UNIVERSITY OF BIRMINGHAM

SCHOOL OF BIOSCIENCES

POSTGRADUATE PROGRAMMES IN THE SCHOOL OF BIOSCIENCES

Introduction to the School of Biosciences

Our range of Masters programmes focus on molecular and cellular aspects of biology and build on research strengths within the School of Biosciences. If you decide to join one of our courses, you will become part of a diverse postgraduate community of staff and students. You will have the opportunity to do a research project in one of our state-of-the-art research laboratories and attend seminars given by visitors from other universities.

We offer Taught Masters MSc courses where you will have two terms of lectures and practicals and then do a research project in the summer; these courses suit students who want to learn more about a particular area before they do their research project. The emphasis is different for our Research Masters (MRes) where the taught component is smaller and you start your research during the first term.

CUTTING-EDGE PROGRAMMES

As one of the top biosciences departments in the UK, our research covers the entire spectrum of cutting-edge bioscience. We deliver internationally excellent teaching and research across the broad span of modern biology.

We offer taught MSc courses in the key aspects of biosciences: Microbiology and Infection, Molecular Biotechnology, Toxicology and Bioinformatics. If you are more interested in a research degree we offer MRes programmes in Molecular and Cellular Biology and Molecular and Mechanistic Toxicology, as well as PhD opportunities.

HIGH-TECHNOLOGY FACILITIES

We have extensive high-technology facilities in areas such as functional genomics, proteomics and metabolomics, including a world-class Advanced Mass Spectrometry Facility. Our cutting-edge facilities extend to protein structure determination and analysis, confocal microscopy, drug discovery, structural biology and optical imaging.

The £8 million Phenome Centre Birmingham is a large metabolic phenotyping facility led by internationally recognised metabolomics and clinical experts at the University of Birmingham, in collaboration with Birmingham Health Partners.

The School of Biosciences is a key partner in the BBSRC Midlands Integrative Biosciences Training Partnership (MIBTP), which is a world-class collaborative interdisciplinary doctoral training programme between the Universities of Birmingham, Leicester and Warwick.

POSTGRADUATE COMMUNITY

Our postgraduate students join a diverse international community of staff and students. The annual Biosciences Graduate Research Symposium, organised by PhD students, features two days of research talks by students and is an event where the whole School comes together to talk about science.

We are home to the Institute of Microbiology and Infection and part of the University's Systems Science for Health initiative.

CONTENTS

PIONEERING RESEARCH

We are ranked sixth in the Russell Group in the Research Excellence Framework 2014 (REF 2014). We combine our discipline expertise with those across the wider University to address the most significant global challenges in the life sciences. Our research focuses on a number of important themes that run through modern biological and biochemical research: Biosystems and Environmental Change; Microbiology and Infection; Molecular Cell Biology and Signalling; and Plant Genetics and Cell Biology.

The Institute of Microbiology and Infection brings together one of the largest groupings of microbiologists in the world. We are at the vanguard of innovative research into combating antimicrobial and antibiotic resistance and have technical expertise in next-generation sequencing, genomics, proteomics, molecular and structural biology, biotechnology and modelling. Amongst many highlights, we have been at the forefront of monitoring the Ebola and Zika outbreaks and developed vaccines and drugs for TB. We are world leaders in bacterial genetics and research into antibiotic resistance, and the applications of microbes to biotechnology.

For more information please visit **www.birmingham.ac.uk/pg-biosciences**


Carl Zeiss
ZEISS

Microbiology and Infection

MSc

FACT FILE

Start date: September
Duration: 1 year full-time, 2 years part-time
Study mode: On campus
Fees for 2018/19: UK/EU – £9,270 full-time, £4,635 part-time; International – £20,610
Entry requirements: Good UK Honours degree or overseas equivalent in a Biosciences subject including at least 20 credits or equivalent in each of general microbiology and biochemistry and at least 20 credits or equivalent of advanced microbiology in the final year of the degree programme.

