied elements such as modules on product development and business plans, in addition to those covering the scientific aspects of the subject.

First destinations of University of Birmingham Biosciences graduates six months after graduation



- Paid work
- Paid work & further study
- Further study only
- Looking for work
- Other

Destinations of Leavers of Higher Education report (DHLE) 2009