Course content

This course provides graduates in the biosciences with sound theoretical and hands-on laboratory experience in cutting-edge microbiology. Students will gain specialist knowledge and insight in key aspects of bacterial infection.

The course is set within the context of the Institute of Microbiology and Infection at the University of Birmingham, the largest grouping of microbiologists in the UK, which brings together experts in areas of microbiology from fundamental science of model organisms to translational research on key pathogens of medical and veterinary importance.

The course will enable you to develop basic abilities and skills on which to build professional capability in a healthcare or related microbiology or biomedical research setting. It will provide you with a foundation in the fundamental molecular microbiology that underlies understanding of infectious disease in healthcare, diagnosis and treatment.

Hands-on laboratory experience will allow you to develop your experimental skills and give you experience of handling a range of microorganisms. You will have the opportunity to carry out a research project based in one of the research laboratories at the University.

Modules

The course consists of six taught modules and a research project.

- Core Concepts and Skills in Microbiology
- Medical Microbiology Practice and Applications
- Antibiotics: Past, Present and Future
- Host-Pathogen Interactions
- Antibiotics, Microbial Surfaces and Surface Interactions
- Omics of Pathogens

www.birmingham.ac.uk/mi-mods

Assessment

In-course assessments are varied in format, to include written assignments such as essays, assessed laboratory notebooks and reports, and group work.

Some modules also include class tests or end of module examinations. Formative assessments are incorporated into the course so that you feel well prepared for the summative ones. The project will be assessed by a combination of a substantial written report, assessment of your performance in the laboratory and an oral presentation at the end of the project.

Fees and funding

A variety of scholarships are available. Please consult the University's postgraduate funding database www.birmingham.ac.uk/pgfunding

LEARN MORE

School of Biosciences
Postgraduate Admissions
Email: bio-pgtadmissions@contacts.bham.ac.uk
Tel: +44 (0)121 414 5476
www.birmingham.ac.uk/msc-mi

CAREERS

The course will give you a thorough grounding in this important and topical area of biomedical science, enabling your entry into employment in health-related positions including hospital and public health laboratories, industry (biotechnology, pharmaceutical and other sectors) and regulatory or quality assurance functions in the public sector or industry. It will also prepare you to work in an academic research setting, studying for a PhD as the next stepon a research-based career path.

Molecular Biotechnology

MSc

FACT FILE

Start date: September
Duration: 1 year full-time
Study mode: On campus
Fees for 2018/19: UK/EU – £9,270 full-time, £4,635 part-time; International – £20,610
Entry requirements: Good UK Honours degree or overseas equivalent in a Biosciences subject including at least 40 credits or equivalent of appropriate molecular biology (including gene cloning) and some genetics as part of your first degree.

Course content

This programme provides you with training in the skills and specialised knowledge needed to equip you for a career in molecular biotechnology in industry or academia. The course has been designed in consultation with experts in biotechnology industries.

We focus on key relevant techniques including molecular biology, functional genomics and other 'omics' technologies, protein expression, and antibody engineering. Practical sessions cover fermentation and molecular biology methods, and a key part of the programme is to complete a major supervised laboratory or computer-based research project.

CAREERS

The programme is aimed at those looking for a future in biotechnology or other life science industries, or those interested in pursuing a research career in life sciences, industry or academia. It is also suitable for those returning from industry to obtain higher qualifications.

The course provides the opportunity to develop your writing and presenting skills. You will also study relevant statistical methods and learn how to produce a grant application or a business plan.

Modules

The course consists of seven taught modules and a research project.

- Introduction to Molecular Biotechnology
- Research Techniques in Molecular Biotechnology
- Practical Applications of Molecular Biotechnology
- Functional Genomics and Reverse Genetics
- Gene Expression Analysis
- Funding Science
- Pharmaceuticals and Therapeutic Biologicals from Bench to Market

www.birmingham.ac.uk/mb-mods

Assessment

A variety of assessment methods are used, including laboratory and literature report preparation and writing, oral presentations and standard examinations.

Fees and funding

A variety of scholarships are available. Please consult the University's postgraduate funding database www.birmingham.ac.uk/pgfunding

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www.birmingham.ac.uk/msc-mb

Molecular and Cellular Biology

MRes

FACT FILE

Start date: September
Duration: 1 year full-time
Study mode: On campus
Fees for 2018/19: UK/EU – £6,570
International – £20,280
Entry requirements: A BSc Honours degree in the Life Sciences (Biosciences, Medical Sciences) with at least a good 2:1 grade and laboratory experience or an equivalent degree in a related discipline accompanied by relevant molecular biology research experience, eg, a substantial undergraduate research project and/or work/internship in a research laboratory.

Course content

The one-year MRes course is designed to provide training in both practical and theoretical experimental procedures. The course is centred on two approximately 17-week research projects, which will provide a wide range of training in scientific methods. Each project will be carried out in a research group in the University. The projects are complemented by two taught modules devoted to research techniques and funding science. These are taught through lectures, seminars and tutorials plus considerable student-centred learning activities.

In this course, we provide professional training in the principles, analytical methods and interpretive skills that are necessary to explore biological systems at the cellular and molecular level. This will include training in a wide range of state-of-the-art techniques. Students will also gain transferable skills in communication, including both oral and written presentation. The course will focus on integrating skills in biological sciences such that students can solve real-world research problems, equipping them to progress onto research careers.

The course will provide students with:

- Hands-on experience of a range of molecular and cellular biological techniques
- A systematic understanding of scientific method
- An understanding of how science is funded in academia and industry
- Skills in interpreting, reporting and presenting analyses of data
- Aptitude for studying a more advanced degree

Assessment

The two taught modules are assessed via examination, essays and oral presentations. The two research projects are assessed via a written thesis that is externally examined.

Fees and funding

A variety of scholarships are available. Please consult the University's postgraduate funding database www.birmingham.ac.uk/pgfunding

CAREERS

There is a great demand for people with training in these areas in industry and in research organisations. Graduates from the course will have the skills to enter careers in areas as diverse as medical science, pharmaceuticals, animal, plant and microbial improvement, as well as industries such as pharmaceutical, insurance, biotech, and consultancy. Graduates of this course will readily find opportunities to progress to PhD training in a wide range of related subjects, and this seems to be the most popular destination for our students. They are also well equipped with professional knowledge and skills to be employed as research and teaching assistants in universities and research institutions, in areas such as medical and pharmaceutical science and biosciences.

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School of Biosciences
Postgraduate Admissions
Email: biosciences-phd@contacts.bham.ac.uk
Tel: +44 (0)121 414 5891
www.birmingham.ac.uk/mres-mcb

Toxicology

MSc

FACT FILE

Start date: September
Duration: 1 year full-time, 2 years part-time
Study mode: On campus
Fees for 2018/19: UK/EU – £9,270 full-time, £4,635 part-time; International – £20,610 full-time
Entry requirements: Good UK Honours degree or overseas equivalent in a subject including Biochemistry, Biology, Human Biology, Microbiology, Zoology/Animal Biology, Chemistry, Pharmacology, Pharmacy, Pharmaceutical Science, Physiology, Medicine, Dentistry, Veterinary Science or Medical Science.

Course content

Toxicology relates to many aspects of our lives, and a career in this field promises to provide a variety of opportunities aimed at improving the standard of life and the environment.

Our Toxicology programmes are designed to meet the future needs of the sector, with contributions by international experts from the pharmaceutical industries, contract research companies, government and external toxicology centres.

The School of Biosciences is internationally recognised as a major centre for toxicology, offering integrated research-led teaching within a highly interactive teaching environment. Our industry links include Public Health England, National Poisons Information Service, AstraZeneca, Unilever, NC3Rs, Sequani and the Health and Safety Executive. Opportunities for site visits to toxicological research and development companies, and research projects at the University or other organisations, provide specialist applied experience and networking opportunities.

The MSc Toxicology programme provides training in theoretical, clinical and laboratory aspects of toxicology and acts as a conversion course, taking students from a variety of backgrounds and giving them new skills to enable them to move into research and employment in the field of toxicology and related disciplines.

Modules

The course consists of a research project, and taught modules including:

- Metabolism and Mechanisms of Toxicity
- Forensic, Clinical and Occupational Toxicology
- Assessing Toxic Potential
- Regulatory Science and Toxicology for the 21st Century
- Practical and Skills Module for MSc Toxicology

www.birmingham.ac.uk/tox-mods

Assessment

The taught components of the programme are assessed by a combination of examinations and coursework including essays, practical reports, data handling and computer workshops and the research project is assessed by a written report, laboratory performance and a short oral viva.

Fees and funding

A variety of scholarships are available. Please consult the University's postgraduate funding database www.birmingham.ac.uk/pgfunding

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Tel: +44 (0)121 414 5476
www.birmingham.ac.uk/msc-tox

CAREERS

The success rate of students on the MSc in Toxicology programme is approximately 95% and the career opportunities are excellent. Even in times of economic hardship, toxicology remains a necessary and important area for funding. The current concern over environmental safety adds to these opportunities.

Those completing the programme in recent years have been employed, for example, in:

- The pharmaceutical industries
- Contract research laboratories
- Government bodies such as the Health and Safety Executive, Health Protection Agency, Food Standards Agency
- NHS Poisons Units
- Water research establishments in pollution control
- Hospital and research laboratories

Molecular Mechanistic Toxicology

MRes

FACT FILE

Start date: September
Duration: 1 year full-time
Study mode: On campus
Fees for 2018/19: UK/EU – £4,270
International – £20,280
Entry requirements: At least a 2:1 Honours degree with a substantial component of molecular biology.

Course content

A developing area of toxicology is the use of molecular and cell biology methods to understand chemical toxicity. This is of fundamental scientific interest and also relates the need for a mechanistic component in chemical risk assessment and development of high-throughput screens for chemical toxicity.

This course provides a research-orientated extension of molecular biology into the subject of molecular mechanistic toxicology.

The School of Biosciences is internationally recognised as a major centre for toxicology, offering integrated research-led teaching within a highly interactive teaching environment. Molecular Toxicology is a major component of the School of Biosciences research activities along with interactions with other departments including Chemistry and the Medical School.

Modules

The course consists of two five-week taught modules taught in Semester 1 in conjunction with the taught MSc Toxicology programme. This is followed by a six-month research project, which provides students with an opportunity for further advanced research training and hands-on experience of molecular and cellular biology techniques embedded in a research laboratory.

Semester 1

- Module 1 Metabolism and Mechanisms of Toxicity
- Module 2 Forensic, Clinical and Occupational Toxicology
- Skills Module

Semester 2

- Laboratory research project

Assessment

You will be taught through a combination of lectures, tutorials, coursework, practical classes, student seminars and placement in a research laboratory. The taught component is assessed by a combination of examinations and coursework. The dissertation component is assessed by preparation of a research thesis.

Fees and funding

A variety of scholarships are available. Please consult the University's postgraduate funding database www.birmingham.ac.uk/pgfunding

CAREERS

After completing the course you will have gained a detailed knowledge of the molecular mechanisms of chemical toxicity (eg, polymorphisms and metabolism, genotoxic and non-genotoxic carcinogens, mechanisms of apoptosis, cDNA microarray and other high throughput screening strategies).

You will also be able to critically evaluate and interpret available scientific literature, and effectively present the results of your research to peers using both written reports and oral communications.

The programme will help you to develop laboratory skills and enable you to effectively interact in a research laboratory setting. Careers include PhD study and employment as research scientists in an industry/clinical/local government setting.

LEARN MORE

School of Biosciences
Graduate Research School
Email: **biosciences-phd@contacts.bham.ac.uk**
Tel: +44 (0)121 414 5891
www.birmingham.ac.uk/mres-mmt

Bioinformatics

MSc/PGDip/Certificate

FACT FILE

Start date: September
Duration: 1 year full-time, 2 years part-time
Study mode: On campus
Fees for 2018/19: UK/EU – £9,000 full-time, £4,500 part-time; International – £20,610 full-time, Diploma UK/EU – £6,000 full-time, £3,000 part-time; International – £16,290; Certificate: UK/EU – £3,000 full-time and part-time; International £6,870
Entry requirements: Good UK Honours degree or overseas equivalent in a subject including Biochemistry, Biology, Human Biology, Microbiology, Zoology/Animal Biology, Chemistry, Pharmacology, Pharmacy, Pharmaceutical Science, Physiology, Medicine, Dentistry, Veterinary Science or Medical Science.

Course content

This course will place you at the forefront of the recent genomics and bioinformatics revolution now driving precision medicine. This cross-college, interdisciplinary programme, draws on expertise from a range of academic staff working within the College of Medical and Dental Science and the College of Life and Environmental Sciences, with access to the University of Birmingham's cutting-edge facilities.

Bioinformatics is one of the fastest-growing fields in industry and academia, and demand for people with these skills far outstrips supply; making our graduates highly employable and sought after.

You will learn from lead researchers in the field, with opportunities to expand your foundational understanding of human genome biology by working with health science experts in the West Midlands Genomic Medicine Centre, University Hospital Birmingham, a major contributor to the 100,000 Genomes Project.

You will explore the frontiers of bioscience, from precision medicine to precision agriculture, and emerging fields, including molecular ecosystems biology and topological data analysis. You will also learn how to analyse predominant 'omics data-types – including next generation sequencing, mass spectrometry, emerging single molecule techniques, genome engineering, imaging and integrative analysis toolsets to enable science at the intersection of these and other measurement modalities. You will also gain a foundation in statistical machine learning to prepare for a career in the information sciences.

Modules

This course is composed of five taught modules, one group project and one independent project. Beginning with a fast-paced introduction to essential capabilities, the taught modules prepare you with vital foundational knowledge. You will develop skills in statistics, computer programming and molecular biology, enabling you to understand and participate in the ongoing revolution in biological data science.
Core modules include:

- Essentials of Biology, Mathematics and Statistics
- Genomics and Next Generation Sequencing
- Data Analytics and Statistical
- Machine Learning
- Metabolomics and Advanced (omics) Technologies
- Computational Biology for Complex Systems
- Interdisciplinary Bioinformatics Group Project
- Interdisciplinary Bioinformatics Individual Project

Learning and teaching environment

With access to world-leading academics and researchers, you will be challenged and encouraged to become independent and self-motivated learners. You will be based in the Centre for Computational Biology (CCB). The CCB provides an opportunity to combine many of the field's components, from both development and application. The Centre is a hub for cross-college collaborative research, teaching and shared resources; linking the Colleges of Medical and Dental Sciences, Life and Environmental Sciences, and Engineering and Physical Sciences.

Teaching is located in the CCB and you will have opportunities to interact with postdoctoral bioinformaticians currently working at the University of Birmingham; sharing their experience, knowledge and passion for this field.

The CCB boasts dedicated teaching rooms, equipped with advanced multimedia technology. Throughout your time with us you will be taught using a variety of methods; lectures, seminars, practical workshops, as well as group and individual projects. We emphasise effective communication, and progressively train you to present in written and oral forms.

LEARN MORE

Programme Administrator
Email: bioinformatics@contacts.bham.ac.uk
www.birmingham.ac.uk/ccb

Where will Biosciences take you?

Our graduates are well placed for careers in pharmaceutical companies, environmental consulting, research and development, as well as health-related careers in hospitals, research or public health laboratories, or in secondary or higher education. Examples of popular job titles include toxicologist, research scientist, project manager and information scientist/manager.

Our graduates are employed by companies including National Poisons Information Service, AstraZeneca, Unilever, Birmingham Women's NHS Foundation Trust, Health Protection Agency and Syngenta. Our programmes are also ideal preparation for working in a research setting, perhaps studying for a PhD as the next step on a research-based career path.

EXAMPLES OF RECENT EMPLOYERS

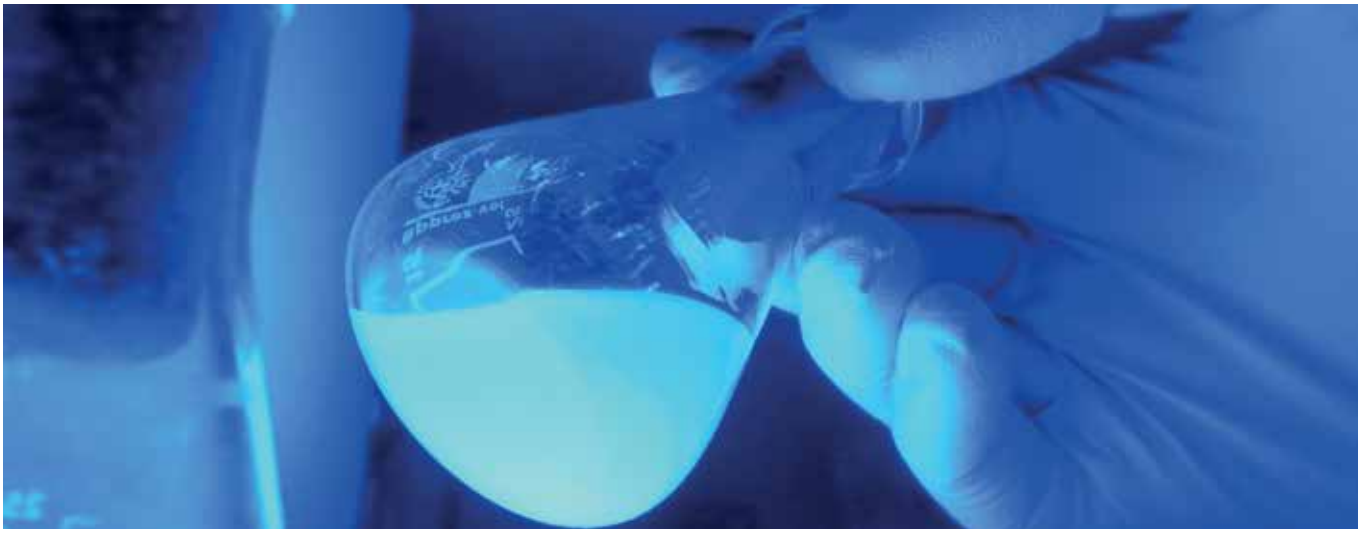
- Campden Bri
- Covance
- Cyprotex
- Dow Agrosciences
- IBM
- Ministry Of Health
- Network Rail
- Northamptonshire Healthcare NHS Foundation Trust
- Oxford Biomedica
- Sanofi Aventis
- The Binding Site

EXAMPLES OF RECENT JOB TITLES

- Biomedical Scientist
- Data Analyst
- Laboratory Assistant
- Biotechnologist
- Medical Writer
- Research Associate
- Medication Safety Officer
- Research Technician
- Microscopist
- Microbiologist

EXAMPLES OF FURTHER STUDY

- PhD
- Graduate Entry to Medicine
- Secondary Science Chemistry Specialism
- European Registered Toxicologist status



This leaflet was written several months in advance of the start of the academic year. It is intended to provide prospective students with a general picture of the programmes and courses offered by the School. Please note that not all programmes or all courses are offered every year. Also, because our research is constantly exploring new areas and directions of study some courses may be discontinued and new ones offered in their place.

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